From: Machtans, Craig (EC)
To: Ellis, Mitch; Damberg, Doug
Subject: letters
Date: Thursday, November 9, 2017 1:56:40 PM
Attachments: AMB Letter House NR Cttee - Artic Refuge 27Oct2017.pdf
10.31.17 - Delegation Letter to Canadian Ambassador.pdf
McLeod - October 19, 2017.pdf
ArcticRefuge.pdf

For your reading pleasure. Our ambassador sent the letter to several different folks, this is one example. And the response from the AK delegation. Also included is the one pager being distributed by our Embassy. Finally, you can see some letters send out to Senators by a member of parliament from the NWT (links inside the pdf lead to the individual letters). The Yukon premier, Yukon member of parliament (federal), and Yukon Environment Minister have all made public statements against opening ANWR lately.

Craig Machtans

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Gestionnaire, Région du Nord (Whitehorse), Service canadien de la faune
Environnement et Changement climatique Canada / Gouvernement du Canada
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Canadian Embassy



Ambassade du Canada

27 October 2017

The Honorable Paul Ryan
Speaker
U.S. House of Representatives
Washington, DC 20515-4901

The Honorable Robert W. Bishop
U.S. House of Representatives
123 Cannon House Office Building
Washington, DC 20515-4401

The Honorable Nancy Pelosi
Minority Leader
U.S. House of Representatives
Washington, DC 20515-0512

The Honorable Raul M. Grijalva
U.S. House of Representatives
1511 Longworth House Office Building
Washington, DC 20515-0303

Dear Representatives Ryan, Pelosi, Bishop and Grijalva,

Given the recent passage of the FY 2018 Budget Resolution and its instructions to the Senate Energy and Natural Resources Committee, I ask you to oppose any efforts to use these instructions to open the Arctic National Wildlife Refuge to development.

In *the 1987 Agreement Between the Government of Canada and the Government of the United States of America on the Conservation of the Porcupine Caribou Herd*, our two governments committed to conserve the Porcupine Caribou Herd and its habitat across its entire migration path. Notably, the treaty specifically recognizes the importance of conserving calving habitat, like the Arctic Coastal Plain, which is essential for birthing the next generations of caribou, thus sustaining the herd and those who depend upon it. The treaty compels us to cooperate so that the risks of irreversible damage or long-term adverse effects are minimized.

The Coastal Plain in the Refuge is the most important habitat to the Porcupine Caribou. When adult females reach the area to calve, they are physically depleted and least tolerant to human disturbance. The Refuge provides high quality food and reduced predation pressure, allowing for successful calving and survival. Peer-reviewed scientific research anticipates lower calf survival as a result of development in the Coastal Plain. Lowered calf and female survival leads directly to herd declines.

The Gwich'in First Nations throughout Alaska, Yukon and the Northwest Territories depend on the herd for their livelihood and culture. The Government of Canada respects the needs of its indigenous communities and has worked with the First Nations and the territories to establish

protected areas in key habitat areas, including the two resource-rich national parks along the Alaska-Yukon border.

Given the critical habitat these lands represent, the dependence of the indigenous peoples on the healthy herd, and the binational commitments of our two nations to protect the herd and its habitat, the Government of Canada calls for maintaining the current restrictions on development within the critical Coastal Plain.

Sincerely,

David MacNaughton
Ambassador

c.c. All members of the House Natural Resources Committee

Congress of the United States
Washington, DC 20515

October 31, 2017

The Honorable David MacNaughton
Ambassador for Canada to the United States
501 Pennsylvania Ave., NW
Washington, D.C. 20001

Dear Ambassador MacNaughton:

We write to express our significant disappointment with the Canadian Embassy's recent communications to the U.S. Senate in opposition to responsible energy development on a small fraction of the Arctic Coastal Plain in northeast Alaska.

Your Embassy began by urging Senators to vote for a partisan amendment that aimed to strike an instruction for the Senate Energy and Natural Resources Committee from the Fiscal Year 2018 budget resolution. You next sent a letter to committee members and Senate leadership opposing responsible development in Alaska's 1002 Area, and apparently intend to follow up by holding a one-sided event at your Embassy next week.

We understand Canada is expressing its views based on concern for its indigenous people, but it is hard to look past the timing and content of these communications. We are even more troubled given Canada's history of exploration on its side of the border and your ongoing dismissal of Alaskans' well-founded concerns related to transboundary mining.

None of us can recall another instance when Canada aggressively lobbied members of the Senate to take a specific action. The timing of your Embassy's first correspondence on this issue, just hours before a key vote, was particularly notable. For example, we are unaware of your predecessor taking a similar action for legislation your government strongly favored to approve the Keystone XL pipeline, which in large part will facilitate the transport of Canadian oil to refineries in the United States.

We respect the commitments made by the U.S. and Canada under a 1987 Agreement to ensure a robust and healthy population of Porcupine caribou, but remind you that it established the appropriate method for consultation between our nations, the International Porcupine Caribou Board. We assure you that if and when development is allowed in a small portion of the 1002 Area, the Board will be appropriately notified and consulted—but neither a vote on an amendment to strike a budget instruction nor legislation moving through Congress to allow for responsible development would actually impact the size of the herd.

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We also take issue with your communications because they ignore the tremendous advances in technology that have been perfected in northern Alaska and Canada's Mackenzie River delta in recent decades. Extended reach directional drilling, the miniaturization of processing facilities, a roughly 80 percent reduction in size in drill pads, the use of ice roads which melt before caribou return in the summer, and seasonal restrictions on exploration and development all guarantee that less than 2,000 surface acres of the Coastal Plain – roughly one-ten-thousandth of the Arctic National Wildlife Refuge – would be developed.

Our experience at the neighboring Prudhoe Bay field is a testament to America's ability to develop its resources while protecting the environment and wildlife. For example, while Alaska's Central Arctic caribou herd numbered 3,000 animals in 1969, it consists of more than 22,000 animals today. We find it very unlikely that this herd would have grown more than seven-fold if caribou were uniquely impacted by carefully controlled energy development.

It is also difficult to understand how developing such a small part of the 1002 Area (which contains an estimated 828,000 acres of land suitable for caribou habitat) will harm the Porcupine herd. We believe this charge is especially curious given Canada's construction of the 417-mile Dempster Highway to Inuvik. That road provided access to Canada's lucrative oil and gas developments in the Mackenzie River valley and crosses the herd's winter habitat. Further, we do not recall the United States objecting to Canada's decision to allow more than 200 oil and gas wells to be drilled in the Yukon Territory, many directly in the path of the migration routes for the herd on its way to Alaska. Nor have we imposed our views on Canadian hunting regulations, which according to the International Porcupine Caribou Board, allowed Canadian hunters to take 2,920 caribou from the herd in 2014.

Ultimately, it is hard not to see Canada's attitude towards the U.S. on this issue as one of "do as we say, not as we do." Despite Canada's attention to caribou in northeast Alaska, we remind you that Canada has repeatedly ignored Alaskans' concerns, including concerns that we have directly expressed to Canadian officials, regarding the development of large-scale hardrock mines in British Columbia that are directly upstream from southeast Alaska's world-class salmon fisheries.

While we support the work being done by the State of Alaska and the Province of British Columbia, Alaskans and their congressional delegation have repeatedly requested consultation and engagement with Canada's federal permitting agencies on transboundary mines. In response, Canada has done remarkably little to consider – let alone be constructive about – our concerns. We would also remind you that while impacts to caribou are hypothetical and inconsistent with the record of development in both Alaska and Canada, the Tulsequah Chief mine has been releasing acid rock drainage and polluting Alaskan waters for more than 50 years. Our concerns were only exacerbated by the tailings pond breach at Mount Polley in 2014, which suggests Canadian mining is not always carried out to the same high safety standards as in the U.S.

As Alaskans, we tend to work closer and have more in common with Canada than any other in delegation in Congress. We hope to work with Canada—and you, as its Ambassador to the United States—on a wide range of issues, ranging from resource development to the potential renegotiation of the North American Free Trade Agreement. If we are to forge a constructive

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working relationship, however, we first urge Canada to be fair in its treatment of our home state of Alaska.



Lisa Murkowski
United States Senator

Dan Sullivan
United States Senator

Don Young
Congressman for All Alaska

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From:	McKenna, Catherine - M.P.
To:	Ministre / Minister (EC)
Subject:	FW: Protecting ANWR
Date:	October 19, 2017 5:12:48 PM
Attachments:	Collins ANWR.pdf Alexander ANWR.pdf Heitkamp ANWR.pdf McCain ANWR.pdf Graham ANWR.pdf Gardner ANWR.pdf Flake ANWR.pdf Heller ANWR.pdf

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From: McLeod, Michael - M.P.
Sent: October 19, 2017 11:59 AM
To: Bennett, Carolyn - M.P.; McKenna, Catherine - M.P.; Carr, Jim - M.P.; Freeland, Chrystia - M.P.; Bagnell, Larry - M.P.
Subject: Protecting ANWR

Good morning,

Please see attached correspondence.

Thank you,

HOUSE OF COMMONS
CHAMBRE DES COMMUNES
CANADA

Hayden Moher
Executive Assistant
Office of Michael McLeod
Member of Parliament for Northwest Territories
Justice Building 04 Ottawa, Ontario K1A 0A6
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Cell : 613-324-2452
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HOUSE OF COMMONS
CHAMBRE DES COMMUNES
CANADA

Michael V. McLeod
Member of Parliament/Député
Northwest Territories/Territoires du Nord-Ouest

October 19, 2017

Susan Collins
Senator for Maine
413 Dirksen Senate Office Building
Washington, D.C. 20510

Dear Senator Collins,

As the Member of Parliament for Northwest Territories, I am writing to you today to express my personal concerns, and the concerns of my constituents, regarding the proposed opening for resource exploration and extraction of the Arctic National Wildlife Refuge (ANWR).

As you may know, the lives of the Gwich'in indigenous peoples, who live in the Northwest Territories, Yukon, and Alaska, are deeply connected to the Porcupine Caribou herd. These caribou calve in the 1002 area of ANWR in Alaska, and the continued protection of this land is paramount to the survival of the herd.

It is my understanding that there is a budget proposal being considered by the United States Senate to open the refuge up for oil and gas development. This will clearly threaten the survival of the Porcupine Caribou, and thus have a truly detrimental effect on the Gwich'in people.

I am asking you to please not support any budgetary measures that will open up ANWR, for the good of our countries, our citizens, and our caribou.

Thank you for your consideration.

Sincerely,

Michael V. McLeod, M.P.
Member of Parliament for Northwest Territories

Ottawa
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Tel/Tél.: 613-992-4587 Fax/Téléc.: 613-992-1586

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0000002788

c.c.: The Honourable Chrystia Freeland, P.C., M.P
Minister of Foreign Affairs

The Honourable Catherine McKenna, P.C., M.P.
Minister of Environment and Climate Change

The Honourable Carolyn Bennett, P.C., M.P.
Minister of Crown-Indigenous Relations and Northern Affairs

The Honourable Jim Carr, P.C., M.P.
Minister of Natural Resources

The Honourable Larry Bagnell, P.C., M.P.
Member of Parliament for Yukon

HOUSE OF COMMONS
CHAMBRE DES COMMUNES
CANADA

Michael V. McLeod
Member of Parliament/Député
Northwest Territories/Territoires du Nord-Ouest

October 19, 2017

Lamar Alexander
Senator for Tennessee
455 Dirksen Senate Office Building
Washington, D.C. 20510

Dear Senator Alexander,

As the Member of Parliament for Northwest Territories, I am writing to you today to express my personal concerns, and the concerns of my constituents, regarding the proposed opening for resource exploration and extraction of the Arctic National Wildlife Refuge (ANWR).

As you may know, the lives of the Gwich'in indigenous peoples, who live in the Northwest Territories, Yukon, and Alaska, are deeply connected to the Porcupine Caribou herd. These caribou calve in the 1002 area of ANWR in Alaska, and the continued protection of this land is paramount to the survival of the herd.

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Thank you for your consideration.

Sincerely,

Michael V. McLeod, M.P.
Member of Parliament for Northwest Territories

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0000002790

c.c.: The Honourable Chrystia Freeland, P.C., M.P
Minister of Foreign Affairs

The Honourable Catherine McKenna, P.C., M.P.
Minister of Environment and Climate Change

The Honourable Carolyn Bennett, P.C., M.P.
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Minister of Natural Resources

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Member of Parliament for Yukon

HOUSE OF COMMONS
CHAMBRE DES COMMUNES
CANADA

Michael V. McLeod
Member of Parliament/Député
Northwest Territories/Territoires du Nord-Ouest

October 19, 2017

Heidi Heitkamp
Senator for North Dakota
516 Hart Senate Office Building
Washington, D.C. 20510

Dear Senator Heitkamp,

As the Member of Parliament for Northwest Territories, I am writing to you today to express my personal concerns, and the concerns of my constituents, regarding the proposed opening for resource exploration and extraction of the Arctic National Wildlife Refuge (ANWR).

As you may know, the lives of the Gwich'in indigenous peoples, who live in the Northwest Territories, Yukon, and Alaska, are deeply connected to the Porcupine Caribou herd. These caribou calve in the 1002 area of ANWR in Alaska, and the continued protection of this land is paramount to the survival of the herd.

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I am asking you to please not support any budgetary measures that will open up ANWR, for the good of our countries, our citizens, and our caribou.

Thank you for your consideration.

Sincerely,

Michael V. McLeod, M.P.
Member of Parliament for Northwest Territories

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c.c.: The Honourable Chrystia Freeland, P.C., M.P
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The Honourable Catherine McKenna, P.C., M.P.
Minister of Environment and Climate Change

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Member of Parliament for Yukon

HOUSE OF COMMONS
CHAMBRE DES COMMUNES
CANADA

Michael V. McLeod
Member of Parliament/Député
Northwest Territories/Territoires du Nord-Ouest

October 19, 2017

John McCain
Senator for Arizona
218 Russell Senate Office Building
Washington, D.C 20510

Dear Senator McCain,

As the Member of Parliament for Northwest Territories, I am writing to you today to express my personal concerns, and the concerns of my constituents, regarding the proposed opening for resource exploration and extraction of the Arctic National Wildlife Refuge (ANWR).

As you may know, the lives of the Gwich'in indigenous peoples, who live in the Northwest Territories, Yukon, and Alaska, are deeply connected to the Porcupine Caribou herd. These caribou calve in the 1002 area of ANWR in Alaska, and the continued protection of this land is paramount to the survival of the herd.

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I am asking you to please not support any budgetary measures that will open up ANWR, for the good of our countries, our citizens, and our caribou.

Thank you for your consideration.

Sincerely,

Michael V. McLeod, M.P.
Member of Parliament for Northwest Territories

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04, Justice Building/Édifice de la Justice, Ottawa, ON K1A 0A6
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0000002794

c.c.: The Honourable Chrystia Freeland, P.C., M.P
Minister of Foreign Affairs

The Honourable Catherine McKenna, P.C., M.P.
Minister of Environment and Climate Change

The Honourable Carolyn Bennett, P.C., M.P.
Minister of Crown-Indigenous Relations and Northern Affairs

The Honourable Jim Carr, P.C., M.P.
Minister of Natural Resources

The Honourable Larry Bagnell, P.C., M.P.
Member of Parliament for Yukon

HOUSE OF COMMONS
CHAMBRE DES COMMUNES
CANADA

Michael V. McLeod
Member of Parliament/Député
Northwest Territories/Territoires du Nord-Ouest

October 19, 2017

Lindsey Graham
Senator for South Carolina
290 Russell Senate Office Building
Washington, D.C. 20510

Dear Senator Graham,

As the Member of Parliament for Northwest Territories, I am writing to you today to express my personal concerns, and the concerns of my constituents, regarding the proposed opening for resource exploration and extraction of the Arctic National Wildlife Refuge (ANWR).

As you may know, the lives of the Gwich'in indigenous peoples, who live in the Northwest Territories, Yukon, and Alaska, are deeply connected to the Porcupine Caribou herd. These caribou calve in the 1002 area of ANWR in Alaska, and the continued protection of this land is paramount to the survival of the herd.

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Thank you for your consideration.

Sincerely,

Michael V. McLeod, M.P.
Member of Parliament for Northwest Territories

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0000002796

c.c.: The Honourable Chrystia Freeland, P.C., M.P
Minister of Foreign Affairs

The Honourable Catherine McKenna, P.C., M.P.
Minister of Environment and Climate Change

The Honourable Carolyn Bennett, P.C., M.P.
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The Honourable Larry Bagnell, P.C., M.P.
Member of Parliament for Yukon

HOUSE OF COMMONS
CHAMBRE DES COMMUNES
CANADA

Michael V. McLeod
Member of Parliament/Député
Northwest Territories/Territoires du Nord-Ouest

October 19, 2017

Cory Gardner
Senator for Colorado
354 Russell Senate Office Building
Washington, D.C 20510

Dear Senator Gardner,

As the Member of Parliament for Northwest Territories, I am writing to you today to express my personal concerns, and the concerns of my constituents, regarding the proposed opening for resource exploration and extraction of the Arctic National Wildlife Refuge (ANWR).

As you may know, the lives of the Gwich'in indigenous peoples, who live in the Northwest Territories, Yukon, and Alaska, are deeply connected to the Porcupine Caribou herd. These caribou calve in the 1002 area of ANWR in Alaska, and the continued protection of this land is paramount to the survival of the herd.

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I am asking you to please not support any budgetary measures that will open up ANWR, for the good of our countries, our citizens, and our caribou.

Thank you for your consideration.

Sincerely,

Michael V. McLeod, M.P.
Member of Parliament for Northwest Territories

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0000002798

c.c.: The Honourable Chrystia Freeland, P.C., M.P
Minister of Foreign Affairs

The Honourable Catherine McKenna, P.C., M.P.
Minister of Environment and Climate Change

The Honourable Carolyn Bennett, P.C., M.P.
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Member of Parliament for Yukon

HOUSE OF COMMONS
CHAMBRE DES COMMUNES
CANADA

Michael V. McLeod
Member of Parliament/Député
Northwest Territories/Territoires du Nord-Ouest

October 19, 2017

Jeff Flake
Senator for Arizona
413 Russell Senate Office Building
Washington, D.C 20510

Dear Senator Flake,

As the Member of Parliament for Northwest Territories, I am writing to you today to express my personal concerns, and the concerns of my constituents, regarding the proposed opening for resource exploration and extraction of the Arctic National Wildlife Refuge (ANWR).

As you may know, the lives of the Gwich'in indigenous peoples, who live in the Northwest Territories, Yukon, and Alaska, are deeply connected to the Porcupine Caribou herd. These caribou calve in the 1002 area of ANWR in Alaska, and the continued protection of this land is paramount to the survival of the herd.

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Thank you for your consideration.

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Michael V. McLeod, M.P.
Member of Parliament for Northwest Territories

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0000002800

c.c.: The Honourable Chrystia Freeland, P.C., M.P
Minister of Foreign Affairs

The Honourable Catherine McKenna, P.C., M.P.
Minister of Environment and Climate Change

The Honourable Carolyn Bennett, P.C., M.P.
Minister of Crown-Indigenous Relations and Northern Affairs

The Honourable Jim Carr, P.C., M.P.
Minister of Natural Resources

The Honourable Larry Bagnell, P.C., M.P.
Member of Parliament for Yukon

HOUSE OF COMMONS
CHAMBRE DES COMMUNES
CANADA

Michael V. McLeod
Member of Parliament/Député
Northwest Territories/Territoires du Nord-Ouest

October 19, 2017

Dean Heller
Senator for Nevada
324 Hart Senate Office Building
Washington, D.C 20510

Dear Senator Heller,

As the Member of Parliament for Northwest Territories, I am writing to you today to express my personal concerns, and the concerns of my constituents, regarding the proposed opening for resource exploration and extraction of the Arctic National Wildlife Refuge (ANWR).

As you may know, the lives of the Gwich'in indigenous peoples, who live in the Northwest Territories, Yukon, and Alaska, are deeply connected to the Porcupine Caribou herd. These caribou calve in the 1002 area of ANWR in Alaska, and the continued protection of this land is paramount to the survival of the herd.

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Thank you for your consideration.

Sincerely,

Michael V. McLeod, M.P.
Member of Parliament for Northwest Territories

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0000002802

c.c.: The Honourable Chrystia Freeland, P.C., M.P
Minister of Foreign Affairs

The Honourable Catherine McKenna, P.C., M.P.
Minister of Environment and Climate Change

The Honourable Carolyn Bennett, P.C., M.P.
Minister of Crown-Indigenous Relations and Northern Affairs

The Honourable Jim Carr, P.C., M.P.
Minister of Natural Resources

The Honourable Larry Bagnell, P.C., M.P.
Member of Parliament for Yukon

CANADA UNITED STATES
FRIENDS | PARTNERS | ALLIES

A SHARED COMMITMENT:
PROTECTING THE PORCUPINE CARIBOU HERD

For thirty years, Canada and the U.S. have worked together to conserve the Porcupine Caribou and its habitat. The Arctic National Wildlife Refuge is critical to our continued success and as such, Canada opposes opening the Arctic Refuge and specifically the Coastal Plain to resource development.

UNIQUE AND IRREPLACEABLE

There are roughly 200,000 Porcupine Caribou ranging across Alaska, Yukon, and the Northwest Territories. In 1987, the U.S. and Canada signed an agreement to jointly protect this "great natural resource." The agreement commits our countries to conserving the herd and habitat of the Porcupine Caribou, including cooperating to avoid risks of irreversible damage or long-term adverse effects. It requires us to consult each other on any activities, including oil and gas development, that may potentially impact the caribou or their habitat.

Porcupine Caribou rely on the Coastal Plain of the Arctic National Wildlife Refuge to give birth to around 40,000 calves each year. Disruptions from resource development would create risks for calf survival, and harm the only healthy herd in North America.

THE CARIBOU PEOPLE

The Gwich'in Nation spans both sides of the border across the Porcupine Caribou migratory route. They rely heavily on the herd for their culture and livelihood. Porcupine Caribou also provide the Gwich'in with their main source of food. Conserving the caribou and safeguarding their habitat is vital to the preservation of Indigenous history and way of life.



CANADA'S COMMITMENT TO CONSERVATION

Through agreements with the Yukon Territory and Indigenous peoples, Canada is protecting the Porcupine Caribou Herd and its range across nearly 8,000 square miles along the Alaskan border—including the resource-rich Old Crow Flats. However, caribou do not respect national boundaries and hard choices are required to conserve the herd and respect Indigenous peoples on both sides of the border.



From:	Lor, Socheata
To:	Fischbach, Tracy
Cc:	Ryan Mollnow; Mitch Ellis; Stephanie Brady; Joseph Darnell; Michael Gieryic; Doug Damberg; John Martin
Subject:	Re: Arctic 1002 EA - ATTORNEY CLIENT PRIVILEGE - Meeting Notes
Date:	Friday, November 10, 2017 4:53:09 PM

Thank you for capturing these notes, Tracy! I checked with notes I took and it looks like you've captured everything.

Soch

~~~~~~~~~~~~~~~~~
Socheata Lor, Ph.D.
Deputy Assistant Regional Director - Region 7
National Wildlife Refuge System
U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99503
Office: 907.786.3420
Cell: 907.891.6194
~~~~~~~~~~~~~~~~~

On Thu, Nov 9, 2017 at 11:13 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Hi all,
>
> Following are my notes from our discussion with Mike and Joe on November 1. Please let me know if you see something that is not correct.
>
> Thanks!
>
> ---
>
> November 1, 2017
>
> Attendees: Ryan Mollnow, Socheata Lor, Mitch Ellis, Stephanie Brady, Joe Darnell, Mike Gieryic, Doug Damberg, Tracy Fischbach
>
> In the EA we do need to have explanations of why we aren't analyzing other parts of this chapter. Why aren't we doing the environmental portion of the regs?
> Lead with a discussion outlining that the rest of the reg is not within the scope of the evaluation. It's not warranted as part of the change. We may decide that the environmental protections are adequate. Put a disclaimer somewhere that the additional NEPA would lay out possible additional stipulations.
>
> Add "Considered but Eliminated" Section - Include the other Environmental Regulations in 37.31 & 32. It's beyond the scope of the proposed rule-making and we can include other stipulations (see page 11 of current EA).
>
> We can add to stipulations but not remove regulatory requirements.

Reference the CCP and the earlier EIS (Chapt 4 from 1983 version). Develop an executive summary to put into the environmental consequences (incorporate by reference). Then add any new information about that resource area. Give summaries of any updated information for these creatures.

Consider this as a programmatic model. Review the 1983 EIS to consider the broad brush evaluation that was done. For example, where is the polar bear critical habitat. Water resources section may be new information for this issue.

Review the CCP and the EIS to understand the whole list of resources to consider.

Check out recent NPRA NEPA documents from 2012.

Consider other resources to evaluate other resources such as "opportunities for visitor experiences." Think about when the action takes affect and then consider what opportunities would be affected.

Section 810 needs to be included along with general discussions of Section 7 and Section 106. Specific Section 7 & Section 106 would be done when we do site-specific NEPA.

T&E Species - Polar bears, spectacled eiders in small numbers,

---

Tracyann S Fischbach
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From: Granfors, Diane
To: Brady, Stephanie; Mollnow, Ryan
Subject: Re: Arctic LCC follow up on working with refuges on development effects science needs
Date: Tuesday, November 14, 2017 9:55:42 AM

Is there any chance we would want to shift focus of the first round of ROCs to Arctic instead of Selawik? It seems to me that identifying the priority ROCs, at least for the coastal plain, to be a starting point for an Open Standards process or decision analysis would be a strategy to "identify the types of science that will be needed to evaluate the what, when and where of oil exploration and development on Arctic Refuge." Otherwise we might just be in for a brainstorming session that won't feel very satisfying when it comes to deciding what to do.

On Tue, Nov 14, 2017 at 6:42 AM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:

> This all sounds good Wendy - the proposed rule has not published as of yet - we are working on edits to the EA right now - maybe we can catch up after thanksgiving? I would like to perhaps loop in John martin and Tracy fischbach as well - thanks.
>
> stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |
> U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska |
> 907.306.7448
>
> On Mon, Nov 13, 2017 at 8:07 AM, Granfors, Diane <diane_granfors@fws.gov> wrote:
>
> > Hi Wendy-
> >
> > I'd be happy to work with you and Paul, and perhaps call in someone from Arctic Refuge, to discuss further and help plan such a meeting.
> >
> > cheers-
> > Diane
> >
> > On Thu, Nov 9, 2017 at 1:57 PM, Wendy Loya <wendy_loya@fws.gov> wrote:
> >
> > > Hi Ryan, Stephanie and Diane,
> > >
> > > I just wanted to follow up on the conversation I had with Ryan and Stephanie regarding how Arctic LCC could help refuges think strategically on the types of science that will be needed to evaluate the what, when and where of oil exploration and development on Arctic Refuge. My suggestion was that we could perhaps facilitate a workshop that was structured around some of the decision-making issues and impact assessment needs of both BLM-NPRA and DNR (especially water use/ice roads) that could help guide science planning by refuge staff, USGS and other researchers. Is that, or some variation of that, still of interest? I know that some Arctic staff have begun to do outreach on this to other agency experts, and we can move forward with Arctic/refuges staff engaged in identifying their needs. Maybe that is the next step?

> Ryan, I know you are transitioning positions, but wanted to make sure to capture your thoughts on this ☺
>
> Cheers,
>
> Wendy
>
> Dr. Wendy M. Loya, Coordinator
>
> Arctic Landscape Conservation Cooperative (LCC)
>
> Anchorage, Alaska
>
> 907.786.3532 (office)
>
> 907.227.2942 (mobile)

--

Diane Granfors, PhD
Alaska Region Inventory and Monitoring Coordinator
National Wildlife Refuge System
U.S. Fish and Wildlife Service
1011 East Tudor Road, MS 235
Anchorage, AK 99503
diane_granfors@fws.gov
907-786-3429

Collaborative ecosystem science to inform National Wildlife Refuge System conservation decisions in Alaska.

--

Diane Granfors, PhD
Alaska Region Inventory and Monitoring Coordinator
National Wildlife Refuge System
U.S. Fish and Wildlife Service
1011 East Tudor Road, MS 235
Anchorage, AK 99503

From:	Kohout, Jenifer
To:	Fischbach, Tracy
Cc:	Mary Colligan; Karen Clark; Doug Damberg; Stephanie Brady; James Wilder; Ryan Wilson; Patrick Lemons
Subject:	Re: Help with Arctic 1002 EA
Date:	Tuesday, November 14, 2017 10:39:22 AM

Hi Tracy,

Please call me when you get in so we are clear on what you need and when you need it.

Thanks, Jenifer

On Tue, Nov 14, 2017 at 8:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Hi,
>
> As Karen mentioned, we are in a big push to get a beefed up EA done for the regulation change that would open the 1002 for oil & gas exploration.
>
> Would you be able to break someone free to write a relatively short 1-2 page Affected Environment section and environmental consequences section for polar bears?
>
> I'll be in the office at 9, if folks have questions. I'll be working on trying to outline a hypothetical exploration plan based on a state proposal from 2015.
>
> Thank you!
> -Tracy
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
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> Hours: Mon - Thurs 9:15 am to 3:15 pm
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--
Jenifer Kohout
Deputy Assistant Regional Director for Ecological Services
Alaska Region
U.S. Fish & Wildlife Service
p. (907) 786-3687

From: Wendy Loya
To: Tracy Fischbach
Cc: Stephanie Brady; John Martin
Subject: RE: BLM"s NPRA EIS
Date: Tuesday, November 14, 2017 12:32:36 PM

Tracy,

3D and 2D seismic are described in what seems to be great detail starting on Page 12 of Volume 2. I think it would be easy to copy and paste some paragraphs from that. Mobilizing the vehicles from Prudhoe Bay to Arctic Refuge would require a good snow year, and maybe there is a way to stage materials at Pt. Thompson for subsequent years? I have no idea!

On page 19 you will see some general details on volume of water needed for ice pad construction, while adequate snow cover is needed for low pressure vehicles involved in the seismic surveys (see below for DNR guidelines)

Kimberley Maher at DNR in Fairbanks Kimberley.maher@alaska.gov I believe is the primary contact for ice road permits. She has recently begun to engage with the LCCs and seems very helpful and may have some draft text.

DNR will implement tundra opening for general cross country travel in wet sedge tundra when a minimum 15 cm (6 inches) of snow cover is available and ground hardness reaches a minimum of 75 drops of the slide hammer to penetrate one foot of ground. At this combination of ground and snow conditions, no significant change in the depth of active layer, soil moisture, or vegetation composition and structure is anticipated.

DNR has determined that once a minimum threshold of 23 cm (9 inches) of snow cover and a ground hardness of 25 drops of the slide hammer for one foot of soil penetration has been attained, general tundra opening in tussock tundra can proceed without a significant change in active layer depth, soil moisture, or vegetation community composition and structure.

Dr. Wendy M. Loya, Coordinator
Arctic Landscape Conservation Cooperative (LCC)
Anchorage, Alaska
907.786.3532 (office)
907.227.2942 (mobile)

From: Fischbach, Tracy [mailto:tracy_fischbach@fws.gov]
Sent: Tuesday, November 14, 2017 10:04 AM
To: Wendy Loya
Cc: Stephanie Brady; John Martin
Subject: Re: BLM's NPRA EIS

Would you be willing to write a skeleton description of 3-D exploration might look like? Do they use helicopters? How do they get across the land? How much water

is needed to make an ice road?

One technical question on the BLM EIS. I'm looking for all of their BMPs. They cite them in the EA that I'm looking at, but I can't seem to find a compiled list. Do you know if there is a compiled list or if they are just in each resource section?

I know this is asking a lot, but any help you can give would be awesome.

Thank you! -T

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On Tue, Nov 14, 2017 at 9:46 AM, Wendy Loya <wendy_loya@fws.gov> wrote:

Hi Refuges planning team,

I believe you will find some excellent information in the current BLM EIS for NPRA if you haven't already. Volume 1 of the Final EIS has information for the "Affected Environment" and Volume 2 has the "Environmental Consequences" for the 4 alternatives they explored. The basic information for exploration is largely the same across alternatives, just the magnitude of exploration changes as the amount of area open for leasing changes.
https://eplanning.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=dispatchToPatternPage&currentPageId=14702

I worked quite a bit on evaluating this plan in my previous position, and am happy to help if you think I can.

Best regards,
Wendy

Dr. Wendy M. Loya, Coordinator
Arctic Landscape Conservation Cooperative (LCC)
Anchorage, Alaska
907.786.3532 (office)
907.227.2942 (mobile)

From: McCaffery, Brian
To: Harwood, Christopher
Subject: Inadequate review
Date: Tuesday, November 14, 2017 12:53:13 PM

Found this gem in the EA I'm reading:

"...refueling would be expected to make a minimal to negligent contribution to the cumulative effects of all oil and gas operations in the region."

Pretty sure that is not what they intended to say!

BJM

--
Brian J. McCaffery
U. S. Fish and Wildlife Service
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources
Branch of Conservation Planning and Policy

Phone: (907) 330-7514
e-mail: brian_mccaffery@fws.gov

"Do something that scares the living hell outta your boss!" -- Dan Ashe, former Director, USFWS

From:	Fischbach, Tracy
To:	Kohout, Jenifer
Cc:	Mary Colligan; Doug Damberg; Stephanie Brady; Patrick Lemons; James Wilder; Ryan Wilson; Christopher Putnam
Subject:	Re: Help with Arctic 1002 EA
Date:	Tuesday, November 14, 2017 1:27:47 PM

Yes. Thank you!

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On Tue, Nov 14, 2017 at 11:23 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:

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>
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>
> Ryan will draft the "Affected Environment" section focusing on status of the Southern Beaufort Sea subpopulation and use of the 1002 Area, particularly in the winter. He'll rely on USGS population surveys, the ESA critical habitat designation, and a recent publication showing more land-based denning, etc.
>
> Christopher will tackle the "Environmental Consequences" section. Assuming that the nature of the activity is exploratory (seismic) work in the winter, Christopher will pull in information from our SBS incidental take regulations/EA and will incorporate by reference mitigation measures that would reduce potential impacts on polar bears denning in the area. In this section, we will also touch on potential indirect consequences (e.g. impact of increased barge traffic) and cumulative impacts (e.g. climate change - sea ice loss - access to prey -- more nutritionally stressed bears on land, etc).
>
> We understand that you need our 1-2 page entries by Thurs (Nov 16) at 12 noon.
>
> --Jenifer
>
> On Tue, Nov 14, 2017 at 8:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

Hi,

As Karen mentioned, we are in a big push to get a beefed up EA done for the regulation change that would open the 1002 for oil & gas exploration.

Would you be able to break someone free to write a relatively short 1-2 page Affected Environment section and environmental consequences section for polar bears?

I'll be in the office at 9, if folks have questions. I'll be working on trying to outline a hypothetical exploration plan based on a state proposal from 2015.

Thank you!
-Tracy

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Jenifer Kohout
Deputy Assistant Regional Director for Ecological Services
Alaska Region
U.S. Fish & Wildlife Service
p. (907) 786-3687
e. Jenifer_Kohout@fws.gov

From:	Fischbach, Tracy
To:	Perdue, Margaret
Cc:	Greta Burkart; John Trawicki; Stephanie Brady
Subject:	Re: Help with evaluating water resources in the Arctic 1002 Area - Due Noon on Thursday, Nov 16
Date:	Tuesday, November 14, 2017 1:33:39 PM

Hi Meg,

Do you have this website? http://dnr.alaska.gov/mlw/mapguide/wr_intro.cfm

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On Tue, Nov 14, 2017 at 11:15 AM, Perdue, Margaret <margaret_perdue@fws.gov> wrote:

> Hi Tracy ---
>
> I checked in with John, I had forgotten that Greta is at the NAASH meeting at NCTC this week.
>
> I can try to pull language together ... but Greta if you have anything drafted for the WRIA for Arctic or other references that would address the issues that Tracy outlined please send them to me.
>
> Thanks
>
> Meg
>
> On Tue, Nov 14, 2017 at 10:54 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
>
> > Hi Greta,
> >
> > The Refuge program is in a big push to get a beefed up EA done for the regulation change that would open the Arctic's 1002 area for oil & gas exploration. The draft EA is due to HQ by this Friday morning, November 17, so I need draft sections to me by **noon on Thursday, Nov 16** . I was told that you are probably the best person to write the water resources section. If not, please let me know ASAP.
> >
> > I need a relatively short 1-2 page Affected Environment section and a 1-2 pages Environmental Consequences section for water resources.

The **Affected Environment** section would include:
What water resources have been there historically.
What water resources are there now.
What is the trend. (Showing this in a chart or graph makes it very easy to understand.)

This section is just the facts, and should include all water resources that you think may be affected by exploration in the 1002 area. This could include waters outside the Refuge. Including a map of the area evaluated is super helpful. Also, if we don't know, we can just say that. Please do cite all of your resources.

The **Environmental Consequences** section would include:
How are the resources listed in the Affected Environment going to be affected by exploration activities. This would include ice roads, ice pads, etc. According to the State's proposal it takes about 1 million gallons of water to make 1 mile of road. Where would/could water be taken to use for building ice roads? Do other species use those waters? We want to keep it short and sweet. We have very little time for this effort.

Thank you SO much!

-Tracy

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--
Meg Perdue, Water Quality Specialist
Water Resources Branch - National Wildlife Refuge System
U.S. Fish & Wildlife Service Regional Office MS 235
1011 E. Tudor Rd
Anchorage, AK 99503
phone: 907-786-3421 fax: 907-786-3976
email: margaret_perdue@fws.gov

From: Wilson, Ryan
To: Kohout, Jenifer
Cc: Christopher Putnam; Mary Colligan; Patrick Lemons; James Wilder
Subject: Re: Help with Arctic 1002 EA
Date: Tuesday, November 14, 2017 1:37:30 PM

Sounds good.
Ryan

On Tue, Nov 14, 2017 at 11:28 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:

> Ryan and Christopher,
>
> Thanks for your help on this. Hopefully it feels manageable given the short length. If you could get me your drafts as early tomorrow (Wed) as possible, I'll take the lead on coordinating review by Jim, Patrick and Mary before we send to Refuges.
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> Make sense?
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> > > I'll be in the office at 9, if folks have questions. I'll be working on trying to outline a hypothetical

exploration plan based on a state proposal from 2015.

Thank you!
-Tracy

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--
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--
Ryan Wilson, Ph.D., Certified Wildlife Biologist ®
Marine Mammals Management, Polar Bears
U.S. Fish and Wildlife Service
1011 E. Tudor Rd., MS341
Anchorage, AK 99503

Phone: (907) 786-3830
Email: ryan_r_wilson@fws.gov
Fax: (907) 786-3816

From: Perdue, Margaret
To: Burkart, Greta
Subject: Follow-up on request for hydrology input for Arctic
Date: Tuesday, November 14, 2017 2:45:36 PM

Hi Greta ---

In case you are checking your email, It would be helpful if you could provide any information or point me to references on observed trends in hydrology related impacts on the coastal plain including the following :

changes in the timing of freeze up and break up
changes in the incidence of rain on snow events
changes in snow pack / cover

Thanks

--
Meg Perdue, Water Quality Specialist
Water Resources Branch - National Wildlife Refuge System
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1011 E. Tudor Rd
Anchorage, AK 99503
phone: 907-786-3421 fax: 907-786-3976
email: margaret_perdue@fws.gov

From: Fischbach, Tracy
To: Edward Decleva
Subject: 1002 EA Purpose & Need, Etc.
Date: Tuesday, November 14, 2017 3:29:30 PM

---

1. Purpose and Need

We, the U.S. Fish and Wildlife Service, propose to amend the regulations at 50 CFR §§ 37 - *Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska*, regarding the dates when an application may be submitted for a permit for a geological and geophysical exploration plan on the Arctic National Wildlife Refuge lands described in the Alaska National Interest Lands Conservation Act. This action is an update to our regulations to allow opportunities for applications to conduct seismic exploration. Further, the ability to collect new information on oil and gas resources will better inform public policy decisions. We are taking this action in support of Executive Order 13783, Promoting Energy Independence and Economic Growth.

Alternatives are to change the rules or not to change the rules. I will have a basic description of what arctic oil & gas exploration looks like this afternoon.

Thanks so much for the help,
-Tracy

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From: Wilson, Ryan
To: Kohout, Jenifer
Cc: Christopher Putnam; Mary Colligan; Patrick Lemons; James Wilder
Subject: Re: Help with Arctic 1002 EA
Date: Tuesday, November 14, 2017 6:11:36 PM
Attachments: Affected_Environment_PB.docx

Hi Jennifer,
Here's my first hack at the 'Affected Environment' section. Please let me know if you think anything should be added/deleted as this is the time I've ever worked on one of these.
Thanks,
Ryan

On Tue, Nov 14, 2017 at 11:37 AM, Wilson, Ryan <ryan_r_wilson@fws.gov> wrote:

> Sounds good.
> Ryan
>
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> > Thanks for your help on this. Hopefully it feels manageable given the short length. If you could get me your drafts as early tomorrow (Wed) as possible, I'll take the lead on coordinating review by Jim, Patrick and Mary before we send to Refuges.
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Polar bears in the Southern Beaufort Sea (SBS) subpopulation are the most likely to occur in the 1002 area of the Arctic National Wildlife Refuge. The subpopulation is shared by the U.S. and Canada. The boundary of the SBS subpopulation, as recognized by the Polar Bear Specialists Group, is Icy Cape, Alaska to the west and south of Banks Island and east of the Baillie Islands, Canada to the east (Obbard et al. 2010). The SBS subpopulation had an estimated population size of approximately 900 bears in 2010 (Bromaghin et al. 2015). This estimate represents a significant reduction from previous estimates of approximately 1,800 in 1986 (Amstrup et al. 1986), and 1,526 in 2006 (Regehr et al. 2006). Although there was some evidence in the 2010 estimate that the population might be showing signs of the subpopulation beginning to increase (Bromaghin et al. 2015). In addition, analyses of over 20 years of data on the size and body condition of bears in this subpopulation demonstrated declines for most sex and age classes (Rode et al. 2010, 2014).

Population declines and the size and body condition of bears in the SBS subpopulation have been linked to declining sea ice conditions in the Beaufort Sea (Regehr et al. 2006; Rode et al. 2010, 2014, in press; Bromaghin et al. 2015). Declining sea ice conditions in the Beaufort Sea have also led to an increase in the proportion of the subpopulation coming onshore in summer and autumn (from 5.8% during 1986-1999 to 20% during 2000-2014) and a 30 day increase in time spent on land (Atwood et al. 2016). While on land, polar bears typically do not feed (Rode et al. 2015), although bears in the SBS subpopulation are drawn to bowhead whale remains from subsistence harvest, particularly adjacent to the community of Kaktovik, Alaska (Wilson et al. 2017). These whale remains may be helping offset lost hunting opportunities for bears in the SBS subpopulation due to sea ice loss (Herreman and Peacock 2013, Atwood et al. 2016).

In addition to a higher proportion of the SBS subpopulation occurring on shore during summer and autumn, there is also an increasing trend towards more bears denning on land (Olson et al. 2017). Between 1985-2013, the percent of bears denning on land in the SBS subpopulation increased from 34 to 55%, linked to sea ice declines. Designated Critical Denning Habitat overlaps with 77% of the 1002 area of the Arctic National Wildlife Refuge (U.S. Fish and Wildlife Service 2010). There is also 38% more denning habitat available in the coastal plain of the Arctic National Wildlife than in the region immediately west of the refuge (Durner et al. 2006). Polar bears have been shown to den in the 1002 area with greater frequency than expected based on available habitat (Amstrup 1993). Based on known den locations from 2000-2010, 22% of dens for bears in the SBS subpopulation occurred within the 1002 area (Durner et al. 2010). Thus, the 1002 area has been documented to be an important area for denning by polar bears and will likely increase in importance as the percent of bears denning on land increases with sea ice loss (Olson et al. 2017).

Minimizing disturbance while bears are in dens is important because timing of den emergence is significantly related to cub survival (Rode et al. in review). Females observed with cubs in spring emerged 15 days later than females observed without cubs (Rode et al. in review). Land-based denning also appears to be important for polar bears, as bears that den on land have significantly higher reproductive success (Rode et al. in review).

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From: E&E News
To: christopher_putnam@fws.gov
Subject: November 15 -- Energywire is ready
Date: Wednesday, November 15, 2017 5:48:52 AM

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ENERGYWIRE — Wed., November 15, 2017

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Trump's 'energy dominance' transforms Alaska's future

Nov. 8, 2016, was a time of triumph and hope for Alaska Republican Sen. Lisa Murkowski as she won re-election, Republicans kept control of the Senate and Donald Trump won the presidency. She confidently asserted that the new president would pave the way for oil and gas development in the Arctic National Wildlife Refuge. Now, a year later, the Republicans are closer than ever to opening ANWR to drilling.

TOP STORIES

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Puerto Rico utility chief cites high-priced offers of grid assistance

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From: kevinp
To: gnickas@wildernesswatch.org; dserra@wildernesswatch.org; jsmith@wildernesswatch.org; gary@wildrockies.org; danajohnson@wildernesswatch.org; b6 @gmail.com; b6 @gmail.com; b6 @mosquitonet.com; roger_kaye@fws.gov
Subject: From E&E Daily -- TAX POLICY: GOP throws health care curveball into ANWR fight
Date: Wednesday, November 15, 2017 6:42:16 AM

This E&E Daily story was sent to you by: kevinp@wildernesswatch.org

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TAX POLICY

GOP throws health care curveball into ANWR fight

Geof Koss, E&E News reporter

Published: Wednesday, November 15, 2017



(Right to left) Senate Finance Chairman Orrin Hatch (R-Utah) and ranking member Ron Wyden (D-Ore.) argued yesterday about Republicans moving to include a repeal of the Affordable Care Act insurance mandate in their tax reform plan. C-SPAN

Senate Republicans last night punted on a series of tough decisions on key energy tax breaks in the latest version of their tax bill, while injecting the tricky politics of health care into the push to open the Arctic National Wildlife Refuge to oil drilling.

The revised **chairman's mark**, released by Finance Chairman Orrin Hatch (R-Utah), makes no mention of orphaned renewables, biodiesel, nuclear or carbon capture and sequestration credits sought by members of both parties in the more than 350 amendments filed to the bill (***E&E Daily***, Nov. 14).

However, the revised measure would repeal the individual mandate tax that lies at the heart of the Affordable Care Act (ACA), the Obama-era health care law that Republicans have failed repeatedly

to repeal after years of promises to do so.

While quelling growing furor among conservatives by repealing the Obamacare tax, the move also would raise $318 billion over 10 years, according to the Joint Committee on Taxation (JCT), easing concerns that the bill would exceed fiscal limits.

"By scrapping this unpopular tax from an unworkable law, we not only ease the financial burdens already associated with the mandate, but also generate additional revenue to provide more tax relief to these individuals," Hatch said in a statement.

But reviving the health care fight in tax reform also adds a wrinkle to the ANWR fight, which will flare again this morning down the hall from the ongoing Finance Committee markup, as Energy and Natural Resources Chairwoman Lisa Murkowski (R-Alaska) prepares to move legislation through her committee to open the reserve to drilling.

Murkowski, along with fellow GOPers Susan Collins of Maine and John McCain of Arizona, voted down the Senate GOP's efforts to repeal much of the ACA. In doing so, she repeatedly cited the potential impact on health coverage in her state, which has expanded under the law.

Murkowski now may face a choice of whether to secure the legislative victory on ANWR that has eluded the Alaska delegation — including her father, former Energy Chairman Frank Murkowski (R-Alaska) — for nearly 40 years, or maintain health coverage for thousands of Alaskans.

She has sidestepped the question all week. "We are still working on what may come with the individual mandate," Murkowski said when pressed by reporters yesterday.

Instead she's tried to focus on the markup, where she said Democrats would be able to offer unlimited amendments to the bill. "We are going to process however many amendments they want to bring forward," she said.

Coincidentally or not, there is one section added to Hatch's revised bill that wasn't present in the earlier version: a modification of the tax treatment of Alaska Native corporations and settlement trusts.

Energy amendments

As the Finance Committee heads into day three of the markup, Democrats face a shrinking window of time to offer amendments, a number of which are energy-related (***E&E Daily***, Nov. 14).

Sen. Tom Carper (D-Del.), who has filed several energy amendments, said sponsors have to weigh "how relatively important" their offerings are, as well as the likelihood of picking up some Republican support.

He noted that Republicans on the Finance Committee were working yesterday to get the orphaned renewable credits added back into the bill. "Hopefully they'll be successful," Carper told reporters.

But conservative groups that oppose renewable tax breaks are keeping up the pressure. "Special carve outs for 'green energy' industries" were among the examples of amendments to "redistribute hundreds of billions of dollars from hardworking taxpayers to select corporations and industries that can afford to lobby for special treatment," **wrote** Americans for Prosperity and Freedom Partners to Hatch yesterday.

The groups, which have financial ties to the Koch brothers, also came out against tax breaks for refined coal and nuclear energy.

Other groups weighed in with the committee on various amendments as well.

The Society of Independent Gasoline Marketers of America (SIGMA) sent a **letter** to the committee urging an extension and phase-out of the biodiesel tax credit but opposing efforts to change the break to a producer's credit, as Sen. Chuck Grassley (R-Iowa) has proposed.

The American Institute of Architects this week **urged** Senate tax-writers to restore the Section 179D tax credit, which provides a deduction for the installation of energy-efficient components in commercial and multi-family buildings.

"These efficiency improvements reduce demands on the power grid, move our country closer to energy independence, and reduce building operating costs — all while mitigating environmental impacts," wrote AIA President Thomas Vonier.

Renewable critics got a boost from longtime wind energy critic Sen. Lamar Alexander (R-Tenn.), who took to the floor yesterday to "nominate" the production tax credit for repeal. He also called on Congress to rid the code of breaks for "mature technology."

"I'm here today to challenge my colleagues to be willing to consider all energy subsidies for mature technologies — wind, solar, oil and gas — as candidates for elimination in a tax reform bill," he said on the Senate floor. "These dollars could be better spent to lower rates for taxpayers."

But Sen. Heidi Heitkamp (D-N.D.), who Republicans are courting to support tax reform, made clear that she wants a host of energy tax issues resolved in whatever final package emerges, including the 2015 deal that extended the PTC and investment tax credit, the orphaned renewables that are extended in the House tax bill but not the Senate's, as well as a change to the 45Q credit to boost carbon capture and sequestration.

"We're waiting to see kind of where this thing ends up, but if we're going to do legacy tax credits for energy, it should be all of the legacy tax credits," she told E&E News. "We need to improve 45Q, but we need to maintain the deal we struck on PTCs and ITCs. We need to take care of the orphans."

House vote expected tomorrow

Meanwhile, the House Rules Committee met last night to pave the way for floor debate on the lower chamber's tax bill today. No amendments will be allowed to the carefully crafted legislation.

House Republicans leaders expect to pass the measure tomorrow, after President Trump meets with GOP lawmakers on Capitol Hill to press for the tax overhaul.

The Sierra Club yesterday announced it was launching a digital ad campaign to sway 29 House Republicans, many of whom are moderates or face tough re-election fights, to oppose the House tax plan.

"Members of Congress should vote against this tax scheme because it is a massive tax cut for the richest 1% and corporate polluters that will result in deep cuts to programs that safeguard public health, clean air and water, and our public lands," said Sierra Club Legislative Director Melinda Pierce in a statement.

"The GOP's plan even manages to raise taxes on the middle class, while sneaking in an outrageous attack on the Arctic Refuge by opening it up for drilling," she said.

GOP House members targeted by the campaign include California's Darrell Issa, Carlos Curbelo of Florida, Elise Stefanik of New York and Virginia's Barbara Comstock.

Reporter George Cahlink contributed.

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From: Martin, John
To: Fischbach, Tracy
Cc: Stephanie Brady
Subject: Re: Update on Arctic 1002 Discussions
Date: Wednesday, November 15, 2017 8:17:10 AM

Thanks for the updates.

Appears that everything is OBE so really have no clue what is relevant anymore.

First day back is this AM - 15 Nov.

On Thu, Nov 9, 2017 at 11:04 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Hi John,
>
> Welcome back! I'll be in at 9, but since I know that you'll be in earlier, I thought I'd give you some things to consider.
>
> 1. Look at the documents that Mike Gieryic sent us in his 11/3 emails. There is a copy of the State's proposal for doing exploration in the 1002 area attached to one of those. Very interesting read. He also included EAs from the NPRA that also give us some insights into what we might expect for exploration and development.
>
> 2. We need to strategize a bit about how to tackle the new EA. Frankly, I'm not sure that we can get to a FONSI because of the unknown effects. Mike feels strongly that we need to evaluate the effects of exploration as best we can. The State's proposal at least gives us something to use as a stand-in proposed exploration plan.
>
> 3. We need to gather an in-house IDT. I will take charge on that part of this business. I will be a social butterfly the week of November 6, gathering up folks who may be able to help us out. I'm thinking Refuge folks (Steve, Joanna, Steve Arthur (bio), Jen Reed (visitor experiences), others?), Joanna Bryant (EA, Subsistence), Marine Mammals Management (polar bears), MBM (international bird resources), Ed (cultural resources), John T (water), and whoever else we think needs to be involved.
>
> 4. After I send this, I'll review/edit my notes from our meeting with Joe D and Mike G so everyone has those and can get a sense of where DOI solicitors feel that we should go.
>
> Again, welcome back. See you soon! -Tracy
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
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> Hours: Mon - Thurs 9:15 am to 3:15 pm
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As-it-happens update · November 15, 2017

NEWS

US Senate panel set to advance quest for oil in Arctic refuge

Kitco News

US Senate panel set to advance quest for oil in Arctic refuge ... WASHINGTON, Nov 15 (Reuters) - Oil drilling in a vast **Alaskan** wildlife refuge ... director of the **U.S. Fish and Wildlife Service** under former President George W. Bush, ...

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BT is near approval of huge grazing plan

Jackson Hole News&Guide

With grizzly bears now under Wyoming management, consultation with the **U.S. Fish and Wildlife Service** about the formerly "threatened" species is no ...

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Companies plan local gas line work

New Castle News

... and an "avoidance measure" from the **U.S. Fish** & **Wildlife Service**, indicating there is an endangered species of Indiana bats in that area.

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Trump Administration Seeks Two-Year Delay on Pesticide Assessments Following Industry Request

EcoWatch

Unless the court approves the new delay request, the **U.S. Fish and Wildlife** and National Marine Fisheries **services** will use those assessments to develop common-sense measures to reduce the pesticides' harm to endangered ...

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Opening day of deer hunting season in Michigan brings promise of new spending

Crain's Detroit Business

Hunting generates a $2.3 billion economic impact in Michigan, according to the **U.S. Fish and Wildlife Service**. That figure includes food and lodging ...

Firearm deer season more than just tradition in Michigan - WNEM Saginaw
Full Coverage

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Aspen Daily News

... the National Park Service, the **U.S. Fish and Wildlife Service** (all bureaus of the Interior Department), the U.S. Forest Service and for federal water ...

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Thomas Mitchell: Constitution stretched to the breaking point

Elko Daily Free Press

That is what the 10th U.S. Circuit Court of Appeals has done with the ... of protecting the prairie dog population than the **U.S. Fish and Wildlife Service**.

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MDC/ST. Louis Zoo Endangered Beetle Reintroduction Earns National Recognition

STL.News

The recovery partnership, which includes the **U.S. Fish and Wildlife Service** (USFWS) and The Nature Conservancy (TNC), began in 2012. The St.

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Send Feedback

From: Martin, John
To: Burkart, Greta
Subject: Re: winter water availability in Arctic
Date: Wednesday, November 15, 2017 8:55:55 AM

Greta

This is my first day back after several back-to-back TDYs and AL.

And at this point, I cannot recall exactly what I found or where I may have put it.

But will keep looking as the 1002 area is not going away anytime soon.

John

On Tue, Oct 31, 2017 at 1:10 PM, Burkart, Greta <greta_burkart@fws.gov> wrote:

> Hi John,
>
> John Trawicki mentioned that you found a memo about winter water availability in rivers. Could you send a copy of this or give me a call b6 [redacted]. I am trying to assess potential threats to water resources and prioritize sampling needs.
>
> Thanks,
>
> Greta
>
> Greta Burkart, PhD
> Aquatic Ecologist
> US Fish and Wildlife Service
> Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
> 101 12 th Ave Rm 236
> Fairbanks, AK 99701
> ph: (907) 456-0519
> fax: (907) 456-0428
> email: greta_burkart@fws.gov
> www.facebook.com/arcticnationalwildliferefuge

From: Greg Siekaniec
To: Fischbach, Tracy
Cc: Karen Clark; Doug Damberg; Socheata Lor; Stephanie Brady; Steve Berendzen; Joanna Fox
Subject: Re: Update from Tuesday evening
Date: Wednesday, November 15, 2017 8:56:16 AM

Tracey et.al.,

Thank you for your attention to this request for expediency in responding to the request for a much more fulsome EA. Your good thinking, dedication to our conservation perspective, and hard work is greatly appreciated.

I know this is not the favored way of completing our business and we prefer a much more thorough review and compelling analysis. However, if we do get a request for additional seismic investigations we will again enter into a very thorough analysis per the existing regulations for the 1002 area.

Good work and stay strong....

Greg

Sent from my iPad

On Nov 15, 2017, at 1:02 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Sorry for the late update. It's been a long day. Folks in FES have stepped up to assist us in evaluating effects to Polar Bears and summarizing what an "generic" exploration activity may look like. Big thank you to Jenifer Kohout, Ryan Wilson, and Chris Putnam. Brian McCaffery is helping me wade through which resources may need additional review (other than the obvious ones). Meg Perdue is evaluating water quantity/quality issues. Wendy Loya is helping me find all kinds of useful info from the NPRA EIS done in 2012 and also provided a nice summary of climate trends on the North Slope.
>
> I'm working on getting a summary of the socioeconomics of the area done and hope to get the subsistence analysis done tomorrow. I have the basic outline of the document done, so as I receive sections we/I can chuck them in.
>
> I talked with Mike G today and clarified some concerns I had about the fact that some of the environmental restrictions in 37.31 and 37.32 are no longer BMPs. We are going to rely on the upfront sentence regarding the RD being able to add stipulations as needed.
>
> I've also let everyone know that the deadline has been upped to 10 am to me, so we can get our best shot to you by 2:30pm. on Thursday.
>
> Signing off for the evening - T
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369

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From: Fischbach, Tracy
To: Martin, John
Cc: Stephanie Brady
Subject: Re: Update on Arctic 1002 Discussions
Date: Wednesday, November 15, 2017 9:02:30 AM

Hi John,

So, the upshot is that the new EA is due tomorrow to Greg and Karen by 2:30 pm. It is due into HQ by Friday morning.

I think I sent you my udpate from last night. I'll double check. Below is the link to the active document. It's in Google Docs. I know you don't like that but we need multiple people to be writing and commenting at the same time. We won't have time to coallate.

I would love it if you can work with Brian on finalizing which resources we are analyzing further and which ones we are not. Table 1-3 and 1-4. Then divy out unwritten sections and go for it. Also go through my scribbles and update as necessary.

The people we have writing are:

Ryan Wilson - Polar Bears
Meg Perdue - Water
Chris Putnam - What a generic exploration looks like in the Arctic
Wendy Loya - Provided a write-up of Climate Change (currently in Chapt 3)

It would be great to get more people writing if we can find bodies.

See you at 9. - Tracy

20171113_EA_ARC 1002 Reg Change_DRAFT

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
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(907) 786-3369

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From: Dawn Serra, Wilderness Watch
To: Roger Kaye
Subject: Take Action: NO oil drilling or leasing in the Arctic Refuge!
Date: Wednesday, November 15, 2017 9:24:27 AM



Tell Congress to vote against ANY budget bill that includes oil drilling or leasing in America's Arctic National Wildlife Refuge!

The Arctic National Wildlife Refuge—America's largest wildlife refuge and one of the largest intact and pristine ecosystems on Earth—is an almost mythical place, both beautiful and rugged. Found in the northeastern corner of Alaska where the Brooks Range bulges up near the Arctic Ocean to create a unique combination of arctic, subarctic, and alpine habitats, the Arctic Refuge stretches approximately 200 miles by 200 miles, covering almost 20 million acres. **Nearly the entire Arctic Refuge is designated Wilderness or recommended for wilderness designation by the U.S. Fish & Wildlife Service!**

The Arctic Refuge provides critical habitat for polar bears, huge migrating herds of caribou, muskoxen, wolves, Dall sheep, brown bears, arctic foxes, and more than 200 species of birds. Beluga and bowhead whales migrate along the coast of the Arctic Refuge with ringed and bearded seals.

Unfortunately, the Trump Administration—and some in Congress—are pushing a 2018 budget plan, which includes provisions that would open the coastal plain of the Arctic National Wildlife Refuge for oil and gas

drilling. This is the heart of the area in which the 200,000+ members of the Porcupine caribou herd migrate over 400 miles every spring to reach their traditional, critical calving and forage grounds on the refuge.

Adding insult to injury, the Trump Administration and its allies in Congress want to use oil revenue from the Arctic Refuge to pay for a massive tax break for the richest people in America! If they have their way, the fate of the Arctic Refuge could be determined by Thanksgiving.

Please tell your senators and representative to vote against ANY budget bill that includes oil drilling or leasing in the Arctic Refuge.

TAKE ACTION

Now is a great time to donate to Wilderness Watch—a generous member from Alaska is matching all first-time donations.

I Support Wilderness!

Photo by USFWS: Caribou graze on the coastal plain of America's Arctic National Wildlife Refuge, with the Brooks Range as a backdrop

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Keeping wilderness wild

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PO Box 9175
Missoula, 59807
(406) 542-2048
info@wildernesswatch.org

www.wildernesswatch.org

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Manage Subscription

From: McCaffery, Brian
To: Martin, John
Subject: Re: Update on Arctic 1002 Discussions
Date: Wednesday, November 15, 2017 9:42:51 AM

Yes, yes, and no. I am the Brian, there are sections unwritten, but it is due *tomorrow* at 2:30 PM. Don't get me going. I just spent two hours hiking in the Bearsdale Springs State Natural Area to diffuse my anger regarding the absurdity and inappropriateness of the deadline, but it's still bubbling just below the surface. The pileated, ruffed grouse, and wood duck were comforting, though!

My instructions from Tracy were to evaluate affected environment relative to winter exploration for biological resources (Water Resources is doing hydrology). Thus, I've got most migratory birds off the table, but that still needs to be explained briefly. I've got birds covered (i.e., I'm working on them today; e.g., some raptors might start nesting prior to the end of winter exploration--GYRF and GOEA), and I may be able to summarize large mammal issues (I"ve already extracted info from the CCP). You may be most able to contribute by determining whether or not we need to evaluate vegetation and wetlands (i.e., what are impacts of winter exploration [ice roads, ice pads, temporary camps, etc.] on vegetation and wetlands. I suspect/hope that you may be more up on that issue than I am (you can't be *less* so). How does that sound?

BJM

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> Date: Wed, Nov 15, 2017 at 7:02 AM
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> To: "Martin, John" <john_w_martin@fws.gov>
> Cc: Stephanie Brady <stephanie_brady@fws.gov>
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> So, the upshot is that the new EA is due tomorrow to Greg and Karen by 2:30 pm. It is due into HQ by Friday morning.
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> I think I sent you my udpate from last night. I'll double check. Below is the link to the active document. It's in Google Docs. I know you don't like that but we need multiple people to be writing and commenting at the same time. We won't have time to coallate.
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> I would love it if you can work with Brian on finalizing which resources we are analyzing further and which ones we are not. Table 1-3 and 1-4. Then divy out unwritten sections and go for it. Also go through my scribbles and update as necessary.
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>
> Ryan Wilson - Polar Bears

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Chris Putnam - What a generic exploration looks like in the Arctic
Wendy Loya - Provided a write-up of Climate Change (currently in Chapt 3)

It would be great to get more people writing if we can find bodies.

See you at 9. - Tracy

20171113_EA_ARC 1002 Reg Change_DRAFT

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

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--
Brian J. McCaffery
U. S. Fish and Wildlife Service
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources
Branch of Conservation Planning and Policy

Phone: (907) 330-7514
e-mail: brian_mccaffery@fws.gov

"Do something that scares the living hell outta your boss!" -- Dan Ashe, former Director, USFWS

From: McCaffery, Brian
To: Martin, John
Subject: Re: Update on Arctic 1002 Discussions
Date: Wednesday, November 15, 2017 9:48:24 AM

Or not...I just saw that at least the affected environment table has been filled in for both Vegetation and Wetlands. Don't know if a comparable section has been or needs to be written as text in the EA. Sorry I can't be of more help. There's nothing written in the fish section of the Affected Environment table, so I'd guess maybe that topic hasn't been handled yet, particularly since it wasn't even in the table yesterday!

BJM

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"Do something that scares the living hell outta your boss!" -- Dan Ashe, former Director, USFWS

From:	Decleva, Edward
To:	Fischbach, Tracy
Cc:	Wendy Loya; Ryan Wilson; Christopher Putnam; Joanna Fox; Stephen Arthur; Brian McCaffery; Margaret Perdue; John Trawicki; Doug Damberg; Kohout, Jenifer; Steve Berendzen; Karen Clark; Greg Siekaniec; Stephanie Brady; Socheata Lor
Subject:	Re: Review of Regs at 50 CFR 37.32 & Deadline has moved to Thursday at 10 am
Date:	Wednesday, November 15, 2017 9:55:46 AM
Attachments:	RHPO Review of 50 CFR Part 37.docx

There are no concerns regarding cultural resources in 50 CFR 37.32 Special Areas.

In fact, cultural resource concerns are sufficiently addressed throughout the entire regulation (see the attached). I see no need to revise or omit any of the sections pertaining to cultural resources. But should the regulation be revised, please give me the opportunity to review.

Thank you, Ed

Edward J. DeCleva
Regional Historic Preservation Officer
U.S. Fish and Wildlife Service, Alaska Region
1011 E Tudor Rd, MS-235
Anchorage, AK 99503

edward_decleva@fws.gov
907-786-3399

On Tue, Nov 14, 2017 at 2:23 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Hi all,
>
> I am re-reading later sections of Chapter 37 and am looking at 50 CFR 37.32 Special Areas.
>
> Are these still appropriate? SOL asked us to consider whether we need to change these regulations as well. I know we are on a tight deadline, but we need to do a quick gut check to determine whether we need to push forward suggested edits to this section. For instance, I know that we now use a 1 mile buffer for polar bear dens, not 1/2 mile.
>
> **Finally, the deadline has been moved UP.** We now need the draft to Greg and Karen by 2:30 pm on Thursday. **So.... if you can get something to me by 10 am on Thursday, that would be great! Sorry!**
>
> Thanks all,
> Tracy
>
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50 CFR Part 37 – Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska

Cultural resources are addressed in the following (per review by Ed DeCleva, Regional Historic Preservation Officer, 15 November 2017):

Subpart A – General Provisions

37.2 Definitions.

(e) Cultural resource means any district, site, building, structure, or object significant in American history, architecture, archeology, engineering or culture, as determined in accordance with 36 CFR 60.6.

Subpart C – Exploration Plans

37.21 Application requirements.

(d) (11) A general description of the anticipated impacts that the proposed exploratory activities may have on the refuge's wildlife, its habitat, the environment, subsistence uses and needs, and cultural resources, and a description of mitigation measures which will be implemented to minimize or avoid such impacts;

Subpart D – Environmental Protection

37.31 Environmental protection.

(d) Cultural resources.

(1) Prior to implementing any plan of operation, the permittee shall obtain from the Regional Director copies of the cultural reconnaissance reports, maps and other available documents which identify all know cultural resource sites and areas of predicted high probability of containing cultural resources. The Regional Director may reasonably restrict or prohibit exploratory activities in these areas and, in accordance with 36 CFR part 800, thereby mitigate, minimize or avoid any adverse effects thereon.

(2) Unless otherwise specified by the Regional Director, the following prohibitions shall be in effect:

(i) No vehicle of any type shall pass over or through a known cultural resource site with standing structures; and

(ii) No seismic train shall camp on a known cultural resource site.

(3) If any exploratory activities require entry into areas known to contain historic or archeological resources, high probability areas, or areas previously unsurveyed for cultural

resources, prior to the initiation of such activities, the permittee shall, if ordered by the Regional Director, locate, identify and evaluate properties eligible for listing on the National Register of Historic Places, recover for the Department historic and archeological data contained in such properties, and take measures, as directed by the Regional Director, designed to mitigate, minimize or avoid to the extent practicable any significant adverse effects on them. Such efforts shall be done in a manner prescribed or approved by the Regional Director in accordance with a programmatic memorandum of agreement among the Service, the State Historic Preservation Office and the Advisory Council on Historic Preservation, and without expense or liability to the Department.

Subpart E – General Administration

37.46 Cost reimbursement.

(a) Each applicant for or holder of a special use permit issued under this part shall reimburse the Department for its actual costs incurred, including, but not limited to, its direct costs and indirect costs ……reviewing, modifying, and approving or disapproving the applicant's or permittee's exploration plan(s) of operation;….. and identifying, evaluating and preserving historic, archeological and cultural resources in areas to be explored by the permittee;….

(c) Upon issuance of a special use permit, the permittee shall make an initial advance payment covering that current fiscal year quarter and quarterly payments thereafter to cover the actual costs incurred by the Department in administering the permittee's permit for its duration. Such costs shall include, but are not limited to, those direct costs and indirect costs,….., incurred in reviewing and acting on permittee's plan(s) of operation; …..; and identifying, evaluating and preserving historic, archeological and cultural resources in areas to be explored by the permittee.

Subpart F – Reporting and Data Management

37.51 Operational reports.

(b) Each permittee shall submit to the Regional Director a semiannual report of exploratory activities … (4) a narrative summary of … (ii) adverse effects of the exploratory activities on…. cultural resources,….

RHPO Comment:

The regulation sufficiently addresses (1) compliance requirements for cultural resource identification, evaluation, and preservation, and (2) associated cost reimbursement and reporting. It is recommended that no changes be made to the cultural resource components of the regulation presented above.

From: Google Alerts
To: sara_boario@fws.gov
Subject: Google Alert - Arctic National Wildlife Refuge
Date: Wednesday, November 15, 2017 10:07:10 AM

Google Alerts

Arctic National Wildlife Refuge

Daily update · November 15, 2017

NEWS

Gazette editorial: Hands off the **Arctic National Wildlife Refuge**

Charleston Gazette-Mail

That's how six former Interior Department officials describe the prospect of opening a portion of the **Arctic National Wildlife Refuge** to oil and gas ...

Jane Goodall urges US Senate to halt quest for **Arctic refuge** oil - Reuters
Senate panel set to advance quest for oil in **Arctic refuge** - Reuters
Senate may ditch Roosevelt's conservation legacy for oil - The Hill
Full Coverage

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The Energy 202: 'Zombie' arguments made by Trump officials at Bonn climate conference

Washington Post

The letter challenges estimates that drilling in the **ANWR** would raise $1 billion to offset the costs of tax cuts, noting that "revenues may only amount to ...

Flag as irrelevant

Committee Watch: Week of November 13, 2017

Countable

... the Interior to establish and administer a competitive oil and gas program in the non-wilderness portion of the **Arctic National Wildlife Refuge** — 9am.

Flag as irrelevant

Daily on Energy: Power goes out in Puerto Rico

Washington Examiner

... allow oil and natural gas drilling in a portion of the **Arctic National Wildlife Refuge**. ... No other refuge in America has expressly permitted oil and gas ...

Flag as irrelevant

Report: US set to become net exporter of oil and gas within 10 years

Midwest Energy News

British primatologist Jane Goodall asks U.S. senators to protect Alaska's **Arctic National Wildlife Refuge** from oil and gas drilling, saying it will have a ...

Flag as irrelevant

Republican tax plan state of play: Both chambers say they are largely on track

KBZK Bozeman News

Murkowski has been pushing for years to open up Alaska's **Arctic National Wildlife Refuge** to oil and gas drilling. It just so happens that to comply with ...

Overnight Regulation: Senate tax bill to include ObamaCare mandate repeal | Sessions sidesteps ... - The Hill

Full Coverage

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WEB

BHA Video: Stand Up for the **Arctic National Wildlife Refuge**



Backcountry Hunters & Anglers

Alaska's 19.3 million-acre **Arctic National Wildlife Refuge** feeds our dreams of the wild, offering sportsmen the opportunity to hunt and fish vast tracts of ...

Flag as irrelevant

Spoiler Alert: Drilling and **Wildlife** Cannot Coexist in the **Arctic Refuge**

National Audubon Society

In an area as ecologically sensitive as the coastal plain of the **Arctic Refuge**, there is no such thing as a “small” footprint.

Flag as irrelevant

Protect the **Arctic Refuge**!

Current Action Alerts - Defenders of Wildlife

The fate of the **Arctic National Wildlife Refuge** is on the line. Alaska Senator Murkowski, Chairman of the Senate Energy and Natural Resources ...

Flag as irrelevant

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From: Bold Visions Conservation
To: Tell Congress to Protect The Arctic National Wildlife Refuge! RogerHeart of Darkness
Subject: Heart of Darkness
Date: Wednesday, November 15, 2017 10:14:35 AM

View this email in your browser

BOLD VISIONS CONSERVATION



HELP THE CAUSE

DONATE NOW

BVC ELSEWHERE

FOLLOW on FACEBOOK

FOLLOW on TWITTER



Heart of Darkness

Stephen Capra

As a young man I remember clearly reading about how we built a dam, which would flood the heart of out the beautiful and perfect Glen Canyon. In my twenties I often said to myself or friends, "How could we be so stupid, how could we not understand that we were destroying our wild heart."

In many readings, I heard about the people involved, the corps and the push for progress off the back of our natural world. I kept thinking if we could have just delayed this a few more years it may have never occurred. The cost of dams was skyrocketing and public sediment was shifting in part due to the fight over Dinosaur National Monument, led by David Brower, which ironically led to the compromise which opened Glen Canyon to its demise. But the fact remains the appetite for massive dams was fading.

In the years since, many have learned of the fate of this once glorious landscape and have like pilgrims, gone to see the very dam that broke so many hearts. Some have unfurled large plastic symbolic cracks across its mass, while others have written about the timeless nature of what once was. This past week the death of Katie Lee, who made it her life's mission to sing, write and speak out about our loss of beauty in Glen Canyon and perhaps our innocence.

Today, Alaska Senator Lisa Murkowski will push once again at a markup to open our modern version of Glen Canyon, the Arctic National Wildlife Refuge, to oil and gas development. Given all we know today about climate change, loss of habitat, wildlife and the magic of this vast wilderness that has been compared to the Serengeti, one can only marvel at man's utter stupidity.

Since 1985, I have made protection of the Arctic National Wildlife Refuge a personal mission. From standing in street fairs in New York City to lobbying on the Hill, from giving talks across our nation to walking the length of the Continental Divide to raise awareness about this 19 million acre land of hope and wildness and others did much more.

During that time we came close to victory and ever closer to defeat, but each time somehow we were able to keep the rigs at bay. It was something people from across the nation came to understand was perhaps the last great example of wilderness it its most pristine form.

Today we have a congress poised to strip away all means of a shared America,

destroying health care, Tax cuts for the wealthiest Americans, taking a wrecking ball to our natural world. They move forward devoid of a conscious, driven by greed and a poisoned philosophy, they call freedom.

The Arctic Refuge is too many the last sense of what was once the Great Plains, a massive landscape that still allows wildlife roam freely. From musk ox to grizzly, polar bear to whale, caribou to snow geese in the hundreds of thousands. It is surrounded by Native Peoples, who use that land and water for life. It remains a modern miracle.

Like many I have worked to protect these lands now for more than 32 years, yet I have never set foot in the Refuge. Sure it has been a dream, but like past conservationists, I see it as not something I must visit, but rather it is far more important to know that it exists and is protected.

In Alaska today, oil revenue has dropped, the state is in financial flux as they search for the next big thing to drive their economy. So the push for drilling in the Refuge is naturally part of their mindset. Perhaps more important is the depraved nature of the oil industry and their never lose an acre mindset. They refuse to ever give up on a fight and that is part of their ongoing effort to delay and block any and all efforts to move away from oil and in effect, to save our planet.

However, we are in an energy transition and we are close to freeing ourselves from oil and must if we are to save our planet. Drilling the refuge today is akin to damming the Colorado and flooding Glen Canyon. We do not need to do it! There are better ways. It begins with conservation of our resources, the transition to electric cars, and demanding of our political leaders to stop destroying wildness for profit.

We have a President, a pathetic version of a man, who relishes in harming people, wilderness and wildlife. He has allowed wildlife to be killed while they hibernate or den. He has made a fool of America by walking away from climate accords and does not work for our countries betterment, only his own.

To allow the Refuge to be destroyed under his leadership is a sacrilege. So we must fight. The **Tax bill** will include language to open the Refuge and it must be voted down. Murkowski now is faced with destroying Health care in this bill also, but opening the Refuge remains the incentive to get her vote.

The Arctic Refuge was designated after a long push that began with Olaus and

Marty Murie. They brought former Supreme Court Justice William O Douglas to the Refuge and he would help make the case in Washington. In the closing days of the Eisenhower Administration that had done little for conservation, the Refuge was designated. First at 8 million acres expanded to 19 after the Alaska Lands Act and if finally protected, could be one of the world's most important reserves at 20.5 million acres.

But the 1.5 million acres of the coastal plain, the place caribou go to give birth, the place of polar bears and the staging area for millions of birds could become an oil field in 2018.

How could we be so foolish, how could we turn our backs on wildness? When our leaders refuse to lead, then we must be leaders. We know so much more about the value of protected lands and wildlife, we know the folly of oil to our planet. We simply cannot allow this to happen in 2017.

We could not save Glen Canyon, but we must save the Refuge or bear witness to madness. Beauty and the freedom of wildness are what our world is losing and losing fast. We are losing our sense of a world leader and to be leader we must act with grace, intellect and vision.

Drilling represents none of this and sends a signal to other perhaps less wealthy nations that destroying the natural world for oil, gold, copper, you name it makes sense and the destruction of wildlife is simply the cost of business.

It is as tragic as it is sickening. We can and we must be so much better!

The Arctic Refuge needs us all and America for its part needs the Arctic National Wildlife Refuge. It simple makes us better. We cannot look back again with heartbreak.
We must fight these bastards to the end.



When you give to big environmental group, it falls into a big, general fund. When you donate to Bold Visions, we appreciate every penny ...and every penny is spoken for long before it arrives!

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From:	Amee Howard
To:	Sara Boario; Gregory Siekaniec; Karen Clark; doug_damberg@fws.gov; socheata_lor@fws.gov; Crystal Leonetti
Subject:	Arctic Refuge 1002 Mark-up Hearing
Date:	Wednesday, November 15, 2017 10:18:36 AM

Hi All,

The Chairman's mark passed with one amendment from Senator Cassidy (R-LA) to expand revenue sharing. Final Vote was Yay: 13, Nay: 10.

The minority side of the committee offered 8 amendments ranging from striking the oil and gas purpose language to eliminating tax breaks for industry. One amendment was tabled and all others did not pass committee.

There was a good deal of discussion and debate. The hearing lasted just over 3 hours.

Let me know if you have any questions or would like additional details.

Thanks so much!
Amee

Sent from my iPhone

From: Google Alerts
To: sara_boario@fws.gov
Subject: Google Alert - U.S. Fish and Wildlife Service Alaska
Date: Wednesday, November 15, 2017 10:32:11 AM

Google Alerts

U.S. Fish and Wildlife Service Alaska

As-it-happens update · November 15, 2017

NEWS

Senate panel set to advance quest for oil in Arctic refuge

Reuters

WASHINGTON (Reuters) - Oil drilling in a vast **Alaskan** wildlife refuge could move ... But former U.S. interior department officials, who worked under both ... director of the **U.S. Fish and Wildlife Service** under former President George ...

Flag as irrelevant

Adorable baby walruses meet for first time

icFlorida

He was estimated to be two weeks old at the time of his rescue, and due to his age, Aku was deemed non-releasable by **U.S. Fish and Wildlife Service** ...

Flag as irrelevant

VIDEO: Baby walruses meeting for first time may be cutest thing ever

www.local10.com

... found abandoned off the coast of **Alaska**. Due to his age, he was deemed non-releasable by the **U.S. Fish and Wildlife Service** and sent to SeaWorld ...

Flag as irrelevant

Monarch Butterflies Are Disappearing, But They May Be Saved, Say Researchers

Northwest Public Radio

The **U.S. Fish and Wildlife service** is currently assessing whether to give the monarch butterfly protection under the Endangered Species Act.

Flag as irrelevant

Tri-Basin hires engineering firm for Kearney County groundwater recharge project

Kearney Hub

... and a partnership agreement with Central, Rainwater Basin Joint Venture and **U.S. Fish and Wildlife Service's** Rainwater Basin Management District ...

Flag as irrelevant

DANGEROUS SHOOTING CONTINUES AFTER GATE FIRE

East County Magazine

As for the **U.S. Fish and Wildlife Service**, the federal agency rarely patrols the area due to budget cuts, according to testimony presented at a recent ...

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Send Feedback

From: Wilderness Watch
To: doug_damberg@fws.gov
Subject: Take Action: NO oil drilling or leasing in the Arctic Refuge!
Date: Wednesday, November 15, 2017 10:50:22 AM

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guardian-banner-arctic-11-17.jpg

Tell Congress to vote against ANY budget bill that includes oil drilling or leasing in America's Arctic National Wildlife Refuge!

The Arctic National Wildlife Refuge—America's largest wildlife refuge and one of the largest intact and pristine ecosystems on Earth—is an almost mythical place, both beautiful and rugged. Found in the northeastern corner of Alaska where the Brooks Range bulges up near the Arctic Ocean to create a unique combination of arctic, subarctic, and alpine habitats, the Arctic Refuge stretches approximately 200 miles by 200 miles, covering almost 20 million acres. **Nearly the entire Arctic Refuge is designated Wilderness or recommended for wilderness designation by the U.S. Fish & Wildlife Service!**

The Arctic Refuge provides critical habitat for polar bears, huge migrating herds of caribou, muskoxen, wolves, Dall sheep, brown

bears, arctic foxes, and more than 200 species of birds. Beluga and bowhead whales migrate along the coast of the Arctic Refuge with ringed and bearded seals.

Unfortunately, the Trump Administration—and some in Congress—are pushing a 2018 budget plan, which includes provisions that would open the coastal plain of the Arctic National Wildlife Refuge for oil and gas drilling. This is the heart of the area in which the 200,000+ members of the Porcupine caribou herd migrate over 400 miles every spring to reach their traditional, critical calving and forage grounds on the refuge.

Adding insult to injury, the Trump Administration and its allies in Congress want to use oil revenue from the Arctic Refuge to pay for a massive tax break for the richest people in America! If they have their way, the fate of the Arctic Refuge could be determined by Thanksgiving.

Please tell your senators and representative to vote against ANY budget bill that includes oil drilling or leasing in the Arctic Refuge.

take-action.jpg

Now is a great time to donate to Wilderness Watch—a generous member from Alaska is matching all first-time donations.

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Keeping Wilderness Wild

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(406) 542-2048
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www.wildernesswatch.org

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From: Google Alerts
To: andrea_medeiros@fws.gov
Subject: Google Alert - U.S. Fish and Wildlife Service and Alaska
Date: Wednesday, November 15, 2017 11:03:22 AM

Google Alerts

U.S. Fish and Wildlife Service and Alaska

Daily update · November 15, 2017

NEWS

US Senate panel set to advance quest for oil in Arctic refuge

Kitco News

US Senate panel set to advance quest for oil in Arctic refuge ... WASHINGTON, Nov 15 (Reuters) - Oil drilling in a vast **Alaskan** wildlife refuge ... director of the **U.S. Fish and Wildlife Service** under former President George W. Bush, ...

Senate may ditch Roosevelt's conservation legacy for oil - The Hill
Full Coverage

Flag as irrelevant

Study: Erosion caused by spawning salmon could make mountains significantly shorter

KTOO

(Photo by Katrina Mueller/**U.S. Fish and Wildlife Service**) ... suggest that the salmon that have shaped culture and history in **Alaska** for generation upon ...

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Send Feedback

From: Roeper, Nancy
To: Mitch Ellis
Subject: Fwd: Take Action: NO oil drilling or leasing in the Arctic Refuge!
Date: Wednesday, November 15, 2017 11:22:32 AM

Mitch - they're trying!!

Nancy

---------- Forwarded message ----------
From: **Dawn Serra, Wilderness Watch** <info@wildernesswatch.org>
Date: Wed, Nov 15, 2017 at 11:25 AM
Subject: Take Action: NO oil drilling or leasing in the Arctic Refuge!
To: nancy_roeper@fws.gov



Tell Congress to vote against ANY budget bill that includes oil drilling or leasing in America's Arctic National Wildlife Refuge!

The Arctic National Wildlife Refuge—America's largest wildlife refuge and one of the largest intact and pristine ecosystems on Earth—is an almost mythical place, both beautiful and rugged. Found in the northeastern corner of Alaska

where the Brooks Range bulges up near the Arctic Ocean to create a unique combination of arctic, subarctic, and alpine habitats, the Arctic Refuge stretches approximately 200 miles by 200 miles, covering almost 20 million acres. **Nearly the entire Arctic Refuge is designated Wilderness or recommended for wilderness designation by the U.S. Fish & Wildlife Service!**

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Please tell your senators and representative to vote against ANY budget bill that includes oil drilling or leasing in the Arctic Refuge.

TAKE ACTION

Now is a great time to donate to Wilderness Watch—a generous member from Alaska is matching all first-time donations.

I Support Wilderness!

Photo by USFWS: Caribou graze on the coastal plain of America's Arctic National Wildlife Refuge, with the Brooks Range as a backdrop.

WILDERNESS WATCH
Keeping Wilderness Wild

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Missoula, 59807
(406) 542-2048
info@wildernesswatch.org

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--
Nancy Roeper, National Wilderness Coordinator
USFWS - National Wildlife Refuge System
5275 Leesburg Pike MS: NWRS
Falls Church, VA 22041-3803
703-358-2389
nancy_roeper@fws.gov

From: Bertram, Mark
To: Churchwell, Roy
Cc: Harwood, Christopher; Stephen Arthur
Subject: Re: summary discussion, feel free to add any missing points
Date: Wednesday, November 15, 2017 11:35:40 AM

Thanks for putting this together Roy, we should make corrections to this and then send this along with our project summary to the group in preparation for the Nov 30 meeting. This is a good way to organize our labor force and expertise in our heads to direct our discussion at the meeting and to address whatever we may be directed to do in the future, complexing, districting, or another scenario.

Cheers,
Mark

Mark_Bertram@fws.gov
Supervisory Wildlife Biologist
US Fish and Wildlife Service
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Fax: (907) 456-0447
Toll Free: 1-800-531-0676
http://www.fws.gov/refuge/yukon_flats/
https://www.facebook.com/YukonFlatsNationalWildlifeRefuge/

On Wed, Nov 15, 2017 at 8:13 AM, Churchwell, Roy <roy_churchwell@fws.gov> wrote:

> Hello,
>
> Yesterday Mike asked how our meeting went and then we had a discussion of some of the ideas he has heard and thought of while in discussions among the managers and RO. Based on that I came up with a restructuring along the lines of the discussion, and I wanted to pass it along as an idea. I don't expect if the biologists provided a plan for restructuring that it would necessarily look like this. I would consider this more of a brainstorming exercise at this point. In this idea, b5 - DP [redacted] Anyway, I don't know what the RO has in mind, but something like this may be what they are thinking.
>
> Roy

On Tue, Nov 14, 2017 at 4:47 PM, Bertram, Mark <mark_bertram@fws.gov> wrote:

> These will be great questions to pose to Doug if/when the Dec mtg materializes.
>
> Cheers,
> Mark
>
> Mark_Bertram@fws.gov
> Supervisory Wildlife Biologist
> US Fish and Wildlife Service
> Yukon Flats National Wildlife Refuge
> 101 12th Avenue, Room 264
> Fairbanks, Alaska 99701
> Voice: (907) 456-0446
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> Toll Free: 1-800-531-0676
> http://www.fws.gov/refuge/yukon_flats/
> https://www.facebook.com/YukonFlatsNationalWildlifeRefuge/
>
> On Tue, Nov 14, 2017 at 1:41 PM, Harwood, Christopher <christopher_harwood@fws.gov> wrote:
>
> > b5 - DP
> > [redacted]
> >
> > I was thinking the same for I&M biologists but they likely have pretty full plates (e.g., Diane having to act, Carol doing subsistence).
> >
> > On Tue, Nov 14, 2017 at 12:28 PM, Bertram, Mark <mark_bertram@fws.gov> wrote:
> >
> > > Good point Roy, then we should consider having discussion on Sept 30 to discuss scenarios when the entirety of our biological workforce is directed to one station.
> > >
> > > Cheers,
> > > Mark
> > >
> > > Mark_Bertram@fws.gov
> > > Supervisory Wildlife Biologist
> > > US Fish and Wildlife Service
> > > Yukon Flats National Wildlife Refuge
> > > 101 12th Avenue, Room 264
> > > Fairbanks, Alaska 99701
> > > Voice: (907) 456-0446
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https://www.facebook.com/YukonFlatsNationalWildlifeRefuge/

On Tue, Nov 14, 2017 at 12:24 PM, Churchwell, Roy <roy_churchwell@fws.gov> wrote:

> Hello All,
>
> My thoughts on this are that from the RO's perspective, surprises like 1002, Ambler, oil and gas on the Flats are not a monkey wrench, but the new normal and what this exercise should entail.
>
> Roy
>
> On Tue, Nov 14, 2017 at 12:16 PM, Bertram, Mark <mark_bertram@fws.gov> wrote:
>
> > b5 - DP [redacted]
> >
> > Surprises, like 1002, ambler, or oil and gas on the flats will throw a monkey wrench into all this but we should have that discussion as well.
> >
> > Cheers,
> > Mark
> >
> > Mark_Bertram@fws.gov
> > Supervisory Wildlife Biologist
> > US Fish and Wildlife Service
> > Yukon Flats National Wildlife Refuge
> > 101 12th Avenue, Room 264
> > Fairbanks, Alaska 99701
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> > https://www.facebook.com/YukonFlatsNationalWildlifeRefuge/
> >
> > On Tue, Nov 14, 2017 at 11:17 AM, Harwood, Christopher <christopher_harwood@fws.gov> wrote:
> >
> > > Gents:
> > >
> > > b5 - DP [redacted]

b5 - DP

[redacted]

[redacted]

CH

On Tue, Nov 14, 2017 at 9:57 AM, Bertram, Mark <mark_bertram@fws.gov> wrote:

> Hi everyone,
>
> Below is a brief summary of our discussion from yesterday on biological districting, please free free to add any missing points. I wanted to capture our discussion since sine of this may help guide on discussion at the next group meeting. I sent out an invite yesterday to all the Fairbanks refuge biologists for a Nov 30, 2pm meeting in the Refuges Conference Room; I reserved the room. I will put together a combined field calendar from the three refuges and send out to all before the meeting.
>
> So yesterday we discussed that we already conduct much collaborative work together. Examples include the sharing of pilots for various surveys and projects such as moose surveys and the lynx study. Northern refuge biologists have an ongoing collaboration with the current lynx project which includes sharing personnel, expertise in trapping and trap building, and providing training for other stations. Other recent examples of collaboration include the expansion of aerial monitoring efforts of lesser scaup and scoter surveys between Koyukuk, Yukon Flats, Tetlin and Kanuti refuges, and the expansion of eagle surveys (including pursuit of database development). Roy Churchwell is also actively assisting Arctic Refuge with sheep work and will be expanding into other mammal monitoring support.
>
> We also discussed that we can grow our efforts of collaboration by increasing sharing of aircraft and personnel. In an effort to increase collaboration each refuge identified our high priority work in a timeline. The following is a brief summary of some of the priority work identified on our timelines for each station. This is ***not*** a complete list and ***may not*** be in priority order but it gives us some idea of where we can begin discussions.

Kanuti: November moose surveys, March/April lynx project, March/April trail cameras, May. June, July shorebird reconn projects, June/July weed pulls
Arctic: Mid July sheep surveys, November and April moose surveys, Year round Porcupine caribou collaborations, July veg sampling,
Yukon Flats: November moose surveys, Feb/March lynx project, May/September trail cameras, June scoter/scaup surveys, July waterfowl brood surveys

We also discussed the idea b5 - DP
[redacted]

b5 - DP
[redacted]

Feel free to add important points I may have missed in this summary.

Cheers,
Mark

Mark_Bertram@fws.gov
Supervisory Wildlife Biologist
US Fish and Wildlife Service
Yukon Flats National Wildlife Refuge
101 12th Avenue, Room 264
Fairbanks, Alaska 99701
Voice: (907) 456-0446
Cell: (907) 347-1524
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Toll Free: 1-800-531-0676
http://www.fws.gov/refuge/yukon_flats/
https://www.facebook.com/YukonFlatsNationalWildlifeRefuge/

--
Christopher Harwood
Wildlife Biologist
U.S. Fish and Wildlife Service
Kanuti National Wildlife Refuge

101 12th Ave.; Room 206
Fairbanks, AK 99701
(907) 455-1836 (w)
(907) 456-0506 (fax)

"In my house, anyone who uses one word when they could have used ten just isn't trying hard."

- Josiah Edward Bartlet, PhD, Nobel Laureate

--
Roy Churchwell, PhD
Wildlife Biologist
US Fish and Wildlife Service
Kanuti National Wildlife Refuge
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(907) 456-0508
https://www.fws.gov/refuge/kanuti/

--
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(907) 455-1836 (w)
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--
Roy Churchwell, PhD
Wildlife Biologist
US Fish and Wildlife Service
Kanuti National Wildlife Refuge
101 12th Ave. Room 206
Fairbanks, AK 99701
(907) 456-0508

From: Wilderness Watch
To: mitch_ellis@fws.gov
Subject: Take Action: NO oil drilling or leasing in the Arctic Refuge!
Date: Wednesday, November 15, 2017 11:38:38 AM

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From:	Wendy Loya
To:	Amy Holman; Andew Balser; Brian Person; Brian Sieben; Catherine Coon; Cheryl Rosa; Diane Granfors; Donald McLennan; Eric Wald; Eva Patton; Jason Taylor; Jeremy Littell; Jimmy Fox; John Pearce; Joshua Bradley; Kimberley Maher; Maija Lukin; Malinda Chase; Mark Miller; Michael Svoboda; Paul Leonard; Robyn Angliss; Ryan Toohey; Sarah LaMarr; Stacie McIntosh; Stephen Arthur; Stephen Gray; Steve Berendzen; Sue Rodman; Zachary Stevenson
Cc:	Sarena Selbo; Aaron Poe; Karen Murphy; Amy Pocewicz; Sara Longan
Subject:	Notes from Arctic LCC Partners Meeting 11/13/17
Date:	Wednesday, November 15, 2017 12:02:59 PM
Attachments:	Notes Arctic LCC Partners meeting 111317.pdf

Hi Arctic LCC Partners,

Thanks to everyone that was able to join Monday's meeting. Paul and I really appreciate your time and ideas in thinking about next steps for the Arctic LCC. Attached is a PDF that has the very texty slides I shared throughout the meeting, with some of my notes summarized on page 10.

The action items from the meeting are:

- Work with North Slope Science Initiative (NSSI) Deputy Director (Mark Miller) and Director (Sara Longan) on formalizing relationship between Arctic LCC and NSSI, likely through engaging Senior Staff and their Oversight Group members.
- Arctic LCC Staff will begin to convene two working groups immediately: Cumulative Impacts Analysis and Caribou Connectivity. Please let us know if you are interested in participating in either; we will work with agency managers and staff to ensure we understand their specific needs and north slope organizations to solicit community input on needs and find local knowledge experts.
- Other working groups, including Hydrologic Monitoring and Modeling and Coastal/Marine spatial science will be scoped in early 2018. Send us additional ideas or needs anytime.
- As regional and national efforts come together to support applications for funding emerge, we'll be in touch!

I hope you all have a wonderful Thanksgiving and we'll be in touch again soon,
Wendy

Dr. Wendy M. Loya, Coordinator
Arctic Landscape Conservation Cooperative (LCC)
Anchorage, Alaska
907.786.3532 (office)
907.227.2942 (mobile)

Arctic LCC Partners Meeting
Nov 13th 1-3pm
Suggested Agenda

Participants: Cherly Rosa, Mark Miller, Diane Granfors, Cathy Coon, Eva Patton, John Pearce, Steve Arthur, Ryan Toohey, Sue Rodman, Robyn Angliss, Amy Holman, Eric Wald, Joel Reynolds

- Introductions
- Summary from Alaska LCC Visioning Session Nov 1-2 hosted by Alaska Conservation Foundation
- Where to go with Arctic LCC under different funding scenarios
  - Future Structure
  - Future Function

Notes from facilitator for LCC Visioning
What are our CORE FUNCTIONS? What is WORKING WELL?

THEMES

- **Leadership on climate change and adaptation** – research, strategies
- **Not siloed** – synthesis of relevant information from multiple sources
- **Forum, convener** – bottom up and top down; a bridge across disciplines and organizations
- **Applied research** – research with a goal of informing land and resource management, community viability issues and options
- **Landscape scale** – ability to work across jurisdictional boundaries
- **Respect for different world views** – integration of "indigenous knowledge" and "science"
- **Partnerships-driven** – a focus on inclusivity, giving equal voices
- **Funding and capacity leverage(r)** – amplify, synthesize partner contributions
- **Place-based focused** – tie to specific geographies, on-the-ground issues
- **Educator and trainer**

Notes from facilitator for LCC Visioning
What COULD WORK BETTER or BE IMPROVED?

THEMES

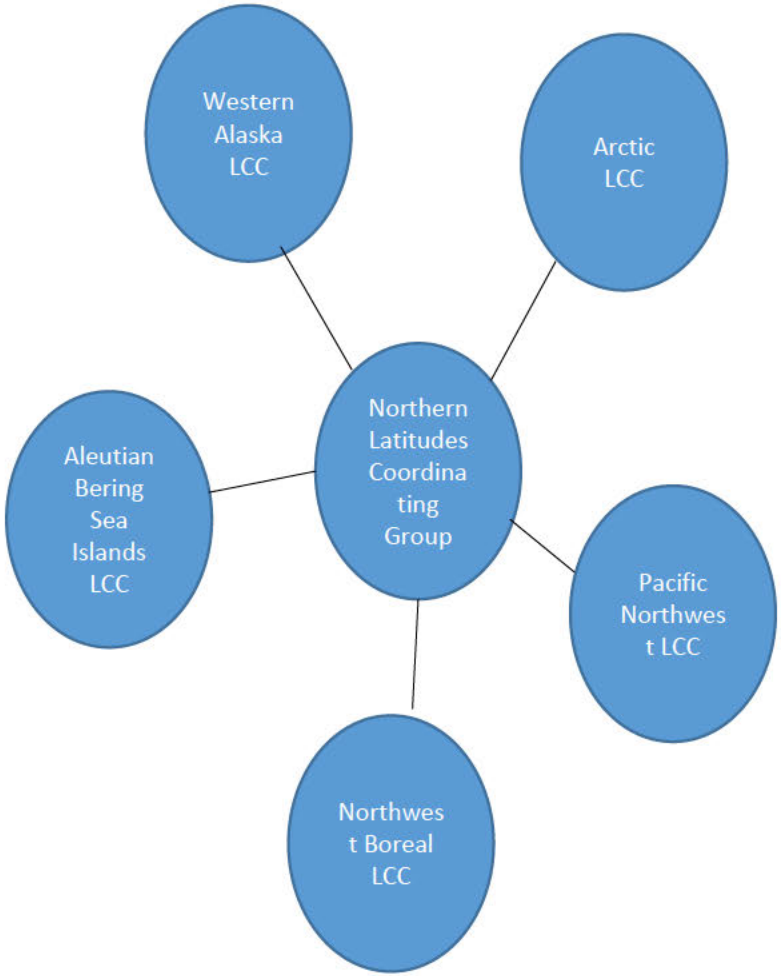
- **Message** – stronger, unified, compelling message and messaging plan, internal and external
- **Stronger, Wider Partnerships** – continue with agencies, researchers, communities, tribes; add Native Corporations, business and industry, consumptive/extractive and non
- **Implementation** – stronger follow through across LCC functions, better performance measures
- **Native Organizations** – further strengthen partnerships, help increase capacity, better representation in LCC staff and leadership
- **"Indigenous Knowledge & Science"** – respect differences, better take advantage of both worlds
- **Internal Governance & Organization** – develop sustainable, forward-looking cross-LCC structure, funding, tools, shared priorities
- **Maximize Value of Meetings/Workshops** – realism about time commitments, continued recognition about value and need for collaboration and communication

Notes from facilitator for LCC Visioning
Draft Summary of Ideas

- Retain 5 Northern Latitude LCCs
- Create Northern Latitudes Coordinating Group
- Request FWS continue to endorse LCCs
  - Retain innovative elements of LCCs in DOI
  - Federal sponsorship enables federal engagement
- Broaden funding strategy for LCC staff and LCC projects

Notes from Partner at LCC Visioning
Draft idea for Northern Latitudes Coordinating Group

- Comprised of LCC Coordinator/Partnership Director and Science Coordinators from all 5 Northern Latitude LCCs
- Non-authoritative group charged with coordinating issues for the common good, coordinating technical initiatives, coordinating responses, etc.
- Creates working groups on technical or policy issues that cross boundaries and support common goals among multiple LCCs



Notes from Partner at LCC Visioning
Draft Regional Funding Strategy

- LCC Federal Staff
  - Request FWS continue funding at least one US federal position per LCC
  - Request partners to contribute to other strategic staff positions through inter/intra agency fund transfers
  - Request funding from NGO/foundations through donation or Cooperative Research and Development Agreements (CRADA)
- LCC NGO Staff
  - Develop MOA with one or more NGO for LCC staff support
  - Request funding from partners or foundations directly to LCC NGO
- LCC Projects
  - LCC working groups partner to self-fund critical research needs
  - LCCs develop and publish prioritized lists of projects to attract funding from any source

Arctic LCC Structure

- Building stronger partnership with Native Alaskans, State of Alaska are DOI stated priorities.
- Canadian partners are there but collaboration needs greater attention to flourish
- Similar participants across other organizations, like NSSI; maintain “implementation” niche
- Future Governance
  - FWS may not support convening Steering Committees
  - If no FWS support at all, do we want to try to continue as an LCC and what does that look like?
  - Formal or informal governance?
    - Steering Committee with limited membership
    - Broad inclusive partnership
    - No overarching Steering Committee, but Chairs of working groups provide leadership

Arctic LCC Overview

- Arctic LCC has been productive in terms of tackling climate science needs identified by partners
  - 60 projects with more than 400 products
- Excellent examples of inter-organizational partnerships to tackle interdisciplinary science
- FWS funding has equalized funding across Alaska LCCs, and uncertain for future ($275,000 in FY 17)
- Technical expertise of federal staff:
  - Paul is Landscape Ecologist ready to tackle big, complex needs
  - Josh is Data/Programming expert
- Climate change is not a priority for Administration, but still important and part of research hypotheses
- Where can we best contribute in the next 4 years?

Possible Future Focus Areas:

Collaborative working groups that build of existing time and financial investment in research, while addressing current administration priorities

Past Groups
Hydrology
Permaforst
Coastal
Species-Habitat
Geospatial

- Cumulative Impacts Analysis
  - Modeling examples that address species of interest for primary drivers of change (climate-driven habitat change, development impacts)
  - Convening expertise on development management and identifying critical research needs across Arctic to understand development impacts
- Caribou Connectivity (Landscape Conservation Design)
  - Providing science to identify how to maintain protected and connected terrestrial and aquatic habitats
  - Potential synergy with State ASTAR planning
  - Arctic-wide community concerns about both costs and benefits of increased infrastructure
- Hydrologic Monitoring and Modeling
  - If not TEON, what? What research is needed to inform current management needs and how can we better coordinate/leverage knowledge and funding?
- Oceans and/or Coastal Issues
  - What is not being done that we can contribute to? Previous Coastal tasks largely completed?
- Others?

Discussion notes

- Formalize a functional relationship between NSSI and Arctic LCC
- All LCC meeting several years ago was helpful for understanding what else was going on and how it might be relevant across LCCs
- Synthesis is needed
- Two translation audiences for products: managers and communities.
- Communities say they are not being heard, so collaboration is key. Discussed how to do that in a region where they are asked to engage in regulation and science input frequently.
- Use NSSI recommendations matrix for ideas, details, validation of working group tasks
- CAFF, CBMP and other Arctic Council initiatives have value and greater awareness of products and discussions needed among federal partners. Also good examples of community engagement. Also sharing Arctic LCC and other partner efforts with CAFF important.
- With regards to offshore needs and linking the land, fresh and salty waters, the One Health initiative of the SDWG might be a useful framework/forum. http://www.sdwg.org/wp-content/uploads/2014/03/Arctic-One-Health-handout-Nov2016.pdf
- AdaptAlaska is emerging as a place to share science with communities, AOOS and SeaGrant should also be at table as we scope Arctic LCC offshore working groups.

NSSI Working Groups formed last week

2011 Barrow Workshop Working Group

- **Charge**: Evaluate how/if follow up is needed with Barrow to close out any incomplete activities that are not addressed in subsequent studies in 2011 report, and provide recommendation on those activities to full STAP for consideration and potential forwarding to OG.

Aircraft Disturbance Working Group

- **Charge**: Pursue an improved understanding and suggest new strategies to address to local concerns on the issue of harassment of animals, birds, and hunters by low-flying aircraft on the North Slope. Provide to full STAP for consideration.

Ecosystem-based habitat status monitoring (link with next)

- **Charge**: Create an approach for driving collaboration among stakeholders for ecosystem-based habitat status and trends monitoring relative to anthropogenic activities (not from natural variability or climate change, etc.) on North Slope.

Focal / subsistence species distribution, abundance, and disturbance-response monitoring (link with previous)

- **Charge**: Create an approach (or synthesize / harmonizes existing approaches) for focal species distribution & abundance monitoring relative to anthropogenic activities (not from natural variability or climate change, etc.) on North Slope.

Document TK specific to subsistence and impacts (climate change & anthropogenic)

- **Charge**: Produce a summary report that recommends a process to support the optimization of science studies and operations through the inclusion of TK and local knowledge. Also determine whether scope extends only to marine mammals or beyond.

DOI Arctic Cumulative Impacts Workshop
Executive Summary

Campbell Science Center - Anchorage, Alaska
April 12 -13, 2016

Improved Collaboration and Communication

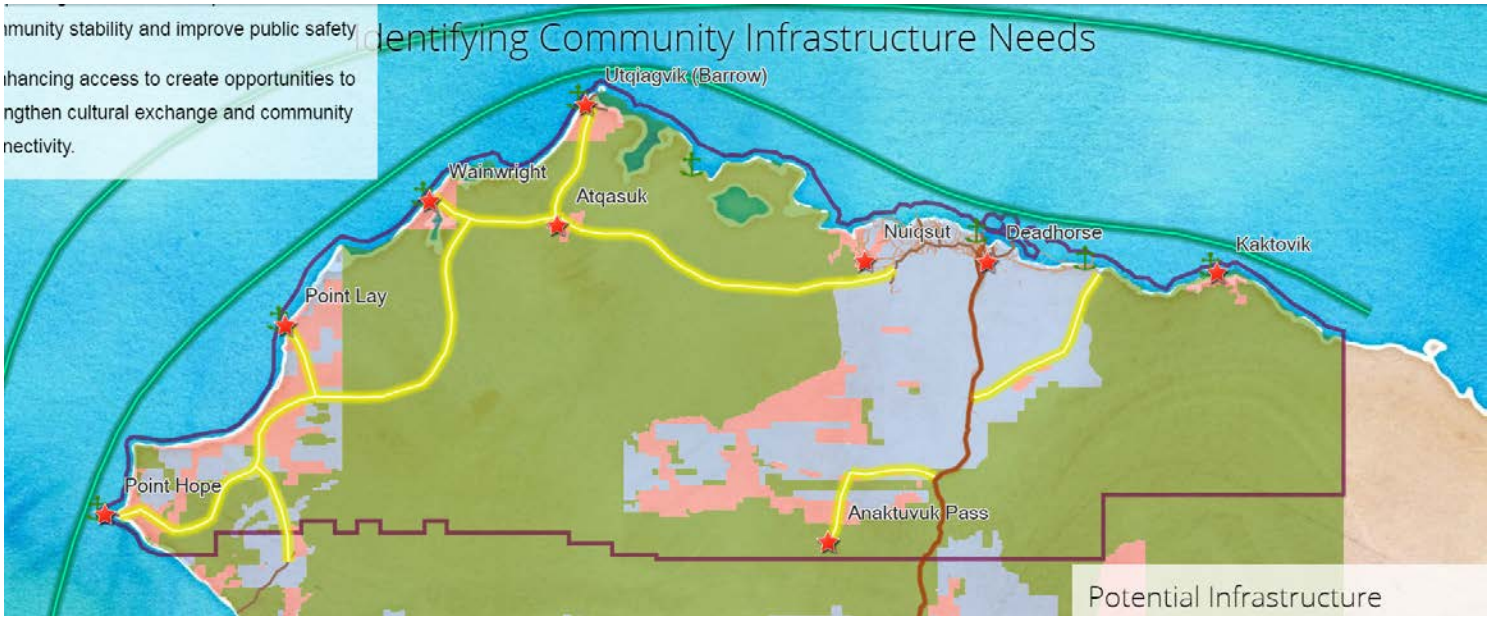
- Hold regular, cross-bureau NEPA coordinator meetings (in part, to facilitate the following recommendations).
- Develop a common language, clear objectives, and standard practices for use within NEPA and related documents for cumulative impacts analyses across bureaus.
- Develop CEQ-based, cumulative impacts analyses training and implement as required, with consistent training across bureaus.
- Each bureau create and save (in a shared space accessible by all bureaus) a consistently formatted, comprehensive, up-to-date list of past, current, and reasonably foreseeable actions.
- Review, and consistently leverage across all bureaus, any best practices and/or lessons learned related to ecosystem-based, broad scale cumulative impacts analyses work completed by the Arctic Council working groups (e.g., CAFF, PAME, and SDWG).

Enhanced Integration

- Develop a platform/clearinghouse/database for comprehensive, up-to-date information and geospatial data on past, current, and reasonably foreseeable actions, where all bureaus access and work from the same database (perhaps maintained by NSSI).
- **Create a shared, comprehensive, land and seascape scale, ecosystem-based, geospatial model to support fully integrated cumulative impacts analyses, where all bureaus are working from and maintaining the same geodatabases and maps (development leveraging NSSI STAP).**
- Support hiring a cross-bureau landscape and seascape coordinator (not a manager, but expertise and capacity to work across and within bureaus) to support Arctic cumulative impacts analysis integration and advancement, possibly stationed at DOI Alaska Secretary's Office.

Arctic Strategic Transportation and Resources – ASTAR

http://soa-dnr.maps.arcgis.com/apps/Cascade/index.html?appid=ab8be9349a08477ebfb66d017e0aec8d

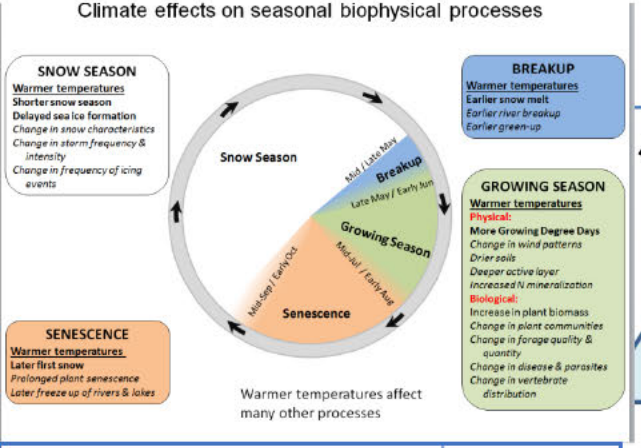


The following slides were not presented at Arctic LCC meeting, but were presented to NSSI Oversight Group (OG) on Weds Nov 8th.
General representation of foundation for Cumulative Effects Modeling.

Arctic Landscape Conservation Cooperative

Advancing Science, Understanding Change.

Quantitative Cumulative Effects Modeling: integrating climate and development impacts



Conceptual models in Arctic LCC Species and Habitat Working Group reports

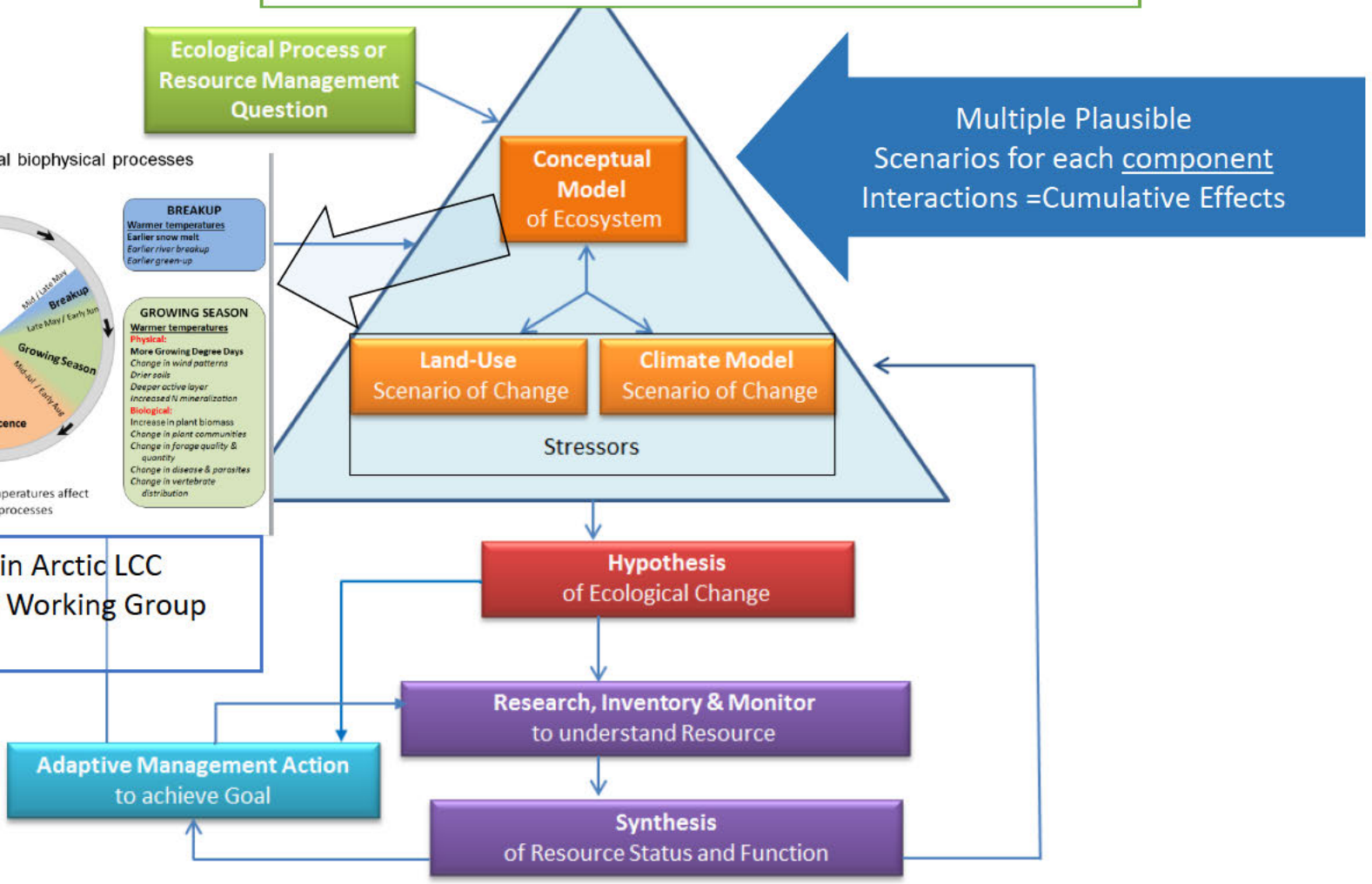
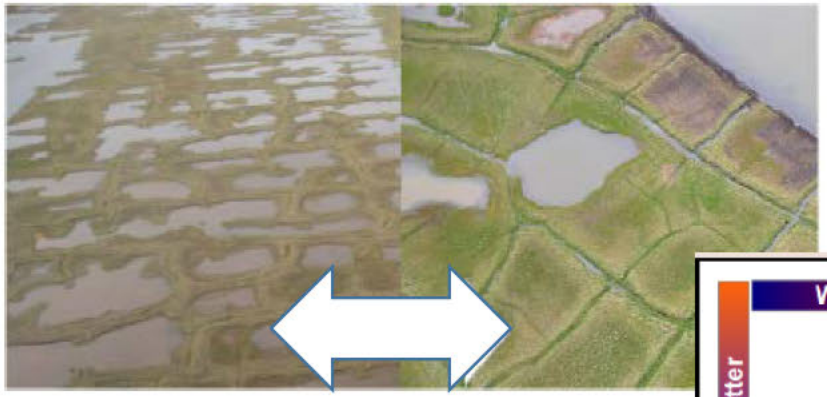


Figure by Wendy Loya

0000002894

Arctic Landscape Conservation Cooperative

Advancing Science, Understanding Change.

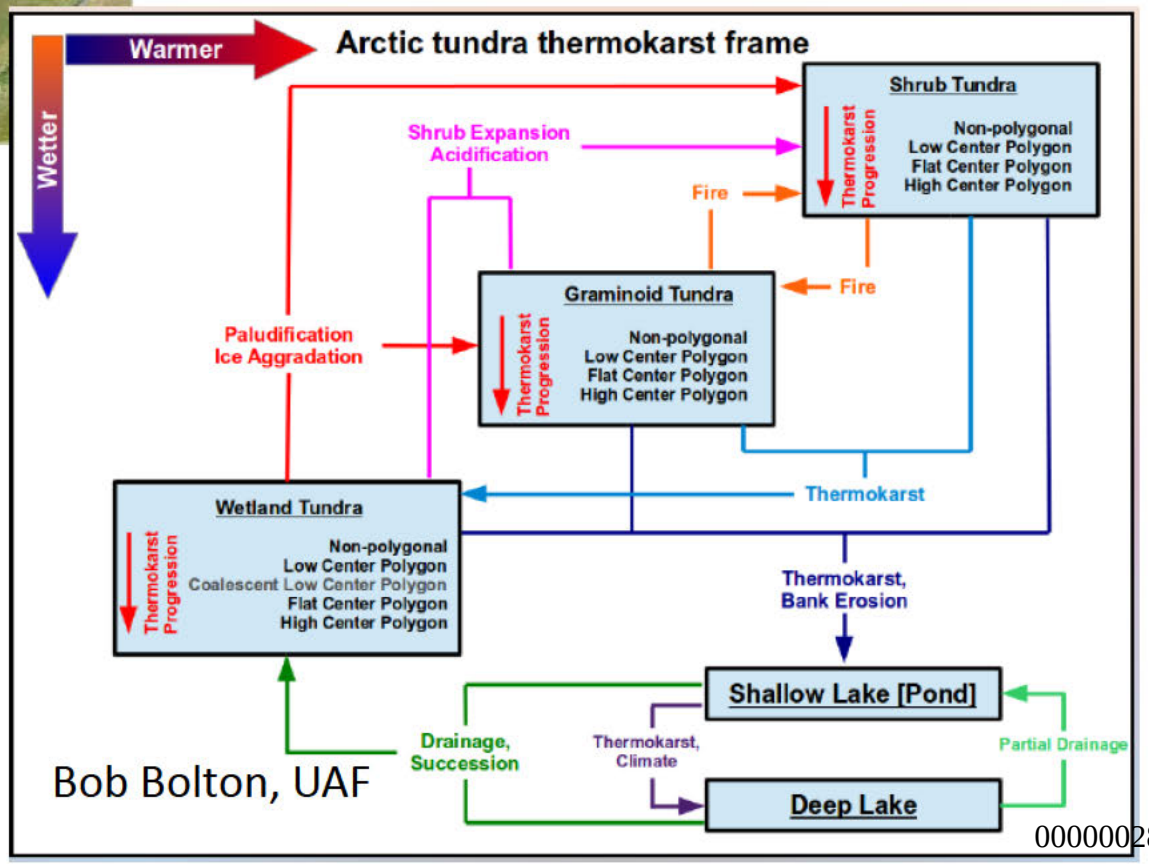


Predicting future landcover: Integrated Ecosystem Model and Alaska Thermokarst Model (ATM)

Climate Science Center, LCCs, SNAP-UAF

ATM will model landform transition associated with increasing active layer for climate scenarios

Plugged into IEM, we can project habitat change and landform stability



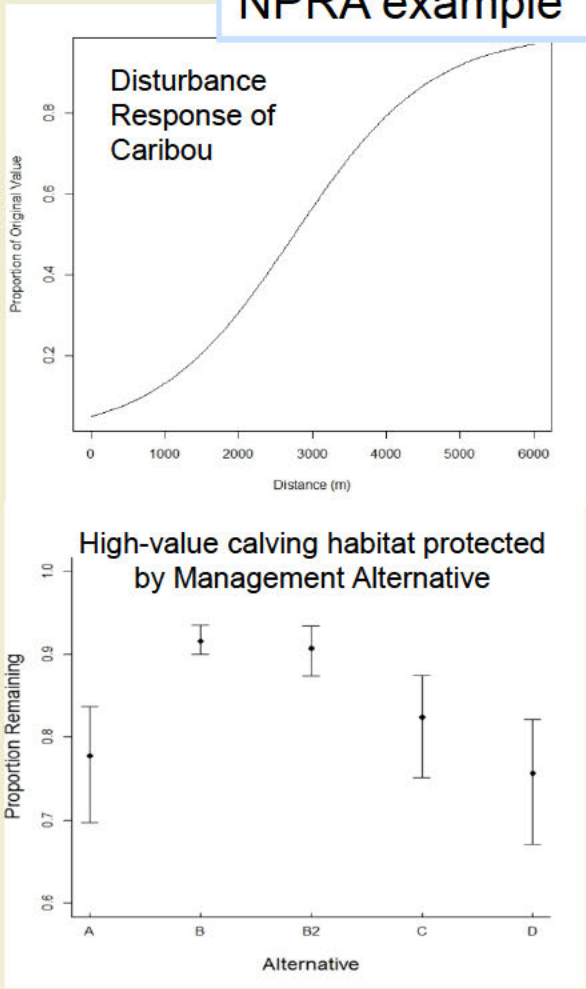
Bob Bolton, UAF

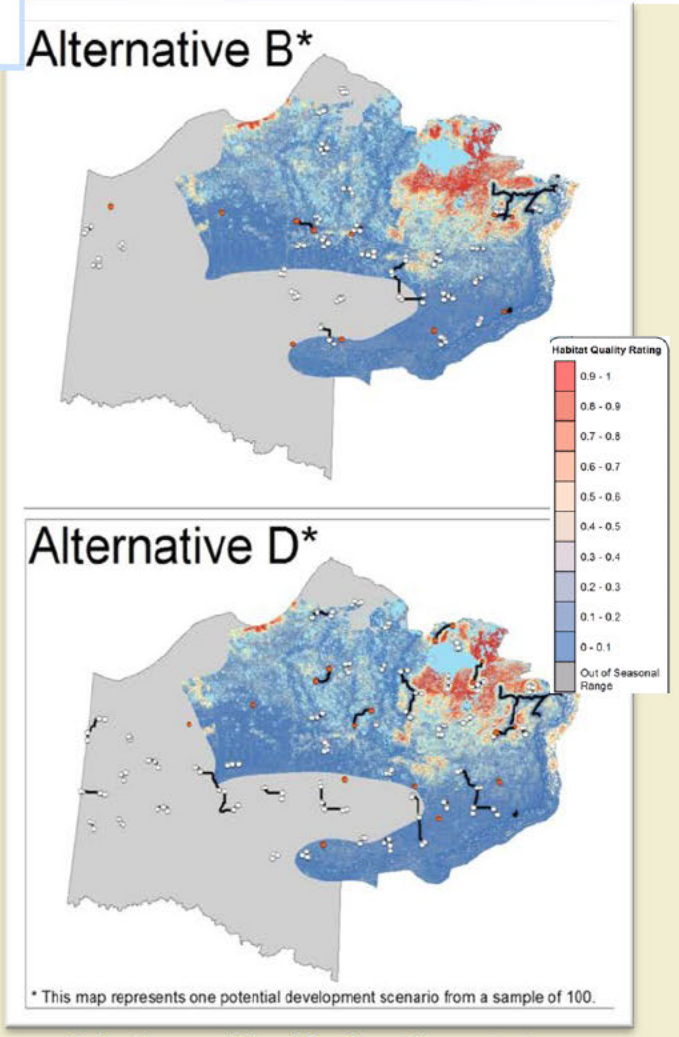
0000002895

Evaluating Climate and Oil & Gas Development impacts on High-value Habitats for Species of Interest

- Understand which habitats species use when
- Climate change projections of habitat shifts
- Probabilistic, iterative (100x) development model to account for uncertainty in where oil & gas might be discovered
- Habitat value discounted based on emperical response of species to development
- Quantitative results showing management implications for valued resources.

NPRA example





RR Wilson, AK Prichard, LS Parrett, BT Person, GM Carroll, MA Smith, .et al. 2012. Summer Resource Selection and Identification of Important Habitat Prior to Industrial Development for the Teshekpuk Caribou Herd in Northern Alaska. PloS one 7 (11), e48697

Wilson, R. R., Liebezeit, J. R. and Loya, W. M. (2013), Accounting for uncertainty in oil and gas development impacts to wildlife in Alaska. Conservation Letters, 6: 350–358.

From: kevinp
To: gnickas@wildernesswatch.org; dserra@wildernesswatch.org; jsmith@wildernesswatch.org; gary@wildrockies.org; danajohnson@wildernesswatch.org; b6 @gmail.com; b6 @gmail.com; b6 @mosquitonet.com; roger_kaye@fws.gov
Subject: From Greenwire -- ARCTIC: Senate panel approves opening refuge to drilling
Date: Wednesday, November 15, 2017 12:03:25 PM

This Greenwire story was sent to you by: kevinp@wildernesswatch.org

GREENWIRE
AN E&E NEWS PUBLICATION

ARCTIC

Senate panel approves opening refuge to drilling

Kellie Lunney, E&E News reporter

Published: Wednesday, November 15, 2017



The Senate Energy and Natural Resources Committee today approved legislation that would open the Arctic National Wildlife Refuge to drilling. Senate Energy and Natural Resources Committee

Updated at 1:55 p.m. EST.

A Senate panel this morning approved legislation that would allow drilling in a portion of the Arctic National Wildlife Refuge, an important step toward realizing a decadeslong goal for the Alaska delegation and a setback for conservation groups and other opponents of energy development in the region.

The Energy and Natural Resources Committee passed a measure 13-10 that would make the coastal plain of ANWR — a 1.5-million-acre portion of the 19-million-acre refuge — available for oil and gas drilling. The vote was largely along party lines, with all Democrats other than West Virginia's Joe Manchin opposing it and every Republican supporting it. The panel's two independents, Angus King of Maine and Bernie Sanders of Vermont, also voted against the

legislation.

Manchin said that while he supported Chairwoman Lisa Murkowski's (R-Alaska) legislation to open drilling in ANWR's so-called 1002 area, he strongly opposed its insertion into the budget reconciliation process as part of Republicans' tax plan.

Sen. Bill Cassidy (R-La.) offered a successful amendment that would increase the share of money that coastal states like Louisiana receive through revenue sharing with the federal government and would direct more funding toward restoring Louisiana's coastlands.

Democrats offered several unsuccessful amendments, some of which Murkowski ruled nongermane, including one from Sanders that sought to increase permits for renewable rather than fossil fuel energy development.

The seven rejected amendments included provisions from New Mexico's Martin Heinrich that sought stronger protections for ANWR's porcupine caribou herd, and one from ranking member Maria Cantwell of Washington that would have struck oil and gas development as a stated purpose within the refuge. Lawmakers voted to table an amendment from Sen. Debbie Stabenow (D-Mich.) that would eliminate tax breaks for major oil companies.

The bill's passage drew quick reactions.

"A clear majority of the people of the North Slope support responsible development in ANWR; they should have the same rights to economic self-determination as people in the rest of the United States," said Rex Rock Sr., president and CEO of the Arctic Slope Regional Corp. "I call on Congress to recognize that Native Alaskans are the best stewards of our lands and open up 1002."

But conservation groups, including the Natural Resources Defense Council and Alaska Wilderness League, rejected arguments that energy development could occur within the coastal plain with minimal environmental impact.

"Look up 'refuge' in the dictionary. Webster's defines it as 'a place that provides shelter or protection,'" said Niel Lawrence, NRDC's Alaska director for the Land and Wildlife Program.

He added: "Subjecting America's last pure wildland — its caribou and musk oxen, the coastal plain, and the Gwich'in way of life — to the destruction of seismic testing and oil extraction is the very opposite of providing shelter and protection."

The League of Conservation Voters today announced a $550,000 multistate television ad campaign urging lawmakers to reject efforts to drill in ANWR. The ads are running in the Washington area as well as parts of Minnesota, Maine and New York.

Sparring over NEPA, revenue

Murkowski and Cantwell engaged in a robust and, at times, tense policy debate over the pros and cons of energy development in the refuge's 1002 area.

Murkowski's legislation "turns the coastal plain into an oil field" and would undermine environmental laws like the National Environmental Policy Act, Cantwell said.

The Alaska Republican reiterated that the 1980 Alaska National Interest Lands Conservation Act set aside the 1002 area as "a small portion of the non-wilderness" for possible future energy

development, and said her bill does not contain any language that waives NEPA or other environmental statutes.

"We have not pre-empted the environmental review, nor have we limited the consultation process with Alaska Natives in any way," Murkowski said. "All relevant laws, all regulations and executive orders will apply under this language."

But Cantwell and other Democrats argued that while the legislation might not technically waive NEPA, for instance, it would create a different management structure that would allow the Interior secretary more flexibility to prioritize energy development over wildlife protection in the coastal plain.

The legislation "confuses" the purpose of ANWR as a refuge, Cantwell said. "It makes it impossible for the refuge to win under this language," she said. The Washington Democrat also took the opportunity to jab Interior Secretary Ryan Zinke, referring to him as "no Teddy Roosevelt."

Murkowski's bill would allow up to 2,000 acres of surface land in the coastal plain for production and support facilities. It would direct the Interior Department to conduct two lease sales within ANWR's 1002 area within the 10-year budget window, the first within four years of enactment and the second within seven years.

It would stipulate a 50-50 revenue-sharing split between the state and the federal government, an "agreement that we are willing to make out of necessity, even though our Statehood Act and the Mineral Leasing Act provided for a 90-10 split in Alaska's favor," Murkowski said.

It also would impose a 16.67 percent royalty on oil and gas produced in the refuge's 1002 area. By way of comparison, the government charges royalties of 12.5 percent for onshore oil and gas production and 18.75 percent for energy developed in the outer continental shelf.

The nonpartisan Congressional Budget Office estimated that drilling in ANWR's coastal plain would bring in about $1.1 billion for Uncle Sam over the next decade after the federal government splits the revenue with Alaska.

That assumes a total $2.2 billion coming in between 2018 and 2027 from oil and gas drilling in the 1002 area, a figure that includes estimated proceeds from bonus bids paid by companies in search of leases (***Greenwire***, Nov. 9).

ANWR vs. health care?

Murkowski's ANWR gambit is complicated by its attachment to the budget reconciliation process and the GOP's tax plan.

The fiscal 2018 budget resolution that Congress passed last month tasked Murkowski's panel with finding $1 billion during the next decade to help offset Republicans' $1.5 trillion tax cut; those instructions gave her the opportunity to write legislation paving the way for drilling in the refuge's coastal plain.

Attaching ANWR language to the larger tax package through reconciliation allows it to move by a simple majority vote without the threat of a filibuster. That means it won't need any Democratic support in the Senate.

It's the best shot the Alaska delegation has had in decades to realize its goal of allowing energy

development in the refuge's coastal plain.

But those odds were jeopardized yesterday with a revised bill from Senate Finance Chairman Orrin Hatch (R-Utah) that would repeal the individual mandate tax that lies at the heart of the Affordable Care Act (ACA), the Obama-era health care law that Republicans have failed repeatedly to repeal after years of promises to do so.

Murkowski voted down the Senate GOP's efforts to repeal much of the ACA earlier this year. In doing so, she repeatedly cited the potential impact on health coverage in her state, which has expanded under the law.

She now may face a choice of whether to secure the legislative victory on ANWR that has eluded the Alaska delegation — including her father, former Energy and Natural Resources Chairman Frank Murkowski (R-Alaska) — for nearly 40 years, or maintain health coverage for thousands of Alaskans.

The chairwoman said after the markup that she hasn't had a chance to look at the revised tax legislation and was singularly focused on getting her legislation through committee today.

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From: kevinp
To: gnickas@wildernesswatch.org; dserra@wildernesswatch.org; jsmith@wildernesswatch.org; gary@wildrockies.org; danajohnson@wildernesswatch.org; b6 @gmail.com; b6 @gmail.com; b6 @mosquitonet.com; roger_kaye@fws.gov
Subject: From Greenwire -- ARCTIC: Jane Goodall urges Senate to block ANWR drilling
Date: Wednesday, November 15, 2017 12:04:52 PM

This Greenwire story was sent to you by: kevinp@wildernesswatch.org

GREENWIRE

AN E&E NEWS PUBLICATION

ARCTIC

Jane Goodall urges Senate to block ANWR drilling

Published: Wednesday, November 15, 2017

Famed primatologist Jane Goodall sent a letter yesterday to all U.S. senators asking them to oppose Republican efforts to open up Alaska's Arctic National Wildlife Refuge to oil and gas drilling.

Republicans hope drilling in ANWR will help offset the cost of their tax reform plan (*see related story*).

"If we violate the Arctic Refuge by extracting the oil beneath the land, this will have devastating impact for the Gwich'in people for they depend on the caribou herds to sustain their traditional way of life," wrote Goodall, who is British.

Goodall's plea falls in line with the opinions of many U.S. scientists and Democrats, who say drilling in the area would largely defeat the purpose of protecting it.

"Does it take the voice of Jane Goodall to beg senators to stop hurting indigenous people and animals?" asked Senate Energy and Natural Resources Committee ranking member Maria Cantwell (D-Wash.).

"She's calling on them to set a conservation example instead of creating the next tragedy," Cantwell said (Timothy Gardner, **Reuters**, Nov. 14). **— NS**

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From:	Fischbach, Tracy
To:	Edward Decleva
Subject:	Fwd: latest version
Date:	Wednesday, November 15, 2017 12:30:50 PM
Attachments:	Arctic NWR permit application NPRM 10.12.17_AK edits clean copy with comments.docx Arctic NWR permit application NPRM 10.12.17_AK edits redline.docx

---

FYI - There may be a new version coming soon.

-T

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

Hours: Mon - Thurs 9:15 am to 3:15 pm
"Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie

Need access to Refuge Documents?
Online Document Database (ServCat)
Need Refuge land status info for Alaska?
FWS Region 7 Land Mapper (FWS version)
FWS Region 7 Land Mapper (Public version)
Region 7 GeoPDF Map Portal

---------- Forwarded message ----------
From: **Fischbach, Tracy** <tracy_fischbach@fws.gov>
Date: Thu, Nov 2, 2017 at 2:08 PM
Subject: Fwd: latest version
To: Amee Howard <amee_howard@fws.gov>

FYI -

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

Hours: Mon - Thurs 9:15 am to 3:15 pm
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Need access to Refuge Documents?
Online Document Database (ServCat)
Need Refuge land status info for Alaska?
FWS Region 7 Land Mapper (FWS version)
FWS Region 7 Land Mapper (Public version)

Region 7 GeoPDF Map Portal

---------- Forwarded message ----------
From: **Fischbach, Tracy** <tracy_fischbach@fws.gov>
Date: Wed, Oct 25, 2017 at 8:28 AM
Subject: Fwd: latest version
To: Greg Siekaniec <greg_siekaniec@fws.gov>

FYI - Some of your comments made me think that perhaps you hadn't seen this latest version of the 1002 proposed rule. The preamble has been rewritten by the solicitor's and contains some interesting discussion.

-T

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

Hours: Mon - Thurs 9:15 am to 3:15 pm
"Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie

---------- Forwarded message ----------
From: **Brady, Stephanie** <stephanie_brady@fws.gov>
Date: Thu, Oct 12, 2017 at 4:15 PM
Subject: Re: latest version
To: "Wilkinson, Susan" <susan_wilkinson@fws.gov>
Cc: Mitch Ellis <mitch_ellis@fws.gov>, Socheata Lor <socheata_lor@fws.gov>, Doug Damberg <doug_damberg@fws.gov>, Ryan Mollnow <ryan_mollnow@fws.gov>, Tracy Fischbach <tracy_fischbach@fws.gov>

Thank you Susan for the opportunity to review the Arctic oil exploration proposed rule - I have attached our edits - both in track changes and a clean copy with comment bubbles. Please let me know if you need anything else.
Stephanie

stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |
U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska |
907.306.7448

On Tue, Oct 10, 2017 at 5:58 AM, Wilkinson, Susan <susan_wilkinson@fws.gov> wrote:

> Please let me know if you have concerns.
>
> --
> Susan Wilkinson

Division of Policy, Performance, and Management Programs
U.S. Fish and Wildlife Service Headquarters
5275 Leesburg Pike, MS: BPHC
Falls Church, VA 22041-3803
703-358-2506

Billing Code: 4333-15

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 37

[Docket No. FWS–R7–NWRS–2017–0072; FF07R00000 1XX FXRS12610700000]

RIN 1018–BC92

Coastal Plain of the Arctic National Wildlife Refuge, Alaska; Geological and Geophysical Exploration Plans; Application Requirements

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule; availability of draft environmental assessment.

SUMMARY: We, the U.S. Fish and Wildlife Service, propose to amend the regulations regarding the dates when an application may be submitted for a permit for a geological and geophysical exploration plan on the Arctic National Wildlife Refuge lands described in the Alaska National Interest Lands Conservation Act. This action is an update to our regulations to

Commented [BS1]: Or just delete this sentence

allow opportunities for applications to conduct seismic exploration. Further, the ability to collect new information on oil and gas resources will better inform public policy decisions. We are taking this action in support of Executive Order 13783, Promoting Energy Independence and Economic Growth.

DATES: Electronic comments on this proposed rule via http://www regulations.gov must be submitted by 11:59 p m. Eastern time on [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]. Comments submitted by mail must be postmarked no later than [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

ADDRESSES: *Document availability:* The draft environmental assessment prepared in support of this proposed rule may be found at http://www regulations.gov in Docket No. FWS–R7–NWRS–2017–0072. Information and supporting documentation that we receive in response to this proposed rule will be available to you for review at *http://www.regulations.gov*, or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, Alaska Regional Office, 1011 E. Tudor Rd., Mail Stop 211, Anchorage, AK 99503; telephone (907) 306–7448.

Comment submission: You may submit comments on this proposed rule or the draft environmental assessment by one of the following methods:

(1) Electronically: Go to the Federal eRulemaking Portal: *http://www.regulations.gov*. Search for FWS–R7–NWRS–2017–0072, which is the docket number for this

Commented [LS2]: Too many words Get to the point

Commented [BS3]: This makes is seem as tho this was just a regulatory oversight – not changed by the Departments view of the law

Commented [BS4]: Further in the background it is stated that the regs are being re-visited for the ability to collect new scientific information about the Coastal Plain, including its oil and gas resources, will better inform public policy decisions on use and management of the natural resources of the Plain

Plus the current regs confine the dates by which an applicant can apply to conduct seismic exploration

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rulemaking. You may submit a comment by clicking on "Comment Now!" Please ensure that you have found the correct rulemaking before submitting your comment.

(2) By hard copy: Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R7–NWRS–2017–0072, U.S. Fish and Wildlife Service, MS: BPHC, 5275 Leesburg Pike, Falls Church, VA 22041–3803.

We will not accept email or faxes. We will post all comments on *http://www.regulations.gov*. This generally means that we will post any personal information you provide us. For additional information, see **Request for Comments**, below.

FOR FURTHER INFORMATION CONTACT: Stephanie Brady, National Wildlife Refuge System, Alaska Regional Office, 1011 E. Tudor Rd., Mail Stop 211, Anchorage, AK 99503; telephone (907) 306–7448; fax (907) 786–3976; stephanie_brady@fws.gov.

SUPPLEMENTARY INFORMATION:

Background

The Arctic National Wildlife Refuge (hereafter, Arctic Refuge), located in northeastern Alaska, is administered by the U.S. Fish and Wildlife Service (Service). The Arctic Refuge was first established in 1960 as the Arctic National Wildlife Range through Public Land Order 2214, for the purpose of preserving unique wildlife, wilderness, and recreational values. The original 8.9-million-acre Range was withdrawn from all forms of appropriation under public land laws, including mining, but not from mineral leasing.

The Arctic Refuge was expanded to 19 million acres with the enactment of the Alaska National Interest Lands Conservation Act (ANILCA) (Public Law 96–487; 16 U.S.C. 410hh–

0000002908

3233, 43 U.S.C. 1602–1784). Section 303(2) of Public Law 96–487 set forth that the purposes for which the Arctic Refuge was established and should be managed include:

(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including participation in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge.

Under ANILCA, the Service was to provide for a comprehensive and continuing inventory and assessment of the fish and wildlife resources of the coastal plain of the Arctic Refuge. This effort was to include an analysis of the impacts of oil and gas exploration, development, and production, and the Service was directed to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources (16 U.S.C. 1342). The "coastal plain" was defined in section 1002 of Public Law 96–487 by a map entitled "Arctic National Wildlife Refuge," dated August 1980 (Figure 1). Biological studies and geological exploration coordinated by the Service, U.S. Geological Survey (USGS), and Bureau of Land Management (BLM) were initiated shortly after enactment of the Act. In April 1982, the Service completed the initial report summarizing

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known information about fish and wildlife and their habitats occurring on the Arctic Refuge coastal plain (hereafter referred to as “the section 1002 area”).

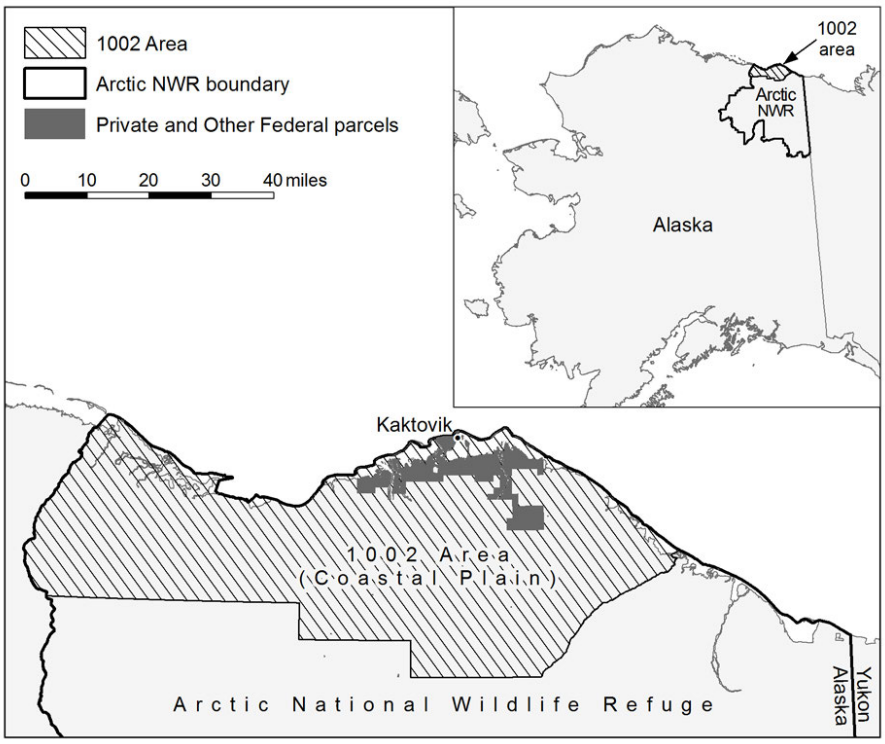


Figure 1. Arctic National Wildlife Refuge showing the coastal plain and section 1002 area.

Section 1002(d) of Public law 96-487 directed the Secretary of the Interior to establish guidelines for exploration through regulations within 2 years after enactment of the Act. In 1982, the Service published a proposed rule to establish guidelines for carrying out exploratory activities on the coastal plain of the Arctic Refuge (47 FR 41060, September 16, 1982). Publication of the proposed regulations had been delayed as a result of the litigation over the decision in March 1981 to transfer responsibility for developing the guidelines from the Service

to the USGS. *See Trustees for Alaska* v. *Watt*, 524 F. Supp. 1303 (D. Alaska 1981), *aff'd per curium*, 690 F.2d 1279 (9th Cir. 1982). The final rule with the regulations along with the "Record of Decision for Oil and Gas Exploration Within the Coastal Plain of the Arctic National Wildlife Refuge, Alaska" (ROD) was published April 19, 1983 (48 FR 16858) with the regulations being codified as 50 CFR part 37. The ROD was based upon the Final Environmental Impact Statement, which had been filed with the Environmental Protection Agency on February 23, 1983, and made available to the public on March 4, 1983. The guidelines were subsequently revised to change the deadlines for submission of exploration plans to the Department for consideration. *See* 49 FR 7569 (March 1, 1984).

Plans were submitted to the Service in accordance with the regulations with plans for summer access by helicopter during 1983–85 being then approved. *See* U.S. Dept. of the Interior, Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment: Report and Recommendation to the Congress of the United States and Final Legislative Environmental Impact Statement, Vol. 1 at 3 (April 1987) ("Section 1002 Report"). The summer exploratory activities were limited to field observations, surface measurements, mapping, and collection of rock samples. One helicopter-supported gravity survey permit was issued for the summer of 1983. Winter exploration plans involving mechanized surface transportation to conduct seismic surveys were approved for the winters of 1983–84 and 1984–85(Section 1002 Report). One permittee, representing an industry group of over 20 companies, was issued a permit to collect the seismic data. More than 1,300 line miles of seismic data were acquired as a result of the winter exploratory activities during the two winters (Section 1002 Report). No exploratory activities of this type have occurred in the Arctic Refuge Coastal Plain since 1985.

The Section 1002 Report was submitted to Congress in April 1987. The report recommended that the entire Arctic Refuge coastal plain be made available for oil and gas leasing (Section 1002(h) Report). The submittal was delayed 7 months past the statutory deadline by a court ruling requiring the Secretary to seek public participation in preparation of the legislative environmental impact statement accompanying the report. *See Trustees for Alaska* v. *Hodel*, 806 F.2d 1378 (9th Cir. 1986).

The Service has historically interpreted the authorization to conduct exploratory activities under section 1002 to have expired with the submittal of the section 1002(h) report to Congress. The legal underpinnings for this position were set out in a January 18, 2001, memorandum to Secretary Bruce Babbitt from Solicitor John Leshy (2001 Memorandum) responding to a letter from Congressman Edward Markey asking what oil and gas related activities are currently allowed or prohibited on the coastal plain of the Arctic Refuge. While opining that the authority expired with submittal of the April 1987 report to Congress, the 2001 Memorandum noted that there were two possible answers to the question because of the wording of section 1002.

The legal interpretation, that the authority to authorize further exploration activities under section 1002 expired in 1987, was tested when the State of Alaska sued the Department of the Interior in 2015. *State of Alaska* v. *Sally Jewell, et al.*, No. 3:14-cv-00048-SLG (D. Alaska). In that suit, the State of Alaska appealed the Service denial of the State's permit request to conduct exploratory work on the Coastal Plain arguing that there was no cutoff of authority in section 1002. In affirming the Service's rejection of the application based upon the interpretation of section 1002 articulated in the 2001 Memorandum, the Court applied the two-step process established by the U.S. Supreme Court in *Chevron U.S.A.* v. *Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984). Applying the first step, the Court concluded that section 1002 was

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ambiguous as to whether additional exploration work was authorized under section 1002, a position advanced by the United States in its briefing. The Court then considered the Service's interpretation of section 1002 and concluded it was a permissible construction. In so finding, the court noted that the Service's construction is not the only permissible interpretation or necessarily the Court's.

It is well established that a department is not bound by prior interpretations of statutes and that it may make changes. Prior interpretations of ANILCA section 1002 focused on the deadline for a report to Congress

This continuing authority recognizes that new and better technology is likely to be developed that can be put to use to expand human knowledge and understanding of the many natural resources of the Coastal Plain. The ability to collect new scientific information about the Coastal Plain, including its oil and gas resources, will better inform public policy decisions on use and management of the natural resources of the Coastal Plain. Without the authority to do further exploration work, the scientific knowledge about the subsurface resources of the Coastal Plain will be limited to what was learned over 30 years ago. Decisions on management and best use of all of the resources on the Coastal Plain will therefore not be informed by the latest and best scientific information.

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The long-term national defense and security of the nation is dependent upon reliable and secure sources of domestic energy resources. President Trump in his March 28, 2017, Executive Order, Promoting Energy Independence and Economic Growth, placed specific emphasis on the need to develop energy resources when he stated:

Section 1 Policy. (a) It is in the national interest to promote clean and safe development of the Nation's vast energy resources, while at the same time avoiding regulatory burdens that

unnecessarily encumber energy production, constrain economic growth, and prevent job creation. Moreover, the prudent development of these natural resources is essential to ensuring the Nation's geopolitical security.

Central to meeting the goal of developing the country's natural resources in a responsible manner to ensure the Nation's geopolitical security is having and considering the best and latest information about the oil and gas resources of the Coastal Plain that science and technology can provide. There have been many advances in geophysical sciences since the 1980's that can today be utilized to further advance the level of knowledge about the oil and gas resources of the Coastal Plain beyond what was learned from exploration work done over 30 years ago. It would be imprudent to make important decisions for development and implementation of plans for securing oil and gas resources and maintaining energy infrastructure such as the Trans Alaska Pipeline System over the long term without securing and utilizing the knowledge that can be gleaned from new modern exploration work on the Coastal Plain. In addition to informing long-term energy security planning, the availability of this new data will further the Service's resource management of the Coastal Plain.

Proposed Changes

In this document, we propose to change the regulations found at 50 CFR part 37 by removing language that restricts the timeframe in which a special use permit to conduct exploratory activities may be issued.

Request for Comments

You may submit information concerning this proposed rule or the draft environmental assessment by one of the methods listed in **ADDRESSES**. We will not accept comments sent by e-mail or fax or to an address not listed in **ADDRESSES**.

If you submit a comment via *http://www.regulations.gov*, your entire submission — including any personal identifying information, such as your address, phone number, or e-mail address—will be posted on the Web site. If your submission is made via a hardcopy comment that includes personal identifying information, you may request at the top of your document that we withhold this personal identifying information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on *http://www.regulations.gov*.

Endangered Species Act Consideration

Section 7 of the Endangered Species Act (16 U.S.C. 1536) requires the Secretary of the Interior to "review other programs administered by him (or her) and utilize such programs in furtherance of the purposes of the Act" and to "insure that any action authorized, funded, or carried out * * * is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat . . . ." Prior to issuance of these regulations, we would consult under section 7 of the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 et seq.), to ensure that any applications for exploration in the section 1002 area of the Arctic Refuge are not likely to jeopardize the continued existence of any species designated as endangered or threatened, or modify or destroy its critical habitat, and that the regulations are consistent with conservation programs for those species. Consultation under section 7 of the Act for the regulations may cause us to change these proposed regulations. Our biological opinion resulting from the section 7 consultation will be a

public document available from the person listed under **FOR FURTHER INFORMATION CONTACT** or via *http://www.regulations.gov* in Docket No. FWS–R7–NWRS–2017–0072.

Required Determinations

Executive Order 13771—Reducing Regulation and Controlling Regulatory Costs

This proposed rule is considered to be an Executive Order (E.O.) 13771 deregulatory action (82 FR 9339, February 3, 2017) because it would amend regulations that currently restrict the dates when a permit application for an exploration plan for the Arctic Refuge would be allowed.

Regulatory Planning and Review (Executive Order 12866 and 13563)

The Office of Management and Budget (OMB) has determined that this rule is not significant. OMB bases its determination upon the following four criteria:

(a) Whether the rule will have an annual effect of $100 million or more on the economy or adversely affect an economic sector, productivity, jobs, the environment, or other units of the government.

(b) Whether the rule will create inconsistencies with other agencies' actions.

(c) Whether the rule will materially affect entitlements, grants, user fees, loan programs, or the rights and obligations of their recipients.

(d) Whether the rule raises novel legal or policy issues.

The proposed rule would remove the regulations that restrict the dates when a permit application may be submitted for a geophysical exploration plan on the section 1002 area in the Arctic Refuge. Thus, this rule would open the process to accept oil exploration applications for

the section 1002 area. Under the proposed rule as an administrative action, potential costs would be limited to application costs incurred by companies choosing to submit applications and by the Service to process the applications.

This analysis is limited in scope and addresses only the administrative action by the Service to accept and review new exploration plans in the Arctic Refuge. Therefore, this analysis does not evaluate costs and benefits related to the issuance of special use permits for specific exploration plans as the details of those plans are currently unknown, and the analysis would be speculative in regards to methods, location, and timing of the exploration activities. Furthermore, the review and approval process for a special use permit in the Arctic Refuge must undergo a separate process under the National Environmental Policy Act (NEPA). ~~Geological exploration and assessment undertakings under the NEPA process could include a number of activities such as seismic testing, aerial surveying, road construction, and more.~~ These exploratory activities have potential impacts including, but not limited to: polar bear viewing tourism, subsistence hunting (especially caribou) by residents, and cultural use by Alaska Natives. Furthermore, "available information indicates that any ANWR oil would be scattered among multiple smaller fields rather than concentrated in a single large field, which would make development more expensive and potentially expand the area in which any environmental effects might occur" (Congressional Research Service 2015).

Measures such as Secretarial Order No. 3352 have occurred to move forward toward energy development in the Arctic Refuge (Department of the Interior May 2017). However, Section 1003 of ANILCA states "production of oil and gas from the Arctic National Wildlife Refuge is prohibited and no leasing or other development leading to production of oil and gas

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from the [Refuge] shall be undertaken until authorized by an act of Congress." Therefore, this analysis does not estimate the potential costs and benefits of oil drilling and extraction.

With this proposed rule, we solicit public input on potential economic impacts and the number of businesses affected to help quantify costs and benefits. Please see the **Request for Comments** section at the end of **SUPPLEMENTARY INFORMATION** for further information about submitting comments.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions) (5 U.S.C. 601 et seq.). However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule would not have a significant economic impact on a substantial number of small entities. Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for "significant impact" and a threshold for a "substantial number of small entities." See 5 U.S.C. 605(b). SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule would not have a significant economic impact on a substantial number of small entities.

The U.S. Small Business Administration (SBA) defines a small business as one with annual revenue or employment that meets or is below an established size standard. To assess the effects of the proposed rule on small entities, we focus on businesses that operate and/or develop

oil gas field properties (North American Industry Classification System (NAICS) 211) that have fewer than 500 employees. According to the U.S. Census Bureau, there are 8,064 businesses under NAICS 211, of which over 99 percent qualify as small businesses (2012). Thus, we expect that most entities that may apply for a special use permit would be considered small as defined by the SBA.

Under the proposed rule, individual businesses would have the opportunity to submit applications for a geological and geophysical exploration plan on the section 1002 area in the Arctic Refuge. Although estimating the number of potential future applicants would be speculative, the last seismic survey (completed in 1985) was conducted by 27 companies under 1 permit. If 27 individual companies applied for separate special use permits under the proposed rule, this would represent less than 1 percent of small businesses.

We therefore certify that this proposed rule would not have a significant economic effect on a substantial number of small entities as defined under the Regulatory Flexibility Act (5 U.S.C. 601 et seq.). A Regulatory Flexibility Analysis is not required. Accordingly, a Small Entity Compliance Guide is not required.

Small Business Regulatory Enforcement Fairness Act

This proposed rule is not a major rule under 5 U.S.C. 804(2), the Small Business Regulatory Enforcement Fairness Act. This rule:

a. Would not have an annual effect on the economy of $100 million or more.

b. Would not cause a major increase in costs or prices for consumers; individual industries; Federal, State, tribal, or local government agencies; or geographic regions.

c. Would not have significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of U.S.-based enterprises to compete with foreign-based enterprises.

Unfunded Mandates Reform Act

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.), we have determined the following:

a. This rule would not ''significantly or uniquely'' affect small governments. A small government agency plan is not required. Actions under the proposed rule would not affect small government activities in any significant way.

b. This rule would not produce a Federal mandate of $100 million or greater in any year. It would not be a ''significant regulatory action'' under the Unfunded Mandates Reform Act.

Takings (Executive Order 12630)

In accordance with E.O. 12630, this proposed rule would not have significant takings implications. A takings implication assessment is not required. This proposed rule does not contain a provision for taking of private property.

Federalism (Executive Order 13132)

This proposed rule does not have sufficient Federalism effects to warrant preparation of a federalism summary impact assessment under E.O. 13132. It would not interfere with the ability of States to manage themselves or their funds. This proposed rule, if adopted, would affect the

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geological exploration of the coastal plain of the Arctic Refuge, which is managed by the Service in Alaska, and would not have a substantial direct effect on State or local governments in Alaska.

Civil Justice Reform (Executive Order 12988)

In accordance with E.O. 12988, the Office of the Solicitor has determined that this proposed rule does not unduly burden the judicial system and meets the requirements of sections 3(a) and 3(b)(2) of E.O. 12988.

Paperwork Reduction Act

This rule does not contain any new collection of information that require approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). OMB has previously approved the information collection requirements associated with Service Special Use Permit Applications (FWS Form 3–2469) and assigned OMB Control Number 1018–0162 (expires December 31, 2019). An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act

Our draft environmental assessment is part of the administrative record for this proposed rule. In accordance with the National Environmental Policy Act (NEPA, 42 U.S.C. 4321 et seq.) and part 516 of the U.S. Department of the Interior Manual (516 DM), the Service proposes amending the existing language in 50 CFR Part 37—Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska, related to exploration plans [50 CFR

37.21(b) and (c)], to remove the date restrictions now in place for those plans. Our draft environmental assessment sets forth that the proposed action to change the regulatory language as described in the rule portion of this document will have no significant impacts on the environment.

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we will evaluate the potential effects on federally recognized Alaska Native tribal governments and Alaska Native corporations through a 810 analysis. . This rule would not interfere with the ability of Tribes to manage themselves or their funds or to regulate exploration activities on Tribal lands. However, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis, and we are seeking their input to evaluate this proposed rule. In addition, we have evaluated this proposed rule under Alaska Native Claims Settlement Act corporation policies. We will consult with Alaska Native tribes and Alaska Native corporations regarding the proposed changes in this rule for the Arctic Refuge.

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Energy Supply, Distribution, or Use (Executive Order 13211)

Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking actions that could have significant adverse effects on energy supply, distribution, or use. We believe that the rule could have positive effects on energy supplies, distribution, or use.

Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.

Clarity of This Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

(a) Be logically organized;

(b) Use the active voice to address readers directly;

(c) Use common, everyday words and clear language rather than jargon;

(d) Be divided into short sections and sentences; and

(e) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in **ADDRESSES**, above. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that you find unclear, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

List of Subjects in 50 CFR Part 37

Administrative practice and procedure, Alaska, Environmental protection, Historic preservation, Oil and gas exploration, Penalties, Reporting and recordkeeping requirements, Surety bonds, and Wildlife refuges.

Proposed Regulation Promulgation

Accordingly, we propose to amend part 37 of title 50 of the Code of Federal Regulations as set forth below:

PART 37—GEOLOGICAL AND GEOPHYSICAL EXPLORATION OF THE COASTAL PLAIN, ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

1. The authority citation for part 37 is revised to read as follows:

AUTHORITY: 5 U.S.C. 301; 16 U.S.C. 715s and 3142; and 31 U.S.C. 9701.

2. Amend § 37.21 by revising paragraphs (b) and (c) to read as follows:

§ 37.21 Application requirements.

* * * * *

(b) Any person wanting to conduct exploratory activities may apply for a special use permit by submitting for review and processing one or more written exploration plans, in triplicate, to the Regional Director, Region 7, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503.

(c) In addition to containing the information required in paragraph (d) of this section, any exploration plan submitted shall describe the applicant's plan for carrying out an integrated program of exploratory activities in such a manner as will satisfy the objective and limitations stated in § 37.1. If an applicant submits an exploration plan in any given year, with the intention of submitting another exploration plan the following year, the applicant shall describe in its initial plan how its future exploratory activities will be integrated with those proposed under its initial plan. Each exploration plan submitted must be published and be the subject of a public hearing in accordance with requirements of § 37.22(b).

* * * * *

§ 37.52 [Amended]

3. Amend § 37.52 by:

a. In the first sentence, removing the period and adding in its place a comma and the words “for 3 years from the date the permittee submits the data and information to the Regional Director pursuant to § 37.53.”; and

b. In the second sentence, removing the words “Until September 2, 1989, the” and adding in their place the word “The”.

Dated: _____.

_____

Principal Deputy Assistant Secretary for Fish and Wildlife and Parks.

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Billing Code: 4333-15

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 37

[Docket No. FWS–R7–NWRS–2017–0072; FF07R00000 1XX FXRS12610700000]

RIN 1018–BC92

Coastal Plain of the Arctic National Wildlife Refuge, Alaska; Geological and Geophysical Exploration Plans; Application Requirements

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule; availability of draft environmental assessment.

SUMMARY: We, the U.S. Fish and Wildlife Service, propose to amend the regulations regarding the dates when an application may be submitted for a permit for a geological and geophysical exploration plan on the Arctic National Wildlife Refuge lands described in the Alaska National Interest Lands Conservation Act. This action is an ~~necessary~~ update to our

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regulations ~~as the dates in the regulations are long past and confine~~ to allow ~~the window of~~ opportunity~~ies to allow~~ for applications to conduct seismic exploration. Further, the ability to collect new information on oil and gas resources will better inform public policy decisions. We are taking this action in support of Executive Order 13783, Promoting Energy Independence and Economic Growth.

DATES: Electronic comments on this proposed rule via http://www regulations.gov must be submitted by 11:59 p m. Eastern time on [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]. Comments submitted by mail must be postmarked no later than [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

ADDRESSES: *Document availability:* The draft environmental assessment prepared in support of this proposed rule may be found at http://www regulations.gov in Docket No. FWS–R7–NWRS–2017–0072. Information and supporting documentation that we receive in response to this proposed rule will be available to you for review at *http://www.regulations.gov*, or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, Alaska Regional Office, 1011 E. Tudor Rd., Mail Stop 211, Anchorage, AK 99503; telephone (907) 306–7448.

Comment submission: You may submit comments on this proposed rule or the draft environmental assessment by one of the following methods:

(1) Electronically: Go to the Federal eRulemaking Portal: *http://www.regulations.gov*. Search for FWS–R7–NWRS–2017–0072, which is the docket number for this

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Plus the current regs confine the dates by which an applicant can apply to conduct seismic exploration

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rulemaking. You may submit a comment by clicking on "Comment Now!" Please ensure that you have found the correct rulemaking before submitting your comment.

(2) By hard copy: Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R7–NWRS–2017–0072, U.S. Fish and Wildlife Service, MS: BPHC, 5275 Leesburg Pike, Falls Church, VA 22041–3803.

We will not accept email or faxes. We will post all comments on *http://www.regulations.gov*. This generally means that we will post any personal information you provide us. For additional information, see **Request for Comments**, below.

FOR FURTHER INFORMATION CONTACT: Stephanie Brady, National Wildlife Refuge System, Alaska Regional Office, 1011 E. Tudor Rd., Mail Stop 211, Anchorage, AK 99503; telephone (907) 306–7448; fax (907) 786–3976; stephanie_brady@fws.gov.

SUPPLEMENTARY INFORMATION:

Background

The Arctic National Wildlife Refuge (hereafter, Arctic Refuge), located in northeastern Alaska, is administered by the U.S. Fish and Wildlife Service (Service). The Arctic Refuge was first established in 1960 as the Arctic National Wildlife Range through Public Land Order 2214, for the purpose of preserving unique wildlife, wilderness, and recreational values. The original 8.9-million-acre Range was withdrawn from all forms of appropriation under public land laws, including mining, but not from mineral leasing.

The Arctic Refuge was expanded to 19 million acres with the enactment of the Alaska National Interest Lands Conservation Act (ANILCA) (Public Law 96–487; 16 U.S.C. 410hh–

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3233, 43 U.S.C. 1602–1784). Section 303(2) of Public Law 96–487 set forth that the purposes for which the Arctic Refuge was established and should be managed include:

(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including participation in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge.

Under ANILCA, the Service was to provide for a comprehensive and continuing inventory and assessment of the fish and wildlife resources of the coastal plain of the Arctic ~~National Wildlife~~ Refuge. This effort was to include an analysis of the impacts of oil and gas exploration, development, and production, and the Service was directed to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources (16 U.S.C. 1342). The "coastal plain" was defined in section 1002 of Public Law 96–487 by a map entitled "Arctic National Wildlife Refuge," dated August 1980 (Figure 1). Biological studies and geological exploration coordinated by the Service, U.S. Geological Survey (USGS), and Bureau of Land Management (BLM) were initiated shortly after enactment of the Act. In April 1982, the Service completed the initial report summarizing

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known information about fish and wildlife and their habitats occurring on the Arctic Refuge coastal plain (hereafter referred to as “the section 1002 area”).

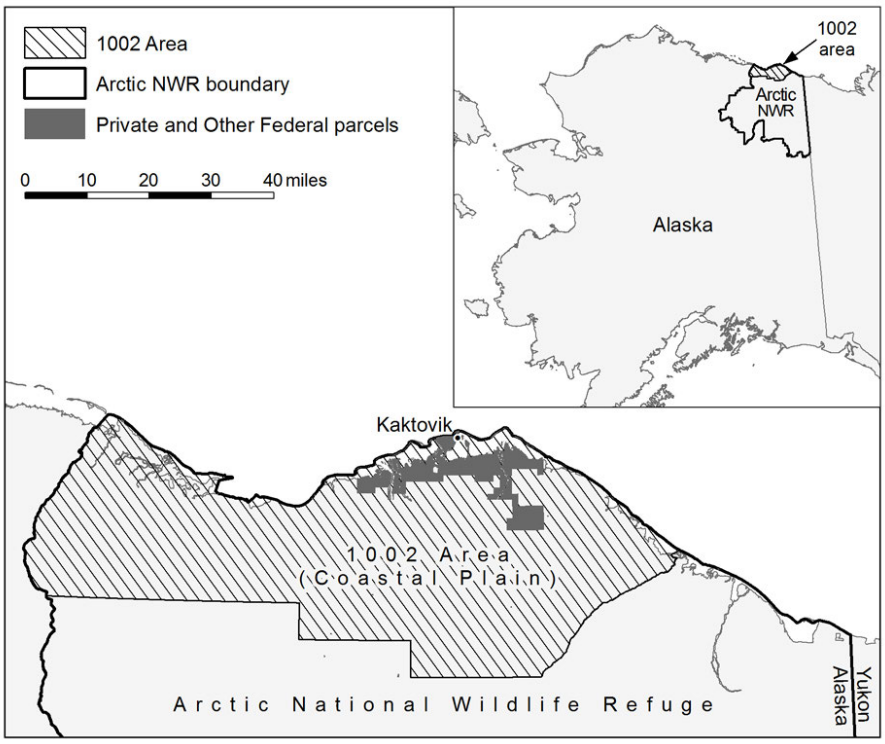


Figure 1. Arctic National Wildlife Refuge showing the coastal plain and section 1002 area.

Section 1002(d) of Public law 96-487 directed the Secretary of the Interior to establish guidelines for exploration through regulations within 2 years after enactment of the Act. In 1982, the Service published a proposed rule to establish guidelines for carrying out exploratory activities on the coastal plain of the Arctic Refuge (47 FR 41060, September 16, 1982). Publication of the proposed regulations had been delayed as a result of the litigation over the decision in March 1981 to transfer responsibility for developing the guidelines from the ~~U.S.~~

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~~Fish and Wildlife~~ Service to the ~~U.S. Geological Survey~~USGS. *See Trustees for Alaska* v. *Watt*, 524 F. Supp. 1303 (D. Alaska 1981), *aff'd per curium*, 690 F.2d 1279 (9th Cir. 1982). The final rule with the regulations along with the "Record of Decision for Oil and Gas Exploration Within the Coastal Plain of the Arctic National Wildlife Refuge, Alaska" (ROD) was published April 19, 1983 (48 FR 16858) with the regulations being codified as 50 CFR part 37. The ROD was based upon the Final Environmental Impact Statement, which had been filed with the Environmental Protection Agency on February 23, 1983, and made available to the public on March 4, 1983. The guidelines were subsequently revised to change the deadlines for submission of exploration plans to the Department for consideration. *See* 49 FR 7569 (March 1, 1984).

Plans were submitted to the Service in accordance with the regulations with plans for summer access by helicopter during 1983–85 being then approved. *See* U.S. Dept. of the Interior, Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment: Report and Recommendation to the Congress of the United States and Final Legislative Environmental Impact Statement, Vol. 1 at 3 (April 1987) ("Section 1002 Report"). The summer exploratory activities were limited to field observations, surface measurements, mapping, and collection of rock samples. One helicopter-supported gravity survey permit was issued for the summer of 1983. Winter exploration plans involving mechanized surface transportation to conduct seismic surveys were approved for the winters of 1983–84 and 1984–85. (Section 1002 Report). One permittee, representing an industry group of over 20 companies, was issued a permit to collect the seismic data. More than 1,300 line miles of seismic data were acquired as a result of the winter exploratory activities during the two winters. (Section 1002 Report). No exploratory activities of this type have occurred in the Arctic Refuge Coastal Plain since 1985.

The Section 1002 Report was submitted to Congress in April 1987. The report recommended that the entire Arctic Refuge coastal plain be made available for oil and gas leasing. (Section 1002(h) Report). The submittal was delayed 7 months past the statutory deadline by a court ruling requiring the Secretary to seek public participation in preparation of the legislative environmental impact statement accompanying the report. *See Trustees for Alaska* v. *Hodel*, 806 F.2d 1378 (9th Cir. 1986).

The Service has historically interpreted the authorization to conduct exploratory activities under section 1002 to have expired with the submittal of the section 1002(h) report to Congress. The legal underpinnings for this position were set out in a January 18, 2001, memorandum to Secretary Bruce Babbitt from Solicitor John Leshy (2001 Memorandum) responding to a letter from Congressman Edward Markey asking what oil and gas related activities are currently allowed or prohibited on the coastal plain of the Arctic Refuge. While opining that the authority expired with submittal of the April 1987 report to Congress, the 2001 Memorandum noted that there were two possible answers to the question because of the wording of section 1002.

The legal interpretation, that the authority to authorize further exploration activities under section 1002 expired in 1987, was tested when the State of Alaska sued the Department of the Interior in 2015. *State of Alaska* v. *Sally Jewell, et al.*, No. 3:14-cv-00048-SLG (D. Alaska). In that suit, the State of Alaska appealed the Service denial of the State's permit request to conduct exploratory work on the Coastal Plain arguing that there was no cutoff of authority in section 1002. In affirming the Service's rejection of the application based upon the interpretation of section 1002 articulated in the 2001 Memorandum, the Court applied the two-step process established by the U.S. Supreme Court in *Chevron U.S.A.* v. *Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984). Applying the first step, the Court concluded that section 1002 was

Commented [BS6]: We do not interpret – SOL interpret Can this be re-worded?

Commented [LS7]: Should these words be capped?

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ambiguous as to whether additional exploration work was authorized under section 1002, a position advanced by the United States in its briefing. The Court then considered the Service's interpretation of section 1002 and concluded it was a permissible construction. In so finding, the court noted that the Service's construction is not the only permissible interpretation or necessarily the Court's.

It is well established that a department is not bound by prior interpretations of statutes and that it may make changes. ~~While the~~ Pprior interpretations of ANILCA section 1002 focused on the deadline for a report to Congress~~, with the passage of time we find it increasingly significant that section 1002 did not include a deadline for when exploration plans must be submitted. We interpret the absence of a deadline to mean that the authority of the Service to collect new and more detailed scientific information about all of the resources on the Coastal Plain has not expired.~~

This continuing authority recognizes that new and better technology is likely to be developed that can ~~and should~~ be put to use to expand human knowledge and understanding of the many natural resources of the Coastal Plain. The ability to collect new scientific information about the Coastal Plain, including its oil and gas resources, will better inform public policy decisions on use and management of the natural resources of the Coastal Plain. Without the authority to do further exploration work, the scientific knowledge about the subsurface resources of the Coastal Plain will be limited to what was learned over 30 years ago. Decisions on management and best use of all of the resources on the Coastal Plain will therefore not be informed by the latest and best scientific information.

The long-term national defense and security of the nation is dependent upon reliable and secure sources of domestic energy resources. President Trump in his March 28, 2017, Executive

Commented [LS8]: Again, this is capped but not previously

Commented [LS9]: Capped? Should it be Coastal Plain?

Commented [BS10]: This applies to the above section regarding why we are doing this

Order, Promoting Energy Independence and Economic Growth, placed specific emphasis on the need to develop energy resources when he stated:

Section 1 Policy. (a) It is in the national interest to promote clean and safe development of the Nation's vast energy resources, while at the same time avoiding regulatory burdens that unnecessarily encumber energy production, constrain economic growth, and prevent job creation. Moreover, the prudent development of these natural resources is essential to ensuring the Nation's geopolitical security.

Central to meeting the goal of developing the country's natural resources in a responsible manner to ensure the Nation's geopolitical security is having and considering the best and latest information about the oil and gas resources of the Coastal Plain that science and technology can provide. There have been many advances in geophysical sciences since the 1980's that can today be utilized to further advance the level of knowledge about the oil and gas resources of the Coastal Plain beyond what was learned from exploration work done over 30 years ago. It would be imprudent to make important decisions for development and implementation of plans for securing oil and gas resources and maintaining energy infrastructure such as the Trans Alaska Pipeline System over the long term without securing and utilizing the knowledge that can be gleaned from new modern exploration work on the Coastal Plain. In addition to informing long-term energy security planning, the availability of this new data will further the Service's resource management of the Coastal Plain.

Proposed Changes

In this document, we propose to change the regulations found at 50 CFR part 37 by removing language that restricts the timeframe in which a special use permit to conduct exploratory activities may be issued.

Request for Comments

You may submit information concerning this proposed rule or the draft environmental assessment by one of the methods listed in **ADDRESSES**. We will not accept comments sent by e-mail or fax or to an address not listed in **ADDRESSES**.

If you submit a comment via *http://www.regulations.gov*, your entire submission — including any personal identifying information, such as your address, phone number, or e-mail address—will be posted on the Web site. If your submission is made via a hardcopy comment that includes personal identifying information, you may request at the top of your document that we withhold this personal identifying information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on *http://www.regulations.gov*.

Endangered Species Act Consideration

Section 7 of the Endangered Species Act (16 U.S.C. 1536) requires the Secretary of the Interior to "review other programs administered by him (or her) and utilize such programs in furtherance of the purposes of the Act" and to "insure that any action authorized, funded, or carried out * * * is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat . . . ." Prior to issuance of these regulations, we would consult under section 7 of the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 et seq.), to ensure that any applications for exploration in the section 1002 area of the Arctic Refuge are not likely to jeopardize the continued existence of any species designated as endangered or threatened, or modify or destroy its critical habitat, and that the regulations are consistent with conservation programs for those

species. Consultation under section 7 of the Act for the regulations may cause us to change these proposed regulations. Our biological opinion resulting from the section 7 consultation will be a public document available from the person listed under **FOR FURTHER INFORMATION CONTACT** or via *http://www.regulations.gov* in Docket No. FWS–R7–NWRS–2017–0072.

Required Determinations

Executive Order 13771—Reducing Regulation and Controlling Regulatory Costs

This proposed rule is considered to be an Executive Order (E.O.) 13771 deregulatory action (82 FR 9339, February 3, 2017) because it would amend regulations that currently restrict the dates when a permit application for an exploration plan for the Arctic Refuge would be allowed.

Regulatory Planning and Review (Executive Order 12866 and 13563)

The Office of Management and Budget (OMB) has determined that this rule is not significant. OMB bases its determination upon the following four criteria:

(a) Whether the rule will have an annual effect of $100 million or more on the economy or adversely affect an economic sector, productivity, jobs, the environment, or other units of the government.

(b) Whether the rule will create inconsistencies with other agencies' actions.

(c) Whether the rule will materially affect entitlements, grants, user fees, loan programs, or the rights and obligations of their recipients.

(d) Whether the rule raises novel legal or policy issues.

The proposed rule would remove the regulations that restrict the dates when a permit application may be submitted for a geophysical exploration plan on the section 1002 area in the Arctic Refuge. Thus, this rule would open the process to accept oil exploration applications for the section 1002 area. Under the proposed rule as an administrative action, potential costs would be limited to application costs incurred by companies choosing to submit applications and by the Service to process the applications.

This analysis is limited in scope and addresses only the administrative action by the Service to accept and review new exploration plans in the Arctic Refuge. Therefore, this analysis does not evaluate costs and benefits related to the issuance of special use permits for specific exploration plans as the details of those plans are currently unknown, and the analysis would be speculative in regards to methods, location, and timing of the exploration activities. Furthermore, the review and approval process for a special use permit in the Arctic Refuge must undergo a separate process under the National Environmental Policy Act (NEPA). ~~Geological exploration and assessment undertakings under the NEPA process could include a number of activities such as seismic testing, aerial surveying, road construction, and more.~~ These exploratory activities have potential impacts including, but not limited to: polar bear viewing tourism, subsistence hunting (especially caribou) by residents, ~~nonnative and native Alaskans,~~ and cultural use by Alaska Natives. ~~native Alaskans.~~ Furthermore, "available information indicates that any ANWR oil would be scattered among multiple smaller fields rather than concentrated in a single large field, which would make development more expensive and potentially expand the area in which any environmental effects might occur" (Congressional Research Service 2015).

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Measures such as Secretarial Order No. 3352 have occurred to move forward toward energy development in the Arctic Refuge (Department of the Interior May 2017). However, Section 1003 of ANILCA states "production of oil and gas from the Arctic National Wildlife Refuge is prohibited and no leasing or other development leading to production of oil and gas from the [Refuge] shall be undertaken until authorized by an act of Congress." Therefore, this analysis does not estimate the potential costs and benefits of oil drilling and extraction.

With this proposed rule, we solicit public input on potential economic impacts and the number of businesses affected to help quantify costs and benefits. Please see the **Request for Comments** section at the end of **SUPPLEMENTARY INFORMATION** for further information about submitting comments.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions) (5 U.S.C. 601 et seq.). However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule would not have a significant economic impact on a substantial number of small entities. Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for "significant impact" and a threshold for a "substantial number of small entities." See 5 U.S.C. 605(b). SBREFA amended the Regulatory Flexibility Act to require

Federal agencies to provide a statement of the factual basis for certifying that a rule would not have a significant economic impact on a substantial number of small entities.

The U.S. Small Business Administration (SBA) defines a small business as one with annual revenue or employment that meets or is below an established size standard. To assess the effects of the proposed rule on small entities, we focus on businesses that operate and/or develop oil gas field properties (North American Industry Classification System (NAICS) 211) that have fewer than 500 employees. According to the U.S. Census Bureau, there are 8,064 businesses under NAICS 211, of which over 99 percent qualify as small businesses (2012). Thus, we expect that most entities that may apply for a special use permit would be considered small as defined by the SBA.

Under the proposed rule, individual businesses would have the opportunity to submit applications for a geological and geophysical exploration plan on the section 1002 area in the Arctic Refuge. Although estimating the number of potential future applicants would be speculative, the last seismic survey (completed in 1985) was conducted by 27 companies under 1 permit. If 27 individual companies applied for separate special use permits under the proposed rule, this would represent less than 1 percent of small businesses.

We therefore certify that this proposed rule would not have a significant economic effect on a substantial number of small entities as defined under the Regulatory Flexibility Act (5 U.S.C. 601 et seq.). A Regulatory Flexibility Analysis is not required. Accordingly, a Small Entity Compliance Guide is not required.

Small Business Regulatory Enforcement Fairness Act

This proposed rule is not a major rule under 5 U.S.C. 804(2), the Small Business Regulatory Enforcement Fairness Act. This rule:

a. Would not have an annual effect on the economy of $100 million or more.

b. Would not cause a major increase in costs or prices for consumers; individual industries; Federal, State, tribal, or local government agencies; or geographic regions.

c. Would not have significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of U.S.-based enterprises to compete with foreign-based enterprises.

Unfunded Mandates Reform Act

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.), we have determined the following:

a. This rule would not ''significantly or uniquely'' affect small governments. A small government agency plan is not required. Actions under the proposed rule would not affect small government activities in any significant way.

b. This rule would not produce a Federal mandate of $100 million or greater in any year. It would not be a ''significant regulatory action'' under the Unfunded Mandates Reform Act.

Takings (Executive Order 12630)

In accordance with E.O. 12630, this proposed rule would not have significant takings implications. A takings implication assessment is not required. This proposed rule does not contain a provision for taking of private property.

Federalism (Executive Order 13132)

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This proposed rule does not have sufficient Federalism effects to warrant preparation of a federalism summary impact assessment under E.O. 13132. It would not interfere with the ability of States to manage themselves or their funds. This proposed rule, if adopted, would affect the geological exploration of the coastal plain of the Arctic Refuge, which is managed by the Service in Alaska, and would not have a substantial direct effect on State or local governments in Alaska.

Civil Justice Reform (Executive Order 12988)

In accordance with E.O. 12988, the Office of the Solicitor has determined that this proposed rule does not unduly burden the judicial system and meets the requirements of sections 3(a) and 3(b)(2) of E.O. 12988.

Paperwork Reduction Act

This rule does not contain any new collection of information that require approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). OMB has previously approved the information collection requirements associated with Service Special Use Permit Applications (FWS Form 3–2469) and assigned OMB Control Number 1018–0162 (expires December 31, 2019). An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act

Our draft environmental assessment is part of the administrative record for this proposed rule. In accordance with the National Environmental Policy Act (NEPA, 42 U.S.C. 4321 et seq.)

and part 516 of the U.S. Department of the Interior Manual (516 DM), the Service proposes amending the existing language in 50 CFR Part 37—Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska, related to exploration plans [50 CFR 37.21(b) and (c)], to remove the date restrictions now in place for those plans. Our draft environmental assessment sets forth that the proposed action to change the regulatory language as described in the rule portion of this document will have no significant impacts on the environment.

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we will evaluate ~~have evaluated~~ the potential effects on federally recognized Alaska Native ~~Indian~~ tribal governments and Alaska Native corporations ~~Tribes~~ through a 810 analysis. ~~and have determined that there are no potential effects~~. This rule would not interfere with the ability of Tribes to manage themselves or their funds or to regulate exploration activities on Tribal lands. However, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis, and we are seeking their input to evaluate this proposed rule. In addition, we have evaluated this proposed rule under Alaska Native Claims Settlement Act corporation policies. We will consult ~~are consulting~~ with Alaska Native tribes and Alaska Native corporations regarding the proposed changes in this rule for the Arctic Refuge.

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Commented [BS14]: We have not consulted on this rulemaking -

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Energy Supply, Distribution, or Use (Executive Order 13211)

Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking actions that could have significant adverse effects on energy supply, distribution, or use. We believe that the rule could have positive effects on energy supplies, distribution, or use. Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.

Clarity of This Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

(a) Be logically organized;

(b) Use the active voice to address readers directly;

(c) Use common, everyday words and clear language rather than jargon;

(d) Be divided into short sections and sentences; and

(e) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in **ADDRESSES**, above. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that you find unclear, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

List of Subjects in 50 CFR Part 37

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Administrative practice and procedure, Alaska, Environmental protection, Historic preservation, Oil and gas exploration, Penalties, Reporting and recordkeeping requirements, Surety bonds, and Wildlife refuges.

Proposed Regulation Promulgation

Accordingly, we propose to amend part 37 of title 50 of the Code of Federal Regulations as set forth below:

PART 37—GEOLOGICAL AND GEOPHYSICAL EXPLORATION OF THE COASTAL PLAIN, ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

1. The authority citation for part 37 is revised to read as follows:

AUTHORITY: 5 U.S.C. 301; 16 U.S.C. 715s and 3142; and 31 U.S.C. 9701.

2. Amend § 37.21 by revising paragraphs (b) and (c) to read as follows:

§ 37.21 Application requirements.

* * * * *

(b) Any person wanting to conduct exploratory activities may apply for a special use permit by submitting for review and processing one or more written exploration plans, in triplicate, to the Regional Director, Region 7, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503.

(c) In addition to containing the information required in paragraph (d) of this section, any exploration plan submitted shall describe the applicant's plan for carrying out an integrated program of exploratory activities in such a manner as will satisfy the objective and limitations stated in § 37.1. If an applicant submits an exploration plan in any given year, with the intention of submitting another exploration plan the following year, the applicant shall describe in its

initial plan how its future exploratory activities will be integrated with those proposed under its initial plan. Each exploration plan submitted must be published and be the subject of a public hearing in accordance with requirements of § 37.22(b).

* * * * *

§ 37.52 [Amended]

3. Amend § 37.52 by:

a. In the first sentence, removing the period and adding in its place a comma and the words "for 3 years from the date the permittee submits the data and information to the Regional Director pursuant to § 37.53."; and

b. In the second sentence, removing the words "Until September 2, 1989, the" and adding in their place the word "The".

Dated: _____.

_____

Principal Deputy Assistant Secretary for Fish and Wildlife and Parks.

0000002945

From: McIntyre, Carol
To: McCaffery, Brian
Subject: Re: nesting golden eagles on Alaska coastal plain
Date: Wednesday, November 15, 2017 12:42:34 PM

Yep, I seem to remember that we didn't spend any or much time doing surveys in the 1002 area.

I wonder if Steve Arthur might know of any sites, but you may have already contacted him.

Cool about the Black-backed Woodpecker and shrike! Our winter yard list also includes a shrike, and a northern goshawk!

Big hugs, B-Mac!

On Wed, Nov 15, 2017 at 10:27 AM, McCaffery, Brian <brian_mccaffery@fws.gov> wrote:

> Thanks, C-Mac! FYI, all of Don Young et al's sites (except perhaps the one at the west end of the Sadlerochit Mtns) were south of the 1002 area. Ted turned me on to a couple known sites in the 1002, however. Will be curious to see if your colleagues have hints of any others.
>
> Cheers,
>
> BJM
>
> PS -- Added a new bird to my WI state list yesterday--Black-backed Woodpecker. My first since my youth in California! Have also been recording red crossbills, and have gotten cuts of at least 3 different call types. Oh yeah, had our first shrike of the winter in our backyard yesterday. Winter feeder birds--you're on notice!
>
> On Wed, Nov 15, 2017 at 10:20 AM, McIntyre, Carol <carol_mcintyre@nps.gov> wrote:
>
> > Hi Bryan, Rob and Brian,
> >
> > Brian McCaffery, FWS, is looking for information on golden eagle breeding sites in the 1002 area of the Arctic National Wildlife Refuge because of the potential for winter seismic exploration to impact early-nesting eagles in late winter/early spring. The 1002 area is basically the coastal plain, north of the Brooks Range - see link below to see the map of the area.
> >
> > If you guys have any radio-tagged eagles that show breeding behavior on the coastal plain or relatively close to it, can you let Brian McCaffery know? He is copied on this email.
> >
> > Thanks!
> >
> > Carol
> >
> > https://pubs.usgs.gov/fs/fs-0028-01/fs-0028-01.htm

--
Brian J. McCaffery
U. S. Fish and Wildlife Service
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources
Branch of Conservation Planning and Policy

Phone: (907) 330-7514
e-mail: brian_mccaffery@fws.gov

"Do something that scares the living hell outta your boss!" -- Dan Ashe, former Director, USFWS

From: Putnam, Christopher
To: Fischbach, Tracy
Subject: Re: Help with Arctic 1002 EA
Date: Wednesday, November 15, 2017 12:47:37 PM
Attachments: Beaufort Sea ITR Petition.pdf

Hi Tracy,

Attached is the petition we received requesting the current set of Beaufort Sea incidental take regulations. This is just FYI in case you wanted more detailed descriptions of oil and gas industry activities on the north slope. Section 2.2 has a good description of seismic survey activities.

Christopher Putnam
Supervisory Fish and Wildlife Biologist
Marine Mammals Management
U.S. Fish & Wildlife Service
1011 East Tudor Rd, MS 341
Anchorage, AK 99503-6199
907-786-3844 office
907-268-0577 mobile
907-786-3816 fax

"All that is gold does not glitter, not all those who wander are lost; the old that is strong does not wither, deep roots are not reached by the frost."
-- J.R.R. Tolkien

On Tue, Nov 14, 2017 at 11:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Yes. Thank you!
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
>
> Hours: Mon - Thurs 9:15 am to 3:15 pm
> "Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie
>
> **Need access to Refuge Documents?**
> Online Document Database (ServCat)
> ***Need Refuge land status info for Alaska?***
> FWS Region 7 Land Mapper (FWS version)
> FWS Region 7 Land Mapper (Public version)
> Region 7 GeoPDF Map Portal
>
> On Tue, Nov 14, 2017 at 11:23 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:
>
> > Hi Tracy,

Just following up on our conversations this morning.

Ryan will draft the "Affected Environment" section focusing on status of the Southern Beaufort Sea subpopulation and use of the 1002 Area, particularly in the winter. He'll rely on USGS population surveys, the ESA critical habitat designation, and a recent publication showing more land-based denning, etc.

Christopher will tackle the "Environmental Consequences" section. Assuming that the nature of the activity is exploratory (seismic) work in the winter, Christopher will pull in information from our SBS incidental take regulations/EA and will incorporate by reference mitigation measures that would reduce potential impacts on polar bears denning in the area. In this section, we will also touch on potential indirect consequences (e.g. impact of increased barge traffic) and cumulative impacts (e.g. climate change - sea ice loss - access to prey -- more nutritionally stressed bears on land, etc).

We understand that you need our 1-2 page entries by Thurs (Nov 16) at 12 noon.

--Jenifer

On Tue, Nov 14, 2017 at 8:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Hi,
>
> As Karen mentioned, we are in a big push to get a beefed up EA done for the regulation change that would open the 1002 for oil & gas exploration.
>
> Would you be able to break someone free to write a relatively short 1-2 page Affected Environment section and environmental consequences section for polar bears?
>
> I'll be in the office at 9, if folks have questions. I'll be working on trying to outline a hypothetical exploration plan based on a state proposal from 2015.
>
> Thank you!
> -Tracy
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
>
> Hours: Mon - Thurs 9:15 am to 3:15 pm
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> FWS Region 7 Land Mapper (Public version)
> Region 7 GeoPDF Map Portal

--
Jenifer Kohout
Deputy Assistant Regional Director for Ecological Services
Alaska Region
U.S. Fish & Wildlife Service
p. (907) 786-3687
e. Jenifer_Kohout@fws.gov

Petition for Incidental Take Regulations for Oil and Gas Activities in the Beaufort Sea and Adjacent Lands in 2016-2021

May 5, 2014

Prepared for

Alaska Oil and Gas Association
121 W. Fireweed Lane, Suite 207
Anchorage, AK 99503

Prepared by

ASRC Energy Services
a subsidiary of Arctic Slope Regional Corporation
Regulatory and Technical Services

3900 C Street Suite 701
Anchorage, Alaska 99503

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ABBREVIATIONS

2D	two-dimensional
3D	three-dimensional
ACS	Alaska Clean Seas
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AKLNG	Alaska Liquefied Natural Gas
AMSA	Australian Maritime Safety Authority
ANWR	Arctic National Wildlife Refuge
AOGA	Alaska Oil and Gas Association
ARRT	Alaska Regional Response Team
ASAP	Alaska Stand Alone Gas Pipeline
ASRC	Arctic Slope Regional Corporation
AUV	Autonomous Underwater Vehicles
BACT	Best Available Control Technology
bbl	barrel
BLM	Bureau of Land Management
BOE	barrels of oil equivalent
BOEM	Bureau of Ocean Energy Management
BOP	blowout preventer
boph	barrels of oil per hour
BPXA	BP Exploration Alaska Inc.
BRPC	Brooks Range Petroleum Corporation
BSEE	Bureau of Safety and Environmental Enforcement
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CGF	Central Gas Facility
Chevron	Chevron USA, Inc.
CI	Confidence Interval
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
cm	centimeter
CPAI	ConocoPhillips Alaska, Inc.

CRU	Colville River Unit
CS	Chukchi Sea
dB	decibel
DOE	Department of Energy
EA	Environmental Assessment
EIS	Environmental Impact Statement
Eni	Eni Petroleum
ESA	Endangered Species Act
ExxonMobil	ExxonMobil Development Company
Federal Grant	Federal Agreement and Grant of Right-of-Way for the TAPS
FLIR	Forward Looking Infrared
FONSI	Finding of no significant impact
FPEIS	Final Programmatic Environmental Impact Statement
FR	Federal Register
ft	foot/feet
ft^2	square feet
GC2	Gathering Center 2
GCF	Gas Conditioning Facility
GHG	Greenhouse Gas
GIS	Geographic Information System
GMTU	Greater Mooses Tooth Unit
GPR	Ground Penetrating Radar
GPS	global positioning system
Hz	hertz
IACPB	International Agreement on the Conservation of Polar Bears
in	inch
IPCC	Intergovernmental Panel on Climate Change
ITR	incidental take regulations
ITS	incidental take statement
IUCN	International Union for Conservation of Nature
JIP	Joint Industry Project
kg	kilogram
kHz	kilohertz
km	kilometer

KRU	Kuparuk River Unit
LACT	Lease automatic custody transfer
lb	pound
LGL	LGL Research Associates
LOA	Letter of Authorization
m	meter
mi	mile
MI	Miscible injectant
mm	millimeter
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
MMscfd	million standard cubic feet per day
MP	milepost
msec	Millisecond
NB	Northern Beaufort Sea
NDS1	Nuna Drill Site 1
NDS2	Nuna Drill Site 2
NEPA	National Environmental Policy Act
NETL	National Energy Technology Laboratory
NGL	natural gas liquids
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NPR-A	National Petroleum Reserve-Alaska
NRC	National Research Council
NSB	North Slope Borough
NTP	Nuna Tie-in Pad
OCS	Outer Continental Shelf
ODS	Oooguruk Drill Site
OPP	Oliktok Production Pad
OSR	oil spill response
OSV	Offshore Supply Vessel
OSRV	Oil Spill Response Vessel
OTP	Oooguruk Tie-in Pad
Pa	pascal

PBSG	Polar Bear Specialist Group
PEIS	Programmatic Environmental Impact Statement
Petition	Petition for Promulgation of Incidental Take Regulations
Pioneer	Pioneer Natural Resources Alaska, Inc.
ppm	parts per million
PSD	Prevention of Significant Deterioration
PSO	Protected Species Observer
psi	pounds per square inch
PTS	permanent threshold shift
pulses/sec	pulses per second
rms	root-mean-square
ROD	Record of Decision
SBS	Southern Beaufort Sea
SDC	Steel Drilling Caisson
SDEIS	Supplemental Draft Environmental Impact Statement
SDI	Satellite Drilling Island
SEL	sound exposure level
Shell	Shell Exploration and Production Company
SID	Spy Island Drillsite
SLAR	side-looking airborne radar
SMU	Southern Miluveach Unit
SPAR	Spill Prevention and Response
SPL	Sound pressure level
TAPAA	Trans-Alaska Pipeline Authorization Act
TAPS	Trans-Alaska Pipeline System
TL	transmission loss
tpy	tons per year
TTS	temporary threshold shift
TU	Tofkat Unit
UAS	Unmanned Aerial Systems
UIC	Underground Injection Control
U.S.	United States
U.S.C.	United States Code
USACE	United States Army Corps of Engineers

USEPA	United States Environmental Protection Agency
USFWS	United States Fish & Wildlife Service
USGS	United States Geological Survey
USW	Ultra Shallow Water
UV/IR	ultraviolet/infrared
VLCC	Very Large Crude Carrier
VLOS	very large oil spill
VSP	vertical seismic profiles
WED	West End Development

1.0 Statement of Request and Context

1.1 Nature of Request

The Alaska Oil and Gas Association (AOGA) and non-member companies listed below, hereby petition the United States Fish & Wildlife Service (USFWS) to renew regulations, pursuant to Section 101(a)(5) of the Marine Mammal Protection Act (MMPA), for the non-lethal unintentional taking of small numbers of polar bears (*Ursus maritimus*) and Pacific walrus (*Odobenus rosmarus divergens*) incidental to oil and gas exploration, development, and production operations and all associated activities in the Beaufort Sea and adjacent northern coast (North Slope) of Alaska for the period of five years beginning August 3, 2016 extending through August 3, 2021. The requested regulations would be the ninth in a series dating from 1993 to the present.

AOGA is a private, non-profit trade association whose 15-member companies represent the majority of oil and gas exploration, production, transportation, refining, and marketing activities in Alaska. AOGA's members are as follows:

Alyeska Pipeline Service Company	Petro Star Inc.
Apache Corporation	Pioneer Natural Resources Alaska, Inc. (Pioneer)
BP Exploration Alaska Inc. (BPXA)	Repsol
Chevron USA, Inc. (Chevron)	Shell Exploration and Production Company (Shell)
Eni Petroleum	Statoil
ExxonMobil Production Company	Tesoro Alaska Company
Flint Hills Resources, Inc.	XTO Energy, Inc.
Hilcorp	

This petition for the promulgation of regulations pursuant to Section 101(a)(5) of the Marine Mammal Protection Act (Petition) is being filed by AOGA on behalf of its members, as well as on behalf of other participating parties. Non-AOGA members who participated in this Petition are: ConocoPhillips Alaska, Inc. (CPAI), Brooks Range Petroleum Corporation (BRPC), and Arctic Slope Regional Corporation (ASRC) Energy Services.

The geographic area of activity, illustrated in Figure 1-1, covers a total area of approximately 73.6 million acres (29.8 million hectares). The geographic area of activity remains the same as covered in the 2011-2016 Beaufort Sea Incidental Take Regulations (ITR) and includes land on the North Slope of Alaska and adjacent waters of the Beaufort Sea, including state waters and Outer Continental Shelf (OCS) waters. The area extends from Point Barrow on the west to the United States (U.S.)-Canada border on the east. The onshore boundary is 40 kilometer (km) (25 miles [mi]) inland, excluding the area within the Arctic National Wildlife Refuge (ANWR). The offshore boundary is the Bureau of Ocean Energy Management (BOEM, formerly the Minerals Management Service [MMS]) Beaufort Sea Planning Area, approximately 322 km (200 mi) offshore.

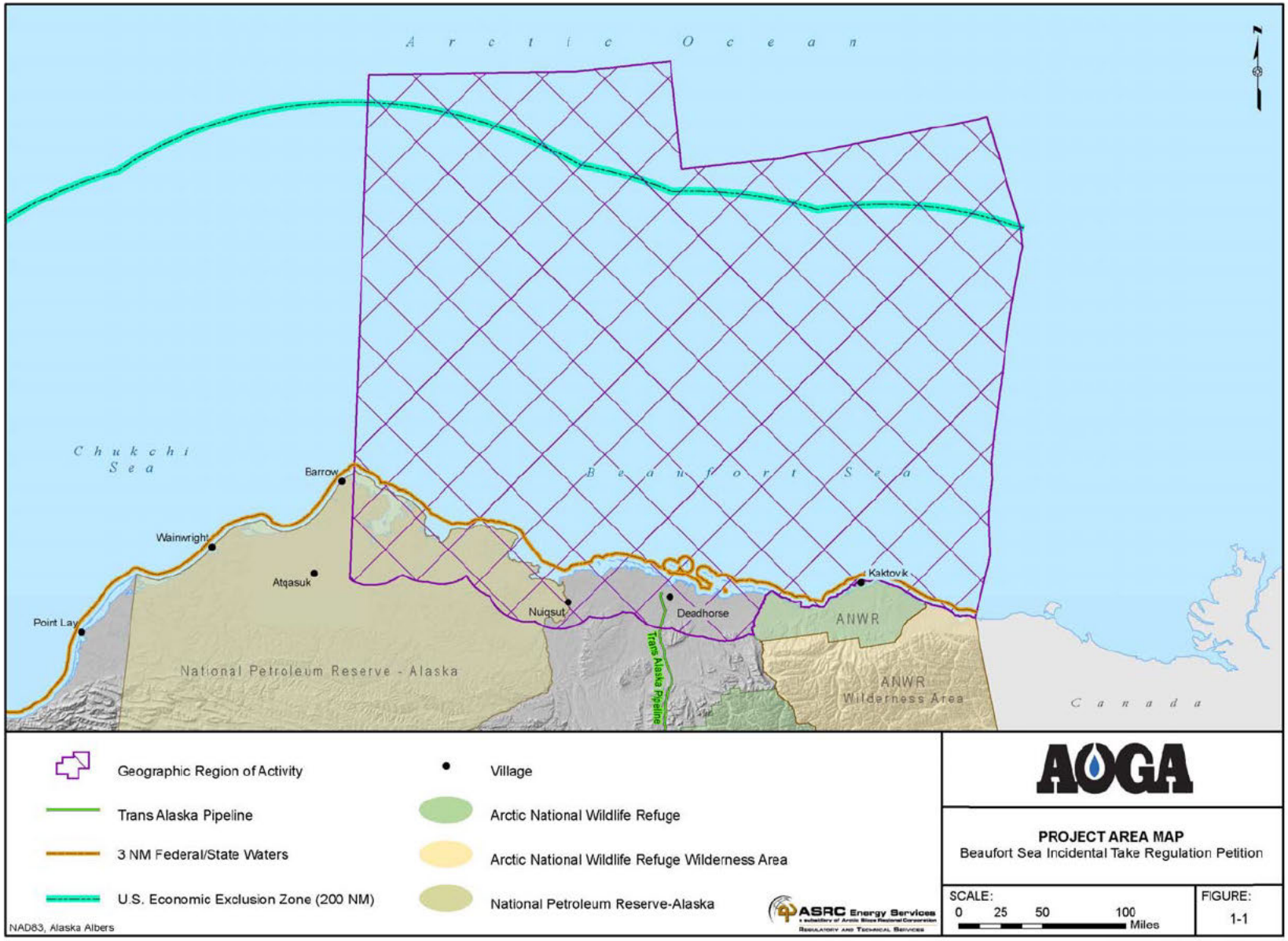


Figure 1-1. Geographic Region of Petition

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As has been the case since 1993, AOGA petitions the USFWS for regulations that cover a class of activity for a period of time. Activity covered by this Petition encompasses all currently foreseeable oil and gas exploration, development, and production occurring within the area specified above for the Petition period. Consistent with the prior and existing regulations, and in consultation with USFWS, AOGA has identified this class of activity because, within the identified geographic area, this class of activity may affect small numbers of polar bear and walrus in substantially similar ways. In other words, the totality of potential effects is small for the class of activity; moreover, given the similarity in possible effects on polar bear and walrus, dividing the class into subcategories would be abstract and arbitrary, and neither comprehensive nor reasonably feasible.

This request by AOGA is consistent with the conservation and management measures stated in the 1976 International Agreement on the Conservation of Polar Bears (IACPB). The IACPB seeks to protect polar bear habitat, restrict the taking of polar bears, and restrict the commercial trade of polar bear parts. The U.S. is one of the five circumpolar countries (along with Canada, Norway, Denmark/Greenland, and the former Soviet Union) to sign the agreement.

In summary, AOGA requests that USFWS authorize the non-lethal, unintentional, incidental take of small numbers of polar bears and Pacific walrus during oil and gas activities within the identified geographic area during the five-year period from August 3, 2016 through August 3, 2021. These regulations should also identify: permissible methods of non-lethal take; measures to ensure the least practicable adverse impact on these species, and on the availability of these species for subsistence uses; and requirements for monitoring and reporting. In conjunction with issuance of the requested ITRs, AOGA further petitions USFWS to engage in consultation under Section 7 of the Endangered Species Act (ESA) and to complete the associated environmental review pursuant to the National Environmental Policy Act (NEPA).

1.2 Regulatory Context

1.2.1 Marine Mammal Protection Act

Section 101(a)(5) of the MMPA, 16 United States Code (U.S.C.) § 1371(a)(5)(A), authorizes the Secretary of the Interior, through the USFWS, to promulgate regulations that allow the incidental, but not intentional, taking of small numbers of marine mammals associated with specified activities (other than commercial fishing), provided that the total of such taking will have no more than a negligible impact on the affected marine mammal species or stocks, and does not have an unmitigable adverse impact on the availability of these species or stocks for subsistence uses. U.S. citizens seeking to carry out activities (other than commercial fishing) that may result in the incidental taking of small numbers of these marine mammals may petition the USFWS to issue ITRs for the specified activities in a specified geographical region. The following key terms and definitions have been promulgated in federal regulations implementing the MMPA at 50 Code of Federal Regulations (CFR) § 18.27(c):

> ***Take*** means to harass, hunt, capture or kill, or attempt to harass, hunt, capture, or kill any marine mammal.
>
> ***Harassment*** means any act of pursuit, torment, or annoyance which has the potential to: 1) injure a marine mammal or marine mammal stock in the wild (Level A harassment); or 2) disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).
>
> ***Incidental, but not intentional taking*** means takings which are infrequent, unavoidable, or accidental. It does not mean that the taking must be unexpected.

> ***Negligible impact*** is an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to adversely affect the species or stock through effects on annual rates of recruitment or survival.
>
> ***Unmitigable adverse impact*** means an impact resulting from the specified activity: 1) that is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs (*i*) by causing the marine mammals to abandon or avoid hunting areas, (*ii*) directly displacing subsistence users, (*iii*) or placing physical barriers between the marine mammals and the subsistence hunters; and 2) that cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

The term "small numbers" is also defined in the regulations, but the USFWS no longer relies on that definition in response to an order by the Ninth Circuit Court of Appeals. Instead, the USFWS's "small numbers" analysis evaluates whether number of marine mammals anticipated to be taken is small relative to the size of the overall population.

Regulations promulgated under Section 101(a)(5)(A) of the MMPA do not permit, approve, or otherwise allow any individual or class of commercial, industrial, or development activity to occur. Rather, each regulation establishes a regulatory framework, linked to a specified area and a specified time frame not to exceed five years, pursuant to which U.S. citizens may apply to USFWS for a letter of authorization (LOA). The regulations identify a suite of regulatory requirements that may be applied by USFWS depending upon the nature of an activity, as well as its location, timing, and duration. Each LOA issued by USFWS imposes specific enforceable mitigation, monitoring, and reporting tailored to the activity addressed in the LOA to ensure that interactions with the identified marine mammal species or stocks occur in small numbers and with no more than a negligible impact.

Pursuant to Section 101(a)(5)(A) of the MMPA, since 1993, the oil and gas industry operating on the North Slope of Alaska and in adjacent waters of the Beaufort Sea has requested and been issued a series of regulations for incidental take authorizations for conducting activities in polar bear and walrus habitat. A detailed history of past regulations can be found in the Federal Register (FR) at 68 FR 66744 (November 28, 2003). Previous regulations were published on November 16, 1993 (58 FR 60402); August 17, 1995 (60 FR 42805); January 28, 1999 (64 FR 4328); February 3, 2000 (65 FR 16828); November 28, 2003 (68 FR 66744); August 2, 2006 (71 FR 43926 [USFWS 2006]); and August 3, 2011 (76 FR 47010). The current regulations will expire on August 3, 2016 (76 FR 47010).

In issuing past regulations, USFWS reviewed the best scientific information available and found that any incidental take (Level B) reasonably likely to result from the effects of oil and gas exploration activities, as mitigated through the incidental take regulatory process, would be limited to small numbers of walruses and polar bears and would have a negligible impact on polar bear and walrus populations. The USFWS uses information such as seasonal distributions, habitat use patterns, and industry monitoring reports to make its finding. In past regulations, the USFWS has concluded that the number of polar bears and walruses using the same geographic region as industry operations is small in comparison to the number of animals in their respective populations in the Beaufort Sea (USFWS 2011).

The USFWS also determined that the footprint of authorized projects is expected to be small compared to the geographic range of polar bear and walrus in the region. Monitoring requirements and adaptive mitigation measures are expected to significantly limit the number of incidental takes (USFWS 2011).

1.2.2 Endangered Species Act

The ESA establishes a comprehensive statutory scheme intended to conserve fish, wildlife, and plants facing extinction. Section 4 of the ESA, 16 U.S.C. § 1533, provides authority for the listing of species as either "threatened" or "endangered," and for the designation of "critical habitat" for listed species. Once a species has been listed, the provisions of the ESA afford protection to such species and to designated critical habitat in the form of various procedural and substantive requirements and prohibitions.

Under Section 7 of the ESA, 16 U.S.C. § 1536, all federal agencies must insure through consultation with USFWS (or the National Marine Fisheries Service [NMFS]) that actions authorized, funded, or carried out by such agencies are not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat designated for such species. If, as a result of consultation, USFWS concludes that the proposed action is not likely to jeopardize listed species or to destroy or adversely modify designated critical habitat, it will issue an incidental take statement (ITS) authorizing take expected to occur as a result of the action. Importantly, as to ESA-listed marine mammals, under Section 7(b)(4)(C) of the ESA, no ITS may be issued with respect to a marine mammal unless authorization for the incidental take has been obtained pursuant to Section 105(a)(5)(A) of the MMPA.

In addition to the consultation requirements of Section 7, Section 9 of the ESA, 16 U.S.C. § 1538, broadly prohibits any person from the taking of any endangered species in the U.S. or on the high seas, except pursuant to an incidental take authorization issued by USFWS, or as otherwise allowed by statutory exemption. The ESA defines a take to mean to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (50 CFR § 17.3). In contrast to the MMPA, take under the ESA has been defined to encompass "harm," which has in turn been defined to include "significant habitat modification or degradation where it . . . injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering." The take prohibition does not apply to species listed as "threatened." Instead, under Section 4(d) of the ESA, 16 U.S.C. § 1533(d), a regulation may be promulgated applying the taking prohibitions of Section 9 to threatened species.

As the ESA relates to the present Petition, USFWS has listed the polar bear as a threatened species (73 FR 28212 [May 15, 2008] [USFWS 2008a]). In addition, pursuant to Section 4(d) of the ESA, USFWS has promulgated a regulation that applies the taking prohibitions of Section 9 to the polar bear, with certain limitations (50 CFR § 17.40(q)). These limitations apply to activities conducted in compliance with incidental take authorization or an applicable exemption under the MMPA; in compliance with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); or in areas within the jurisdiction of the U.S. but outside of existing polar bear habitat.

In response to a petition to list the Pacific walrus as threatened or endangered, the USFWS issued a finding that the listing of the Pacific walrus as threatened or endangered is warranted but precluded by higher priority actions. Accordingly, USFWS designated the Pacific walrus as a candidate species, and it is expected that USFWS will address the status of the walrus in fall of 2017.

Finally, in conjunction with issuance of the regulations proposed in this Petition, USFWS must consult under Section 7 of the ESA regarding the polar bear species. AOGA hereby requests that USFWS initiate this intra-agency consultation process. We further request that USFWS confirm that AOGA may participate in the consultation process as the "applicant."

1.2.3 National Environmental Policy Act

Section 102 of NEPA, 42 U.S.C. § 4332(C), mandates a thoughtful and reasonably thorough analysis of the probable environmental impacts of a proposed major federal action, including analysis of both a reasonable range of alternatives that achieve the purpose and need for the project, and analysis of the no action alternative. An environmental assessment (EA) is a concise document that provides sufficient information and analysis to determine whether preparation of an environmental impact statement (EIS) is necessary. NEPA requires preparation of an EIS for major federal actions that significantly affect the quality of the human environment. An EIS is not required if, after preparation of an EA, a federal agency issues a finding of no significant impact (FONSI). The requirements of NEPA are entirely procedural. Accordingly, while NEPA mandates a thoughtful and thorough analysis, it does not establish any substantive regulatory standards or compel a particular decision to approve, modify, or disapprove a proposal.

USFWS must comply with the NEPA process as a part of its analysis and promulgation of an ITR. The proposed action – the ITR – does not permit, authorize, or otherwise allow any oil and gas activity. Rather, the agency action being analyzed is authorization of non-lethal incidental (unintentional) take of small numbers of polar bear and Pacific walrus over a five-year period in a defined geographic area, that have no more than a negligible impact on these species and that have no unmitigable adverse impact on the availability of these species for subsistence uses by Alaska Natives. Because the proposed action must necessarily have no more than a negligible impact, we anticipate that USFWS may, as in the past, satisfy NEPA through an EA and FONSI process.

1.2.4 Future Regulatory Developments

Although the applicable MMPA, ESA, and NEPA processes described above are well defined, there are at least four areas where future regulatory developments have the potential to affect the ITR requested by this Petition. The following are recent regulatory developments and developments likely to occur between the date of the Petition and issuance of the requested ITR:

- ***National Petroleum Reserve – Alaska (NPR-A) Integrated Activity Plan –*** In February 2013, Bureau of Land Management (BLM) issued a Record of Decision (ROD) for future management of the NPR-A. The decision made 11.8 million acres (4.8 million hectares) of the 22.8 million acres (9.2 million hectares) of NPR-A land available for oil and gas leasing, and made lands available for pipelines or other infrastructure to reach offshore leases. The plan also set aside some surface resources as Special Areas and established best management practices, performance-based stipulations, and monitoring studies. For conservation purposes, approximately 11 million acres (4.4 million hectares) were made unavailable to oil and gas leasing. The plan will remain effective until the BLM determines that it is appropriate to try a new approach at managing the NPR-A. Two recent Presidential Executive Orders (13580 and 13604) may result in increased interagency collaboration during permitting and review of energy projects in Alaska, under the guidance of the Interior Secretary (Hayes 2014). AOGA does not anticipate that these guidelines will result in any necessary delay in issuance of ITRs.
- ***Designation of Polar Bear Critical Habitat –*** USFWS listed the polar bear as threatened and designated an area of 484,734 square km (187,157 square mi) as polar bear critical habitat in 2010. In January 2013, the U.S. District Court of Alaska vacated and remanded the USFWS's final rule designating polar bear critical habitat, concluding that the action was arbitrary and capricious, and in violation of the ESA and the Administrative Procedure Act. If and when a new critical habitat designation will be proposed and finalized remains uncertain.

- ***Petition to list Pacific Walrus under the ESA –*** USFWS has listed Pacific walrus as a candidate species, but it has been precluded by higher priority actions. The USFWS is expected to address the status of the walrus in fall of 2017.
- ***Regulation of Greenhouse Gas (GHG) Emissions –*** In 75 FR 31514, the United States Environmental Protection Agency (USEPA) promulgated the GHG Tailoring Rule. This brings the emissions of GHGs under the Prevention of Significant Deterioration (PSD) and Title V requirements. Among the components of the PSD program, the one that primarily applies to GHGs is the requirement that source owners or operators utilize Best Available Control Technology (BACT) to limit GHG emissions from the source. BACT is established by the permitting authority on a case-by-case basis and which threshold applies to a particular source, how the potential emissions are calculated, and what controls are required are all issues determined in the air permit application and approval process. AOGA does not anticipate that advances in GHG emissions regulation will directly affect issuance of the proposed ITR. Analysis of GHG emissions and climate change issues in connection with this ITR, pursuant to the MMPA, ESA, and NEPA, should be as current as is practicable with the evolving state of scientific information regarding climate change and GHG emissions.
- ***Designation of Bearded Seal and Ringed Seal Critical Habitat –*** In 2012, NMFS listed the bearded seal (*Erignathus barbatus*) and ringed seal (*Phoca hispida hispida*) as threatened under the ESA. Critical habitat has not been designated at this time, but NMFS may propose to designate critical habitat in the future. If and when a new critical habitat designation will be proposed and finalized remains uncertain. The listing of the bearded seal has been challenged in the federal district court for the District of Alaska, and that action is pending.

1.3 Scientific Context

There is a very high degree of scientific consensus that the effects of oil and gas industry operations in the Beaufort Sea and the adjacent North Slope on polar bear and walrus are negligible. The oil and gas industry has been operating in these areas for the past 45 years, with activities since 1993 closely monitored and reported pursuant to Section 101(a)(5)(A) of the MMPA. Accordingly, there is substantial long-term information concerning the class of activity, the specific geographic area, and the two marine mammal species addressed in this Petition. As demonstrated by monitoring data collected under the MMPA from the past 20 years, it is known to a very high degree of reliability that the total number of annual observations of polar bears represents a small proportion of the Southern Beaufort Sea (SBS) and Chukchi/Bering Sea (CS) populations, and that the number of actual incidental takings is a small fraction of annual observations. The data with respect to Pacific walrus, which are uncommon in the Beaufort Sea, demonstrate that there has never been a recorded take within the activity area covered by this Petition as a result of human encounters. Accordingly, with decades of experience, half of which has been rigorously monitored under the MMPA, there is no scientific evidence that oil and gas activity has had, or is having an adverse impact on populations of polar bears and Pacific walruses (USFWS 2011).

In addition, a great deal of scientific and regulatory attention has been focused upon polar bears in recent years in connection with the listing of this species as threatened under the ESA. The regulatory processes associated with the listing by USFWS have included a thorough analysis of the impacts of oil and gas activities on polar bears. Further, industry monitoring programs and compliance with ITRs have helped advance the knowledge of polar bear ecology on the North Slope. The well-supported and unchallenged conclusions of these processes have been that oil and gas activities, as regulated pursuant to ITRs and other provisions of the MMPA, do not pose a threat to the conservation of the polar bear, and do not have more than a negligible impact. The recent and thorough extent of these detailed scientific analyses by USFWS provides further credibility and support for this Petition.

Finally, the findings of USFWS in listing the polar bear under the ESA are important context for this Petition. USFWS has found that this species may be threatened with extinction throughout all or a significant portion of its range as a result of sea ice recession caused by climate change (USFWS 2008a). USFWS has further concluded that: sea ice recession is likely to result in the presence of more polar bears for longer periods of time along the Beaufort Sea nearshore; and sea ice recession is contributing to, and likely will continue to cause, decreased fitness of individual bears, eventually resulting in population declines that may end in extinction (USFWS 2011). Under these circumstances, as assessed by USFWS in its listing decision, other adverse impacts could take on increased significance. However, it does not follow that future declines in polar bear fitness, abundance, and distribution increase the consequences of the incidental take addressed, mitigated, and monitored in this Petition. By definition, the takings addressed in this Petition are non-lethal and unintentional, and are expected to consist of no more than short-term changes in behavior with no detectable long-term injury or consequence, involving very small numbers of polar bear (and few, if any, Pacific walrus). Moreover, in its listing and 4(d) rule for the polar bear, USFWS has expressly found that oil and gas activities in the Arctic, such as those described in this Petition, do not pose a threat to the polar bear species.

1.4 Information Submitted in Response to the Requirements of 50 CFR §18.27

The USFWS regulations governing the issuance of regulations and LOAs permitting incidental takes under certain circumstances are codified at 50 CFR § 18.27. Section 18.27(d) sets out eight (*i-viii*) specific items that must be addressed in requests for rulemaking pursuant to Section 101(a)(5) of the MMPA. Each of these items is addressed in detail in the following chapters. The chapter number and title that addresses the corresponding 50 CFR § 18.27(d) item is identified in Table 1-1.

Table 1-1. Location of Information in this Petition of CFR § 18.27(d) Requirements

Chapter Number	Chapter Title	CFR § 18.27(d) Requirement
2	Description of Activities	(i) A description of the specific activity or class of activities that can be expected to result in incidental taking of marine mammals.
3	Dates, Duration, and Region of Activities	(ii) The dates and duration of such activity and the specific geographical region where it will occur.
4	Species, Number, and Type of Take	(iii) Based upon the best available scientific information: (A) An estimate of the species and numbers of marine mammals likely to be taken by age, sex, and reproductive conditions, and the type of taking (e.g., disturbance by sound, injury or death resulting from collision, etc.) and the number of times such taking is likely to occur.
5	Status, Distribution, and Seasonal Distribution of Species	(iii)(B) A description of the status, distribution, and seasonal distribution (when applicable) of the affected species or stocks likely to be affected by such activities.
6	Anticipated Impact on Species	(iii)(C) The anticipated impact of the activity upon the species or stocks.
7	Anticipated Impact on Subsistence	(iii)(D) The anticipated impact of the activity on the availability of the species or stocks for subsistence uses.
8	Anticipated Impact on Habitat	(iv) The anticipated impact of the activity upon the habitat of the marine mammal populations and the likelihood of restoration of the affected habitat.
9	Anticipated Impact of Habitat Loss or Modification on Species	(v) The anticipated impact of the loss of the habitat on the marine mammal populations involved.
10	Mitigation Measures	(vi) The availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their habitat, and on their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance.
11	Monitoring and Reporting	(vii) Suggested means of accomplishing the necessary monitoring and reporting will result in increased knowledge of the species through an analysis of the level of taking or impacts and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity.
12	Coordination of Research Efforts	(viii) Suggested means of learning of, encouraging, and coordinating research opportunities, plans and activities relating to reducing such incidental taking from such specified activities, and evaluating its effects.

2.0 Description of Activities

CFR § 18.27(d)(i) A description of the specific activity or class of activities that can be expected to result in incidental taking of marine mammals.

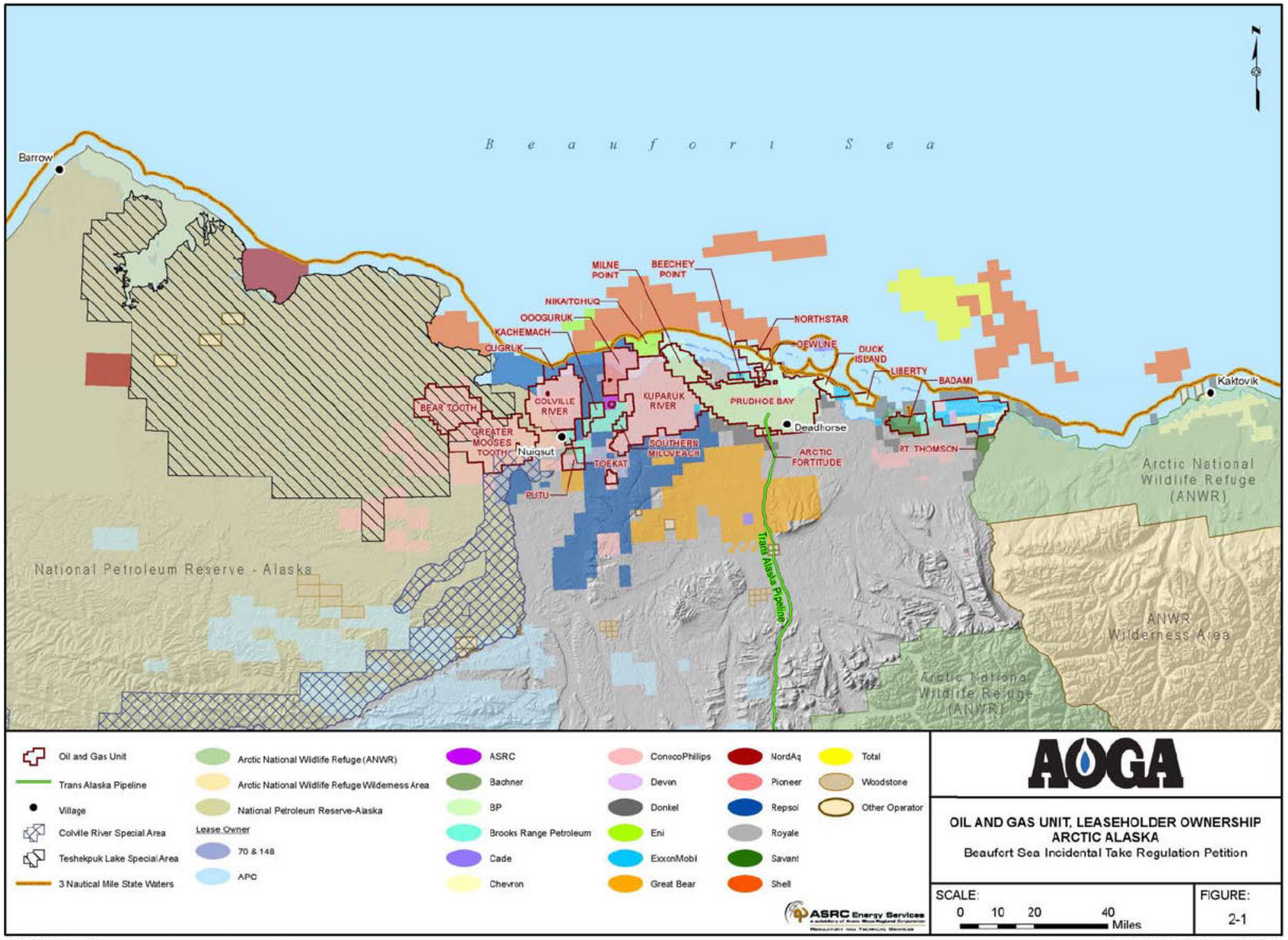
The scope of this Petition includes the activities that will be conducted during the exploration (geological and geophysical surveys, and drilling activities), development, and production phases of oil and gas activities within the Petition's geographic area (Figure 1-1). Activities that may take place between 2016 and 2021 are discussed in this section. It is important to note that all activities described in this section have been implemented during past periods of the Beaufort Sea ITRs. Accordingly, analyses of potential impacts from these activities have been conducted by industry and regulatory agencies over an extended period of years, and the range of reasonably anticipated effects is well documented.

2.1 Oil and Gas Activity

Oil and gas exploration, development, and production activities have occurred on the North Slope and in the nearshore Beaufort Sea region for more than 40 years. The Prudhoe Bay oil reservoir was discovered in 1968 and first oil was pumped in 1977 after completion of the more than 1,288 km (800 mi) of Trans-Alaska Pipeline System (TAPS) between Prudhoe Bay and Valdez. Since the first State of Alaska lease sale of North Slope acreage in December 1964, the State has leased over 12.9 million acres (5.2 million hectares) in the North Slope/Beaufort Sea region. Federal oil and gas lease sales managed under the BOEM and Bureau of Safety and Environmental Enforcement (BSEE) lease program have been held within federal waters of the Alaskan Beaufort Sea for a total of 3.7 million acres (1.5 million hectares). Approximately 39 exploratory wells have been drilled in these offshore leases. Federal lease sales have also recently occurred in the NPR-A, which is managed by the BLM. Between 1975 and 1981, 28 wells had been drilled in the NPR-A. Since the May 1999 lease sale, 20 wells have been drilled in the Northeast Planning Area of NPR-A. Current oil and gas units and leaseholder ownership are presented in Figure 2-1.

Since the first production well was drilled in the Prudhoe Bay unit, more than 15 billion barrels (bbl) of oil have been produced on the North Slope, and more than 2,000 wells have been drilled. The U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL) Summary Report for Alaska Oil and Gas (DOE 2013) reported that about 10 billion bbl of recoverable oil exist in the NPR-A and ANWR, with about 100 billion bbl of oil resources underlying the North Slope. North Slope oil production peaked in 1988 at 2 million bbl per day. Oil produced on the North Slope is transported south via TAPS. Most of the oil arrives at the Valdez Marine Terminal where the oil is transferred to tankers for shipment to world markets. A small portion of the oil is stored and refined in Alaska for local use.

Activities related to petroleum exploration and development in the Beaufort Sea region can include construction of ice roads and pads for general support, support services (camps, warehousing, etc.), geological and geophysical surveys (seismic), shallow hazard surveys, ice gouge and strudel scour surveys (offshore), geotechnical borings (both onshore and offshore), environmental studies, drilling wells, construction of gravel roads and pads, construction of landing strips, and installation of pipelines (both onshore and subsea pipelines and testing of equipment).



NAD83, Alaska Albers

AES-RTS: 13-116-002.mxd, 04/02/14

Figure 2-1. Oil and Gas Units and Leaseholder Ownership in Arctic Alaska

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Total direct surface coverage calculated with Geographic Information Systems (GIS) and aerial photography in 2012 for oilfield related activities (gravel pads, roads, mine sites, and TAPS north of the Brooks Range) is 18,439 acres (7,462 hectares) or approximately 0.1 percent of the Arctic Coastal Plain between the Colville and Canning rivers. Not including TAPS, there are approximately 1,259 km (782 mi) of pipelines and 2,884 acres (1,167 hectares) of gravel roads. These measurements were conducted by Aerometric, Inc. using 2012 aerial photography. Gravel mine sites cover approximately 6,861 acres (2,777 hectares), but not all of these sites are currently in use. Gravel pads within the currently producing oilfields cover approximately 2,874 acres (1,163 hectares).

The following sections provide background information on geological and geophysical surveys, environmental studies, onshore and offshore drilling, development and production, and oil production processes (including production facilities, production wastes, production support operations, and decommissioning and abandonment/restoration). However, it is important to note that plans for exploration and development change regularly in scope and location, and some exploration may not occur at all.

2.2 Geological and Geophysical Surveys

Geological and geophysical surveys are conducted to gather information about subsurface geology. Geological surveys assist in interpreting conditions in the subsurface and may consist of potential field programs, including gravity, magnetics, and electromagnetic surveys; surface geologic surveys; geotechnical site investigations; geochemical surveys; and other evaluations requiring access to the surface of the land or seafloor. Geophysical surveys can be divided into two classes: seismic and shallow hazards surveys. Seismic surveys generally map deep strata beneath the surface of the ground in search of gas and oil-bearing rock formations. Shallow hazard surveys, also known as "site clearance" or "high resolution surveys," are conducted to gather information on near-surface hazards up to 305 to 500 meters (m) (1,000 to 1,640 feet [ft]) below ground level, which could be encountered during drilling, as well as to determine foundation and permafrost conditions. This information is used to plan drilling operations to avoid or minimize the risk of such features.

2.2.1 Geotechnical Site Investigation

Shallow cores provide information about soil conditions where onshore or offshore pipelines, structures, or other facilities are planned, or to define where facilities may not be sited. Soil borings define the soil stratigraphy and geotechnical properties at selected points and may be integrated with seismic data to develop a regional model for predicting soil conditions in areas not sampled.

2.2.2 Reflection Seismic Exploration

Reflection seismology, or "seismic" as it is more commonly referred to by the oil and gas industry, is used to map the subsurface structure of rock formations. Seismic technology is used by geophysicists who interpret the data to map structural traps that could potentially contain hydrocarbons. Seismic exploration is the primary method of exploring for potential hydrocarbon deposits on land, under the sea, and in the transition zone (the interface area between sea and land). The general principle is to send sound energy waves (using an energy source like airgun or vibroseis) into the ground or water, where the different layers within the Earth's crust reflect back this energy. These reflected energy waves are recorded over a predetermined time period (called the record length) by using hydrophones in water and geophones on land. The reflected signals are recorded onto a storage medium, which is usually magnetic tape. The data are then processed and seismic profiles are produced. These profiles are then interpreted for possible hydrocarbon containing structures.

Shallow hazard surveys acquire high resolution profile data and are an integral part of site clearance prior to drilling offshore wells. High resolution profiling is accomplished typically through the use of a high-frequency sub-bottom profiler, an intermediate-frequency profiler, and a multi-channel system. A sub-bottom profiler is used to map geologic features by modulating frequency and pulse rate of an acoustic signal. Intermediate-frequency profilers outline the fine strata and density layers of the subsurface sediments, often referred to as a "boomer." A multi-channel system tows an array of hydrophones that receive the signal from various sizes and numbers of guns, often referred to as a "sparker."

Seismic crews on the North Slope are typically between 80 and 160 personnel. Substantial logistical support is required to cover not only the seismic operation itself, but also to support the main camp (for catering, waste management and disposal, camp accommodations, washing facilities, water supply, laundry, etc.), fly camps (temporary camps set up away from the main camp on large land seismic operations), all of the crew vehicles (maintenance, fuel, spares, etc.), security, possible helicopter operations, restocking of the explosive magazine, medical support, scientists, marine mammal observers, and many other logistical and support functions.

2.2.2.1 Vibroseis

Vibroseis seismic operations use truck-mounted vibrators that systematically put variable frequency energy into the earth. These can be used both onshore and on offshore sea ice. At least 1.2 m (4 ft) of sea ice is required to support heavy vehicles used to transport equipment offshore for exploration activities. These ice conditions vary, but generally exist from sometime in January until sometime in May in the area of activity. The exploration techniques are most commonly used on landfast ice; they can be used in areas of stable offshore pack ice but are less effective. Several vehicles are normally associated with a typical vibroseis operation. One or two vehicles with survey crews move ahead of the operation and mark the source receiver points. Occasionally, bulldozers are needed to build snow ramps on the steep terrain or to smooth offshore rough ice within the survey area.

A typical wintertime exploration seismic crew consists of 40 to 160 personnel. Roughly 75 percent of the personnel routinely work on the active seismic crew, with approximately 50 percent of those working in vehicles and the remainder outside laying and retrieving geophones and cable. Other members of the team are focused on health, safety, or environmental issues, or general camp support.

With the vibroseis technique, activity on the surveyed seismic line begins with the placement of sensors. All sensors are connected to the recording vehicle by multi-pair cable sections. The vibrators move to the beginning of the line, and recording begins. The vibrators move along a source line, which is at some distance or angle to a sensor line. The vibrators begin vibrating in synchrony via a simultaneous radio signal to all vehicles.

In a typical survey, each vibrator will vibrate four times at each location. The entire formation of vibrators subsequently moves forward to the next energy input point (e.g., approximately 67 m [220 ft] in most applications) and repeats the process. In a typical 16- to 18-hour day, a survey will complete 6 to 16 linear km (4 to 10 mi) in two-dimensional (2D) seismic operation and 24 to 64 linear km (15 to 40 mi) in a three-dimensional (3D) seismic operation.

2.2.2.2 Airgun and Watergun Seismic Data Collection

Airgun arrays produce sound waves from multiple guns fired simultaneously that produce sudden releases of pressurized air bubbles to create the sound source, while "ocean bottom cable" or

"streamer cables" with attached hydrophones receive the returned echoes. These seismic techniques use compressed air or water in a cylinder at a pressure of about 2,000 pounds per square inch (psi) released from the gun. In shallow waters or in transition (land and marine) surveys, ocean bottom cable is laid out on the ocean bottom with hydrophones; these hydrophones will measure the energy reflected by the geology. Typically, there will be a source vessel that deploys the airgun array and there will be multiple (generally one to four) cable vessels that lay and pick up the cable.

In deeper waters, marine surveys are conducted using vessels capable of towing one or more seismic cables known as "streamers." Larger vessels may use multiple streamers deployed in parallel, to record data suitable for the 3D interpretation of the structures beneath the sea bed. A single vessel may tow up to 10 streamers, each up to 6 km (3.7 mi) in length, spaced 50 to 150 m (164 to 492 ft) apart. Hydrophones are deployed at regular intervals within each streamer. With this type of setup, the airguns and recording cables are on the same vessel, and the airgun array and streamers can be deployed at different depths, depending on the configuration of survey and regional geology. To accurately calculate where subsurface features are located, navigators compute the position of both the sound source and each hydrophone group. The positioning accuracy required is achieved using a combination of acoustic networks and differential global positioning system (GPS) receivers.

2.2.2.3 Explosives Seismic Data Collection

Explosives can also be used on land as a source of energy to achieve energy waves for seismic surveys. The field procedures for seismic activities using explosives are essentially the same as outlined in the vibroseis section. Explosives are typically set on land at implanted depths of 10 to 30 m (30 to 100 ft). Charges of high velocity explosives of 15 to 45 kilogram (kg) (33 to 99 pounds [lb]) are normally loaded into each hole or "shotpoint," and each shotpoint's charge is remotely detonated individually by the recording crew to produce a seismic record. Current practice limits the use of the explosive method to onshore operation.

2.2.3 Vertical Seismic Profiles

Vertical seismic profiles (VSPs) involve lowering geophones into a well bore on land or offshore and repeatedly activating the energy source. VSPs are elaborate checkshots that are used to calibrate seismic sections to well data (i.e., to correlate the reflections on the recorded seismic data with formations seen during drilling). VSPs are a form of well logging and are conducted both on and off the drill pad. VSP operations are usually crewed by fewer than eight people. If conducted during winter, four or five of the operators remain in the vehicles (vibrators) within 1.6 to 5 km (1 to 3 mi) of the rig, while the others are located at the rig.

2.2.4 Seafloor Imagery

Side-scan sonar is a sideward-looking, two-channel, narrow-beam instrument that emits a sound pulse and "listens" for its return. The sound energy transmitted is in a shape that sweeps the seafloor resulting in a 2D image that produces a detailed representation of the seafloor and any features or objects on it. Side-scan sonar emits high frequency sound typically between 120 and 132 kilohertz (kHz) band, occasionally reaching frequencies up to 410 to 445 kHz. The transmission pulse length can range from 20 milliseconds (msec) to 400 msec, depending on the equipment used. The sonar is typically towed behind a vessel.

2.2.4.1 Offshore Bathymetry

Bathymetry studies are sometimes conducted during the winter ice-season, and the open water season, but prior to seismic surveys to obtain information on water depths, seafloor contours, hazards, and other environmental conditions. These studies are typically conducted using echosounders, such as single-beam or multi-beam sonar devices.

Echosounders measure the time it takes for sound to travel from a transducer, to the seafloor, and back to a receiver. The travel time can be converted to a depth value by multiplying it with the sound velocity of the water column. Echosounders are generally mounted to the ship hull or on a side-mounted pole and could be a single-beam with one transducer, or a multi-beam with an array of transducers. The single-beam sonar device emits a high frequency single pulse of sound directly below the ship along the vessel trackline and provides a continuous recording of water depth along the survey track. Generally these recorders require compensation to rectify the data point. The sonar can operate at a frequency of either 100 kHz or 200 kHz and emits approximately 15 pulses per second (pulses/sec). Each pulse phase is between 0.03 and 0.12 msec. These data can also provide information on evidence of water column anomalies which could indicate gas escaping into the water column.

A multi-beam sonar device is comprised of a transducer array that emits a swath of sound. The seafloor coverage swath of the multi-beam sonar depends on water depth, but is usually equal to two to four times the water depth. This sonar typically operates at a frequency of 240 kHz. It emits approximately 15 pulses/sec, with each pulse duration lasting 21 to 225 msec for a swath that can cover up to 500 m (1,640 ft) in width. The multi-beam system requires additional non-acoustic equipment including a motion sensor (on vessel) to measure heave, roll, and pitch; a gyrocompass (on vessel); and a sound velocity probe (lowered from the vessel when the vessel is stationary). These data provide a 3D view of the seafloor in the surveyed area.

2.2.5 Ultra Shallow Water Array

Ultra Shallow Water (USW) array is a device composed of a series of air powered seismic sound sources (shots) with variable power outputs. The "source array" transmits energy through the water where reflected energy is received by a multi-channel marine digital recording streamer system. This tool is useful in finding shallow faults and amplitude anomalies in the seafloor.

2.3 Environmental Studies

In addition to geological and geotechnical surveys, over the past 40 years there has been extensive research and monitoring in a variety of disciplines, including but not limited to geomorphology (soils, ice content, permafrost); archaeology and cultural resources; vegetation mapping; analysis of fish, avian, and mammal species and their habitat; acoustic monitoring, hydrology; and various other freshwater, marine, and terrestrial studies of the Arctic coastal and offshore regions. Many studies are performed in cooperation with scientists from consulting companies; scientists from oil and gas industry; federal, state, and local agencies; universities; non-profit organizations; and other local community stakeholders. Some research programs are multi-year efforts with objectives to collect baseline data or to answer specific research questions. These data are necessary to develop mitigation and monitoring strategies associated with exploration, development, and production plans by:

- understanding the life cycles and natural variability of wildlife resources, most notably marine mammals, and plant communities;

- assessing whether exploration activities and development of oilfield operations affect wildlife populations and plant communities, and developing appropriate mitigation and monitoring strategies;
- identifying the location of important cultural and historical artifacts in order to avoid these areas during exploration and development phases; and
- understanding the potential for impacts to tundra, air, and aquatic resources through exploration activities and developing mitigation and monitoring strategies.

For the Petition period of 2016 to 2021, studies will continue to be conducted for general monitoring purposes or in anticipation of exploration and development of natural resources in the U.S. Beaufort Sea region.

2.4 Offshore and Onshore Exploration Drilling

There are currently three principal forms of exploratory drilling platforms used in offshore exploration; artificial and natural islands; bottom-founded and bottom-supported structures; and floating vessels. Onshore exploration in the Alaskan Arctic may be conducted from ice pads (single season or multi-season) and gravel pads.

2.4.1 Artificial Islands

Artificial islands are constructed in shallow offshore waters for use as drilling platforms. In the Arctic, artificial islands have been constructed from a combination of gravel, boulders, artificial structures (e.g., caissons which are watertight retaining structures), and/or ice. Artificial islands can be constructed at various times of the year. During summer, gravel is removed from the seafloor or onshore sites and barged to the proposed site and deposited to form the island. In the winter, gravel is transported over ice roads from an onshore site to the island site. After the artificial island is constructed to its full size, slope protection systems are installed, as appropriate for local oceanographic conditions, to reduce ice ride-up and erosion of the island. Once the island is complete, a drilling rig is transported to the island. Approximately 100 personnel operate a typical rig site. Due to economic and engineering considerations, gravel island construction has historically been restricted to waters less than 15 m (50 ft) deep.

2.4.2 Caisson-retained Island

Caisson-retained islands are similar in construction and design to other artificial islands with one significant exception. Rather than relying entirely on gravel or large boulders for support, the island contains one or more floatable concrete or steel caissons, which rest on an underwater gravel berm or on the ocean floor in water less than 6 m (20 ft) deep. The berm is constructed with dredged or deposited material to within 6 m (20 ft) of the sea surface. When each caisson is in place, the resulting concrete or steel ring is filled with sand to give the structure stability. This design, like the artificial gravel island, allows drilling to occur all year. When drilling is completed, the center core of sand can be dredged out, the caissons refloated, and the structure moved to a new location. The berm is left to erode by the natural action of the ocean. Personnel numbers on a caisson-retained island would be equivalent to those on an artificial island.

2.4.3 Steel Drilling Caisson

The Steel Drilling Caisson (SDC), a bottom-founded structure, is a “fit for purpose” drilling unit constructed typically by modifying the forward section of an ocean-going Very Large Crude Carrier

(VLCC). The main body of the structure is approximately 162 m (531 ft) long, 53 m (174 ft) wide, and 25 m (83 ft) high. The deck has been cantilevered to provide additional space. The stability of the system under ice loading is provided by water ballasting of the original cargo tanks. Shotcrete has been applied to the base of the unit to increase its coefficient of friction. The SDC is designed to conduct exploratory year-round drilling under Arctic environmental conditions. On its first two deployments in the Canadian Beaufort, the SDC was supported by subsea gravel berms. For its third deployment in Harrison Bay in 1986, a steel component was constructed to support the SDC in lieu of the gravel berms. It was also used in 2002 by EnCana on the McCovey prospect. The steel base configuration adds 13 m (44 ft) to the design height of the structure and allows deployment of the SDC in water depths of 8 to 24 m (25 to 80 ft) without bottom preparation. The SDC requires minimal support during the drilling season. It is typically stocked with supplies before being moved to a drill site. Two or three tugs and/or supply vessels tow the SDC to or from the drill site during open water periods. Deployment and recovery of the SDC require less than one week each. Personnel (typically a maximum of 100) and some smaller equipment are transported to and from the SDC by helicopter. Fuel and larger items, if required, are transported by supply vessel.

2.4.4 Bottom-Supported Drilling Units

Bottom-supported drilling units typically consist of a buoyant hull with legs that are lowered to the seafloor once the rig is in place. The legs then support the rig when it is raised above the water surface, creating the drilling platform. Jack-up rigs are the bottom-supported drilling units most likely to be used for exploration drilling in Beaufort Sea OCS waters.

In contrast to floating drilling vessels, jack-up units are generally not self-propelled and must be towed to the drill site by tugs. Heavy lift vessels are generally required for the transport of jack-up rigs over long distances. These types of drilling units can be used in relatively shallow waters, generally under 400 ft (120 m). Jack-up rigs typically are used during ice free periods: however new jack-up rigs are designed to withstand multi-year ice floes. Oil spill response, ice management and offshore supply operations would be conducted similarly to those described in Section 2.4.5.

2.4.5 Floating Drilling Vessels

Floating drilling vessels that may be used for exploration drilling in Beaufort Sea OCS waters include drillships (e.g., *Northern Explorer II*, *Noble Discoverer*), semisubmersibles, or other floating vessels in which the hull does not rest on the seafloor. Drillships are generally self-propelled. These types of drilling vessels can typically be used in water depths greater than 18 m (60 ft) in the Beaufort Sea. This range makes them more suitable for the deeper water exploratory prospects than the "bottom founded" units such as the islands or the SDC mentioned in previous sections. Floating drilling vessel crews typically range from 100 to 200 personnel to operate the marine and drilling systems and ensure the safety of the operation (not including support or ice management vessels). These types of floating drilling vessels are held over a well drilling location either by a mooring system (consisting of an anchor, chain, and wire rope) or by the use of dynamic positioning (omni-directional thrusters coupled with a computer control system).

These types of floating drilling vessels operate during the Arctic drilling season with the potential to work during break-up and freeze-up, provided that support vessels are available to manage ice. Operations are supported by one or more ice management vessels (icebreakers) to ensure ice does not encroach on operations. If one of these vessels is moored, then an anchor-handling vessel is required to support the operations. A barge and tug, or other type of Oil Spill Response Vessel (OSRV), typically accompany these floating drilling vessels to provide a standby safety vessel, oil spill response capabilities, and refueling support. Most supplies (including fuel) necessary to complete drilling activities are stored on

the drilling and support vessels or Offshore Supply Vessels (OSVs); however, a shallow draft re-supply vessel can be utilized to move critical equipment to and from marine terminals/docks. Helicopters based at existing shore facilities routinely transfer personnel and additional equipment. Flights may average between 7 and 40 trips a week. Fuel and supply caches may also be deployed on some occasions.

2.4.6 Ice Pads, Roads, and Islands

Ice roads provide seasonal routes for heavy equipment and supplies to be moved to remote areas, both onshore and offshore. These temporary, seasonal roads are constructed by spreading water from local sources (abandoned mine sites, lakes, rivers, seawater) to create a rigid surface. On land and along river corridors, ice roads and pads are constructed from freshwater sources. Most often and when available, abandoned mine sites that have filled with freshwater are used for construction of ice roads on tundra or along river banks. In cases where mine site water is not available, freshwater lakes are used for ice road construction. For grounded ice roads in shallow (< 2 m [< 6.5 ft]) waters of the Beaufort Sea, seawater is initially used for the foundation and the ice road is eventually "capped" with freshwater, strengthening the road. Floating ice roads may also be constructed over deeper water. Ice bridges may be constructed to provide winter access across frozen rivers. Ice airstrips are also constructed to facilitate access and are built in the same manner as ice roads. Ice drilling and storage pads are now commonly used for winter exploration pads. Ice pads are also built in a similar way to ice roads and ice airstrips. The thickness of ice roads, pads, and bridges depends on the loads that must be supported and on terrain, and can range from 15 centimeter (cm) (6 inches [in]) to 3 m (10 ft). Offshore ice pads may be thicker.

Insulated ice pads are occasionally used to allow the ice structure to remain intact through summer, and thus, be used for multiple drilling seasons. Offshore ice islands and offshore ice roads are built using similar techniques to their onshore counterparts.

2.5 Development and Production

Existing North Slope development and production operations extend from the Colville River in the west to Point Thomson and Badami in the east. Badami, Point Thomson, and the Colville River fields are developments without permanent access roads; access is available to these fields by airstrips, barges, and seasonal ice roads. Sales oil pipelines extend from these fields and connect to TAPS. North Slope oilfield developments include a series of major fields and their associated satellite fields. In some cases a new oilfield discovery has been developed completely using existing infrastructure. Thus, the Prudhoe Bay oilfield unit encompasses the Prudhoe Bay, Lisburne, Niakuk, West Beach, North Prudhoe Bay, Point McIntyre, Borealis, Midnight Sun, Polaris, Aurora, and Orion reservoirs; the Kuparuk oilfield development incorporates the Kuparuk, West Sak, Tarn, Palm, Tabasco, and Meltwater oilfields and the Colville River Unit encompasses the Fiord Nechelik, Fiord Kuparuk, Qannik, Nanuq Nanuq, Nanuq Kuparuk, and the Alpine oilfields. Figure 2-1 depicts oil and gas units and leaseholder ownership on the North Slope. Table 2-1 summarizes the area of infrastructure. This area was calculated using recent (2012) aerial photography by Aerometric, Inc. Table 2-2 summarizes existing and potential future oil and gas developments.

Table 2-1. Infrastructure Area on North Slope as of 2012 (Not Including Dalton Highway)

Infrastructure Type	Acres	Hectares
Gravel roads and causeway		
Roads	2,884	1,167
Causeway	231	94
Total gravel road and causeway area	**3,115**	**1,261**
Airstrips (gravel or paved)	**321**	**130**
Offshore gravel pads, islands		
Exploration islands	53	21
Production islands (drillsite, process, support)	149	61
Total offshore gravel pad, island area	**202**	**82**
Gravel pads		
Production pads, drill sites	2,887	1,168
Processing facility pads	854	345
Support pads (camps, power stations)	1,828	740
Exploration site	261	106
Total gravel pad area	5,830	2,359
Total gravel footprint	**9,468**	**3,832**
Other affected areas		
Exploration site-disturbed area around gravel pad	639	259
Exploration airstrip-thin gravel, tundra scar	50	20
Peat roads	517	209
Tractor trail, tundra scar	258	104
Exploration roads-thin gravel, tundra scar	177	72
Gravel pad removed, site in process of recovery	426	172
Gravel pad removed, site is recovered	60	24
Total other affected area	**2,127**	**860**
Gravel mines		
In rivers	5,385	2,179
In tundra	1,476	598
Total gravel mine area	**6,861**	**2,777**
Total impacted area	**18,439**	**7,462**

Source:
National Research Council, 2003
Update by Ken Ambrosius, Aerometric, Inc., October 2, 2013

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Table 2-2. Existing and Potential Oil and Gas Development Projects on the North Slope

Unit	Name	Type of Production	Reserve Location	Production Location	Year Discovered	Year in Production
Existing						
Badami	Badami	Oil	Onshore/Offshore	Onshore	1990	1998
Colville River	Alpine	Oil	Onshore	Onshore	1994	2000
Colville River	CD-3 Fjord	Oil	Onshore	Onshore	1992	2006
Colville River	CD-4 Nanuk/q	Oil	Onshore	Onshore	1996	2006
Duck Island	Eider	Oil	Offshore	Offshore	1998	1998
Duck Island	Endicott	Oil	Offshore	Offshore	1978	1986
Duck Island	Sag Delta North	Oil	Offshore	Offshore	1982	1989
Kuparuk River	Kuparuk	Oil	Onshore/Offshore	Onshore	1969	1981
Kuparuk River	Meltwater	Oil	Onshore	Onshore	2000	2002
Kuparuk River	Tabasco	Oil	Onshore	Onshore	1992	1998
Kuparuk River	Tarn	Oil	Onshore	Onshore	1991	1998
Kuparuk River	West Sak	Oil	Onshore	Onshore	1969	1997
Milne Point	Milne Point	Oil	Onshore/Offshore	Onshore	1969	1985
Milne Point	Sag River	Oil	Onshore	Onshore	1969	1994
Milne Point	Schrader Bluff	Oil	Onshore	Onshore	1969	1991
Nikaitchuq	Nikaitchuq	Oil	Offshore	Offshore	2004	2009
Northstar	Northstar	Oil	Offshore	Offshore	1984	2001
Oooguruk	Oooguruk	Oil	Offshore	Offshore	1993	2008
Point Thomson	Point Thomson	Oil & Gas	Onshore/Offshore	Onshore	1977	2016
Prudhoe Bay	Aurora	Oil	Onshore	Onshore	1999	2001
Prudhoe Bay	Lisburne	Oil	Onshore	Onshore	1967	1981
Prudhoe Bay	Midnight Sun	Oil	Onshore	Onshore	1998	1999
Prudhoe Bay	N. Prudhoe Bay	Oil	Onshore	Onshore	1970	1993
Prudhoe Bay	Niakuk	Oil	Offshore	Onshore	1985	1994
Prudhoe Bay	NW Eileen/Borealis	Oil	Onshore	Onshore	1999	2001
Prudhoe Bay	Polaris	Oil	Onshore	Onshore	1999	2001
Prudhoe Bay	Prudhoe Bay	Oil	Onshore	Onshore	1967	1977
Prudhoe Bay	Pt. McIntyre	Oil	Offshore	Onshore	1988	1993
Prudhoe Bay	West Beach	Oil	Onshore/Offshore	Onshore	1976	1994
	Cascade	Oil	Onshore	Onshore	1993	1996
	East Barrow	Gas	Onshore	Onshore	1974	1981
	Palm	Oil	Onshore	Onshore	2001	2003
	Sag Delta	Oil	Offshore	Onshore	1976	1989
	South Barrow	Gas	Onshore	Onshore	1949	1950
	Walakpa	Gas	Onshore	Onshore	1980	1992
Planned/Potential						
Beaufort	Flaxman Island	Oil	Offshore	Onshore	1975	NA
Beaufort	Gwydyr Bay	Oil	Onshore/Offshore	Onshore	1969	NA

Unit	Name	Type of Production	Reserve Location	Production Location	Year Discovered	Year in Production
Beaufort	Kuvlum	Oil	Offshore	Offshore	1987	NA
Colville River	CD5 Alpine W.	Oil	Onshore	Onshore	2000	2015
Greater Mooses Tooth	GMT1, CD6	Oil	Onshore	Onshore	2000	2017
Liberty	Liberty	Oil	Offshore	Offshore	1983	NA
NPR-A	Gubik	Gas	Onshore	Onshore	1950	NA
Oooguruk	Nuna	Oil	Offshore	Onshore	2011	NA
Kuparuk	Sharktooth, DS 2S	Oil	Onshore	Onshore	2012	NA
	Ataruq/Two Bits	Oil	Onshore	Onshore	2000	NA
	GMT2 Rendezvous	Oil	Onshore	Onshore	2000	2020
	E. Umiat	Gas	Onshore	Offshore	1964	NA
	East Kuparuk	Gas	Onshore	Offshore	1976	NA
	Fish Creek	Oil	Onshore	Offshore	1946	NA
	Hammerhead/Sivulliq	Oil	Offshore	Offshore	1985	NA
	Hemi Springs	Oil	Onshore	Offshore	1984	NA
	Kalubik	Oil	Offshore	Onshore	1992	NA
	Kavik	Gas	Onshore	Offshore	1969	NA
	Kemik	Gas	Onshore	Offshore	1972	NA
	Meade	Gas	Onshore	Offshore	1950	NA
	Mikkelson	Oil	Onshore	Onshore	1978	NA
	Pete's Wicked	Oil	Onshore	Onshore	1997	NA
	Sandpiper	Oil & Gas	Offshore	Offshore	1986	NA
	Simpson	Oil	Onshore	Offshore	1950	NA
	Sourdough	Oil	Onshore	Onshore	1994	NA
	Square Lake	Gas	Onshore	Offshore	1952	NA
	Stinson	Oil	Offshore	Offshore	1990	NA
	Sukukik	Oil	Onshore	Onshore	1988	NA
	Ugnu	Oil	Onshore	Offshore	1984	NA
	Umiat	Oil	Onshore	Offshore	1946	NA
	Wolf Creek	Gas	Onshore	Offshore	1951	NA
	Yukon Gold	Oil	Onshore	Onshore	1994	NA

NA = Not yet in production

2.5.1 Prudhoe Bay Unit

The Prudhoe Bay Unit is the largest oilfield by production in North America and ranks among the 20 largest oilfields ever discovered worldwide. Over 11.5 billion bbl have been produced from a field originally estimated to have 25 billion bbl of oil in place. The Prudhoe Bay oilfield also contains an estimated 26 trillion cubic ft of recoverable natural gas. More than 1,100 wells are currently in operation in the greater Prudhoe Bay oilfields, approximately 830 of which are producing oil (others are for gas or water injection). Average daily production in 2012 was approximately 255,500 bbl of oil equivalent (BOE).

The total development area in the Prudhoe Bay Unit is approximately 6,883 acres (2,785 hectares). On the east side of the field the Main Construction Camp can accommodate up to 625 people, the Prudhoe Bay Operations Center houses up to 449 people, and the Tarmac camp houses 244 people. The Base Operations Center on the western side of the Prudhoe Bay oilfield can accommodate 474 people. Additional personnel are housed at facilities in nearby Deadhorse or in temporary camps placed on existing gravel pads on lease.

2.5.2 Kuparuk River Unit

The Kuparuk oilfield is the second-largest producing oilfield in North America. More than 2.6 billion bbl of oil are expected to be produced from this oilfield. The Greater Kuparuk Area includes the satellite oilfields of Tarn, Palm, Tabasco, West Sak, and Meltwater. These satellite fields have been developed using existing facilities. To date, nearly 1,200 wells have been drilled in the Greater Kuparuk Area, and there are currently 47 producing drill sites. The total development area in the Greater Kuparuk Area is approximately 1,508 acres (603 hectares), including 167 km (104 mi) of gravel roads, 231 km (144 mi) of pipelines, 6 gravel mine sites, and over 50 gravel pads.

Additional infield and peripheral development from existing, expanded, or new drill sites within the Kuparuk River Unit (KRU) will continue for the foreseeable future. A new Kuparuk drill site in the southwest portion of the KRU requiring approximately 3.2 km (2 mi) of additional gravel road, pipelines, and power lines is currently planned for construction starting in 2014 with development drilling starting in 2015. Plans to expand the 1H drill site to accommodate wells are planned for 2015 and expected to be complete in 2017-2017. Other pad expansions and two additional drill sites in the eastern portion of the KRU may be developed later this decade to access additional oil resources.

The Kuparuk Operations Center and Kuparuk Construction Camp are able to accommodate up to 1,200 personnel. Camps located at the Kuparuk Industrial Center are primarily used for personnel overflow for construction activities and to avoid having drilling camps in proximity to drilling activities.

2.5.3 Greater Point McIntyre

The Greater Point McIntyre Area encompasses the Point McIntyre field and nearby satellite fields of West Beach, North Prudhoe Bay, Niakuk, and Western Niakuk. The Point McIntyre area is located 11.3 km (7 mi) north of Prudhoe Bay. It was discovered in 1988 and came online in 1993. BPXA produces the Point McIntyre area from two drill site gravel pads. The field's production peaked in 1996 at 170,000 bbl per day, whereas in 2012 production averaged 25,612 bbl per day with 39 production wells and five injectors in operation. Cumulative oil production as of December 1, 2012 was 704 million BOE.

2.5.4 Milne Point

Located approximately 56 km (35 mi) northwest of Prudhoe Bay, the Milne Point oilfield was discovered in 1969 and began production in 1985. The field consists of more than 220 wells drilled from 12 gravel pads. Milne Point produces from three main fields: Kuparuk, Schrader Bluff, and Sag River. Cumulative oil production as of December 1, 2012 was 308 million BOE. Average daily production rate in 2012 was 17,539 BOE with 114 production wells online. The total developed area of the Milne Point field is 450 acres (182 hectares) of gravel footprints, including 181 acres (73 hectares) of gravel pads, 50 km (31 mi) of gravel roads, one gravel mine site and 93 km (58 mi) of pipelines. The Milne Point Operations Center has accommodations for up to 180 people.

2.5.5 Endicott

The Endicott oilfield is located approximately 16 km (10 mi) northeast of Prudhoe Bay. It is the first continuously producing offshore field in the U.S. Arctic. The Endicott oilfield was developed from two man-made gravel islands connected to the mainland by a gravel causeway. The operations center and processing facilities are located on the 24-hectare (58-acre) Main Production Island. One hundred thirteen wells have been drilled to develop the field, 86 of which are still operable. Five hundred one million BOE have been produced at the Endicott Processing Facility as of August 2013. The average daily production rate at this time was approximately 9,300 BOE. Production at Endicott includes the processing of oil from the Endicott reservoir in the Kekiktuk formation and two satellite fields (Eider and Sag Delta North) which are in the Ivishak formation and were drilled from Endicott's Main Production Island. The total area of Endicott development is 522 acres (210 hectares) of land (this includes the 2008 Satellite Drilling Island [SDI] pad expansion to support the Liberty Rig) with 24 km (15 mi) of roads, 43 km (24 mi) of pipelines, and one gravel mine site. Approximately 85 people are housed at the Liberty Camp on Endicott's SDI.

2.5.6 Badami

Production began from the Badami oilfield in 1998, but has not been continuous. The Badami oilfield is located approximately 56 km (35 mi) east of Prudhoe Bay and is currently the most easterly producing oilfield on the North Slope. The Badami Development Area is approximately 85 acres (34 hectares) of tundra including 7 km (4.5 mi) of gravel roads, 56 km (35 mi) of pipeline, one gravel mine site, and two gravel pads with a total of eight wells. There is no permanent road connection from Badami to Prudhoe Bay. The pipeline connecting the Badami oilfield to the common carrier pipeline system at Endicott was built from an ice road.

2.5.7 Alpine Oil Fields

Discovered in 1996, the Alpine oilfield, the first oilfield to be produced in the Colville River Unit (CRU), began production in November 2000. Alpine is the westernmost oilfield on the North Slope, located 50 km (31 mi) west of the Kuparuk oilfield and just 14 km (9 mi) northeast of the village of Nuiqsut. Although the Alpine reservoir covers 124,204 acres (50,264 hectares), it has been developed from just limited acreage of pads and associated roads. The CRU features a combined production pad/drill site (CD1) and three additional drill sites (CD2, CD3, and CD4) with an estimated 180 wells. Production is from six fields: Alpine, Fiord Nechelik, Fiord Kuparuk, Nanuq Nanuq, Nanuq Kuparuk, and Qannik. There is no permanent road connecting Alpine with the Kuparuk oilfield; small aircraft are used to provide supplies and crew changeovers. Major resupply activities occur in the winter, using an ice road that is constructed annually between the two fields. The Alpine base camp can house approximately 630 personnel.

2.5.8 Greater Mooses Tooth

The Greater Mooses Tooth Unit (GMTU) was established in 2008 through petition to BLM. CPAI requested that the BLM designate and approve the proposed Unit Area so CPAI could perform exploration and development operations in an efficient and logical manner under a unit plan of operations. Previous developments (CD1, CD2, CD3, and CD4) and the proposed CD5 are in a different reservoir within the established CRU. GMT1 was previously identified as CD6 and was renamed after it was determined that it would not be part of the CRU and would be in the newly established GMTU.

2.5.9 Northstar

The Northstar oilfield was discovered in 1983 and developed by BPXA in 1995. The offshore oilfield is located 6 km (4 mi) northwest of the Point McIntyre field and 10 km (6 mi) from Prudhoe Bay in about 39 feet of water. The 15,360-hectare (38,400-acre) reservoir has now been developed from a 2-hectare (5-acre) artificial island. Production from the Northstar reservoir began in late 2001, and production averaged 8,560 BOE per day in August 2013. Cumulative oil production through August 15, 2013 was approximately 158.26 million bbl. Twenty nine wells were drilled to develop the Northstar oilfield, 24 of which are still operable. A subsea pipeline connects facilities to the Prudhoe Bay oilfield. The on-site Base Operations Center houses 50 people and access to the island is via helicopter, hovercraft, and boat.

2.5.10 Oooguruk Unit

The Oooguruk Unit is located adjacent to KRU in shallow waters of Harrison Bay. Pioneer constructed the Oooguruk Drill Site (ODS) and Oooguruk Tie-in Pad (OTP) in 2006 on State of Alaska leases. A subsea flowline was constructed to transfer produced fluids 9.2 km (5.7 mi) from ODS to shore. The subsea flowline transitions to an aboveground flowline supported on vertical support members for 3.9 km (2.4 mi) to OTP for approximately 7.6 acres (3.07 hectares). The offshore drill site (6 acres [2.4 hectares]) is planned to support 48 wells drilled to the Nuiqsut, Torok, and Kuparuk reservoirs. The wells are contained in well bay modules. Expansion of ODS is proposed to increase the working surface area from 6 acres (2.4 hectares) to 9.5 acres (3.8 hectares). The wellbay modules will have a capacity for an additional 24 wells, if needed. Development drilling began in 2007 with unit production commencing in 2008. The ODS helicopter sling load area would be expanded seaward .02 hectares (.05 acre).

2.5.11 Nikaitchuq Unit

The Nikaitchuq Unit is located at Spy Island, north of Oliktok Point and the KRU, and northwest of the Milne Point Unit. Former operator Kerr-McGee Oil and Gas Corporation drilled exploratory wells immediately adjacent to Spy Island, 6.4 km (4 mi) north of Oliktok Point in 2004-2005. In 2007, Eni became the operator in the area, after acquiring Armstrong Oil & Gas interests. In 2007, Eni received State approval for expansion of the unit, combining it with the former Tuvaaq Unit and adding a segment from the KRU. Two additional exploratory wells were drilled at Oliktok Points I-1 and I-2, and development drilling began in 2008. Eni constructed an offshore gravel pad, named Spy Island Drillsite (SID) and onshore production facilities on the Oliktok Production Pad (OPP) on State of Alaska leases. A subsea flowline was constructed to transfer produced fluids from SID to shore. Production began in 2011 at OPP and in 2012 at SID. An expanded development program is underway to recover oil from the Schrader Bluff OA and N reservoirs.

2.5.12 Point Thomson

The Point Thomson Unit is located approximately 32 km (20 mi) east of the Badami field.

The Point Thomson reservoir straddles the coastline with a greater part of the reservoir underlying the Beaufort Sea, however all wells and supporting infrastructure will be located onshore. Full development contemplates wells drilled from a Central Pad and up to two satellite drill sites. Construction of field central processing facilities, gathering lines, an export pipeline to the Badami pipeline, camps, and an airstrip began in 2013 and will continue through 2015, with anticipated production commencing in 2016. No permanent roads will connect Point Thomson with the Alaska all-weather road system at Prudhoe Bay. Infield gravel roads will connect the drill sites with the central production facilities, camp, and airstrip. Ice roads will be constructed annually during drilling and construction between Prudhoe Bay and Point Thomson and barges will be used in most years to provide equipment and supplies to Point Thomson during the open water periods.

Following anticipated startup of production from Point Thomson in 2016, potential full field development may include additional liquids production and sale of gas. Full field development will require additional wells, field facilities, and pipelines. The timing and nature of additional facilities and any expansions will depend upon initial field performance and potentially the ultimate timing of an agreement to construct an Alaska gas pipeline to export gas off the North Slope.

2.6 Oil Production Processes

2.6.1 Production Facilities

Wells are drilled into oil bearing zones to bring oil to the surface. Wells are typically grouped on gravel pads (or islands), commonly called well pads or drill sites, or offshore on development platforms. During development design, pads are placed to optimize oil recovery within the constraints of drilling reach and environmental protection. In general, at the surface well-head, a mix of crude oil, water, and natural gas flows into the manifold building, also located on the well pad. The primary function of the manifold building is to combine production from multiple wells and route it to separation facilities via cross-country flow lines. Some remote locations with space limitations decrease the footprint of the manifold building by utilizing multi-phase flow meters instead of a test separator. Production from a well may be diverted through the multi-phase flow meter or sent directly to a common production flow line. Crude oil from offshore remote locations is transported via buried subsea pipelines to onshore flow lines that deliver it to the separation facilities.

At the separation facilities (also called production facilities, gathering centers, or flow stations), gas, oil, and water are separated. Following the separation process, oil is routed by pipeline to Pump Station 1, which is the beginning of the TAPS. The separated water (referred to as produced water) is sent via pipeline back to the well pads where it is typically injected back into the reservoir to help maintain reservoir pressure and enhance recovery of oil. Most of the produced gas is also reinjected to maintain reservoir pressure. A portion of the gas may be used to fuel the overall production operation. In the Prudhoe Bay Unit, gas is first routed to the Central Gas Facility (CGF) where natural gas liquids (NGLs) and miscible injectant (MI) are extracted using a low temperature separation process. The NGLs are shipped via TAPS with the crude oil. MI is sent via pipelines to the well pads where it is injected for enhanced oil recovery. After the NGLs and MI are removed, the remaining gas is routed to compressors at both the CGF and the Central Compressor Plant, where it is compressed for re-injection into the gas cap of the reservoir. In older fields, such as Prudhoe Bay and Kuparuk, the crude oil fraction of production fluids is substantially less than the water and gas fraction. A diagram illustrating the oil production process is provided in Figure 2-2.

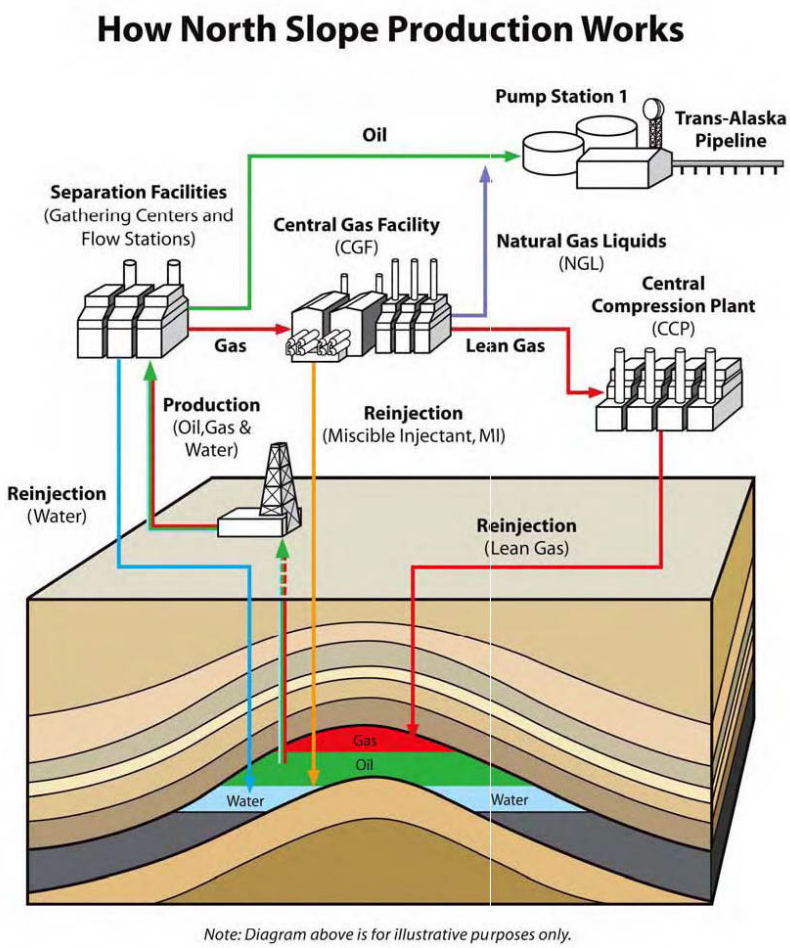


Figure 2-2. North Slope Process Flow Diagram

2.6.2 Production Wastes

Production wastes include drilling muds that are used to lubricate and maintain the well bore during drilling, and rock fragments known as cuttings, removed by the drill bit. Drilling muds are either waterbased mixtures comprised of naturally occurring clays and weighting materials with small amounts of other additives or oil-based mixtures comprised of mineral oil and weighting materials with small amounts of other additives. Until the 1990s, these production wastes were typically placed in "reserve pits" built into the gravel drilling pads; however, new technology has eliminated the need for reserve pits by grinding the cuttings and re-injecting the muds and ground cuttings into deep, confined geologic formations. Subsurface waste disposal is regulated by the USEPA and the State of Alaska under the Underground Injection Control (UIC) and National Pollutant Discharge Elimination System (NPDES) General Permits programs.

Other wastes generated by oilfield operations include well treatment fluids, chemicals used for processing crude oil, rig washwater, accumulated materials such as hydrocarbons solids, sands, and emulsion from production separators and fluid treating vessels, and cooling waters. These wastes are handled by using a variety of techniques, including recycling, underground injection, beneficial reuse in enhanced oil recovery, and shipment to approved offsite facilities.

A small amount of hazardous waste is generated by production facilities. These wastes are handled in accordance with USEPA regulations. Hazardous wastes are sent out of state by truck, rail, and barge to USEPA permitted disposal facilities in the contiguous U.S.

Non-hazardous solid waste and sanitary wastes are also generated at North Slope oilfield facilities. Solid wastes such as empty drums, paper products, wood, etc., are handled at the North Slope Borough (NSB) landfill or incinerated. Disposable food waste is also handled at the NSB landfill facility or incinerated, and wildlife resistant dumpsters have been installed in the oilfield to minimize wildlife attraction to these potential food sources. Sewage wastes are physically and chemically treated by wastewater treatment facilities. North Slope area facilities also operate various recycling programs. Paper products, wood, scrap metal, cardboard, electronics, and other materials are collected and transported off the North Slope to appropriate recycling facilities.

2.7 Support and Distribution

2.7.1 Support Operations

Equipment and people associated with exploration, development, and production operations are transported to and from the facilities by truck or bus, aircraft, hovercraft, marine vessel, or barge towed by a vessel. Equipment and materials are transported to the North Slope by truck. Aircraft, both fixed wing and helicopters, are used for movement of personnel, mail, rush-cargo, and perishable items. Marine vessel, barges, and tugs are used to transport items in open water.

Much of the barge traffic during the open water season unloads from two dockheads at West Dock. The West Dock Users Group coordinates the deliveries and use of the West Dock facilities during the busy open water season. Large sealift barges carrying modules for North Slope infrastructure projects typically off-load modules at West Dock and haul the modules to North Slope destinations. Maintenance dredging is performed as needed at West Dock to ensure barge and sealifts can safely use West Dock. Current permits authorize the removal of up to 220,000 cubic yards of dredge material annually from the navigation channels leading to West Dock.

2.7.2 Trans-Alaska Pipeline System

TAPS is a 122-cm (48-in) diameter crude oil transportation pipeline system that originates at Pump Station 1 in the Prudhoe Bay Oilfield, and extends 1,287 km (800 mi) across the state to its terminus at the Valdez Marine Terminal. Alyeska Pipeline Service Company, as operator of the pipeline, conducts pipeline operations, maintenance and emergency response along the pipeline right-of-way, including approximately 37 km (23 mi) of pipeline located within 40 km (25 mi) of the Beaufort Sea coastline. Personnel are based out of pump stations, and reside in designated living facilities, where lodging and eating amenities are maintained. In addition to routine operations, project work and emergency response training takes place at various distances from the pump stations. Operations and maintenance of the pipeline and facilities includes a 238-km (148-mi) natural gas line that extends south from Pump Station 1 that supplies fuel to power turbines at Pump Stations 3 and 4. Travel primarily occurs along established roads, such as the Spine Road and the Dalton Highway, or along the pipeline right-of-way work pads. The Dalton Highway corridor is shared with the general public.

Congress enacted the Trans-Alaska Pipeline Authorization Act (TAPAA) on November 16, 1973. The Federal Agreement and Grant of Right-of-Way for the TAPS (Federal Grant) was issued on January 23, 1974, and the State Right-of-Way Lease for the TAPS was issued on May 3, 1974. The Federal Grant, as renewed, expires on May 2, 2034. On November 26, 2002, the lease for state land along the pipeline corridor was renewed for an additional 30 years.

2.8 Planned and Potential Future Activities 2016-2021

Projecting specific activities for 2016 through 2021 is uncertain because Arctic oil and gas planning itself carries an inherent level of uncertainty as it is subject to a web of complex operational, economic, and regulatory concerns. Moreover, even those oilfields in an advance stage of planning may not actually be developed. For example, the Liberty oilfield was discovered in 1982 by Shell Oil Company and subsequently acquired by BPXA in 1996 after Shell relinquished its leases. BPXA drilled a well from Tern Island in the winter of 1996−1997, and based on the results of that well, BPXA proceeded with plans to develop the reservoir. Construction activities were initially planned for the 1999−2000 winter season but were subsequently deferred. In early 2002, BPXA announced that it was suspending permit applications to develop the Liberty oilfield. In the fall of 2004, BPXA re-initiated permitting for Liberty with the signing of a Memorandum of Understanding for permit evaluation and the NEPA process. Initial construction activities for the Liberty Development began in early 2009. This demonstrates the uncertainty of identifying future activities since they are driven by a variety of economic, regulatory, and environmental factors beyond the control of the oil and gas industry.

The sections below provide descriptions of potential activities for 2016 through 2021 based on the best available information and represent the oil and gas industry's best projection of the type and magnitude of activities. These are primarily based on information relating to BOEM OCS lease sales, State of Alaska lease sales, NPR-A activities, and potential development/exploration sites. Seismic exploration and exploratory drilling could occur at unidentified locations and potential new satellite oilfields across the North Slope in areas recently leased or in those areas subject to continuing evaluation.

2.8.1 Bureau of Ocean Energy Management Outer Continental Shelf Lease Sales

The BOEM manages the Alaska OCS region encompassing 600 million acres (242 million hectares). Of that acreage, approximately 65 million acres (26 million hectare) are within the Beaufort Sea Planning Area, the area within scope of the Petition request. In July 2012, BOEM issued the Final Programmatic Environmental Impact Statement (PEIS) for future lease sales planned for the Beaufort Sea Planning Area. Sale 186 was held in 2003, resulting in the leasing of 34 tracts encompassing 181,810 acres (73,576 hectares). Sale 195 occurred in 2005, resulting in the leasing of 117 tracts encompassing 607,285 acres (245,760 hectares). Sale 202 was held in 2007, resulting in the leasing of 90 tracts covering 490,700 acres (198,580 hectares). BOEM plans one more lease sale in the Beaufort Sea through 2017: Lease Sale 242. BOEM issued the PEIS for these areas in July 2012 and it is available at http://www.boem.gov/5-Year/2012-2017/PEIS.aspx. Leasing information from BOEM is located at http://www.boem.gov/Oil-and-Gas-Energy-Program/.

2.8.2 National Petroleum Reserve – Alaska

The BLM manages over 23 million acres (9 million hectares) in the NPR-A, and the ROD for the NPR-A Integrated Activity Plan and associated EIS was signed on February 21, 2013. The ROD emphasizes multiple uses of the NPR-A, consultations with local residents, and coordinated scientific studies to protect wildlife habitat, subsistence areas, and other resources. The NPR-A Integrated Activity Plan and EIS addressed potential future industrial activities including pipeline and other oil and gas infrastructure development, oil and gas leasing and exploration, and offshore oil and gas development. The decision also recommends stipulations and best management practices to regulate permitted activities in the NPR-A. The ROD makes approximately 11.8 million acres (4.7 hectares) available for oil and gas leasing. Since 2000, 29 wells have been drilled in the NPR-A (BLM 2013a). Lease sales have occurred regularly in the NPR-A; the 1999 lease sale sold 867,514 acres (351,070 hectares), the 2002 sold 579,269 acres

(234,422 hectares), the 2004 sold 1,403,561 acres (568,001 hectares), the 2006 sold 939,867 acres (380,351 hectares), the 2008 sold 1,656,574 acres (670,392 hectares), the 2010 sold 28,444 acres (11,510 hectares), the 2011 sold 119,987 acres (48,557 hectares), and the 2012 sold 160,628 acres (65,003 hectares) (BLM 2013b). The first lease sale under the February 2013 ROD occurred on November 6, 2013, and sold 245,293 acres (99,267 hectares). BLM anticipates having subsequent annual lease sales. Current operator/ownership information is available on the BLM NPR-A website at http://www.blm.gov/ak/st/en/prog/energy/oil_gas/npra.html.

2.8.3 State of Alaska Lease Sales

In 1996, ADNR, Oil and Gas Division, adopted an "areawide" approach to leasing. Under areawide leasing, the state offers all available state acreage not currently under lease within each area annually. The area of activity in this Petition includes the North Slope and Beaufort Sea planning areas. Lease sale data are available on the ADNR website at: http://www.dog.dnr.state.ak.us/oil/index.htm. Projected activities may include exploration, facility maintenance and construction, and operation activities.

The North Slope planning area has 1,225 tracts that lie between the NPR-A and the ANWR. The southern boundary of the North Slope sale area is the Umiat baseline. In this planning area, several lease sales have been held to date. As of July 2013, there are 831 active leases on the North Slope, encompassing 2.24 million acres (906,496 hectares), and 224 active leases in the state waters of the Beaufort Sea, encompassing 615,296 acres (249,000 hectares).

The Beaufort Sea Planning Area encompasses a gross area of approximately 2 million acres (809,370 hectares) divided into 573 tracts ranging in size from 640 to 5,760 acres (259 to 2,330 hectares). These tracts are located within the NSB and consist of State-owned tidal and submerged lands in the Beaufort Sea between the Canadian Border and Point Barrow. The sale area is adjacent to both the NPR-A and the ANWR. The southern fringe of the sale area includes some state-owned uplands lying between the NPR-A and the ANWR. Several lease sales have been held to date. As of July 2013, there are 226 active leases in the state waters of the Beaufort Sea, encompassing 606,446 acres (245,420 hectares). The last Beaufort Sea areawide lease sale held on November 7, 2012, resulted in the sale of 26 tracts for a total of 99,200 acres (40,145 hectares) on the North Slope. The 2013 lease sale occurred on November 6, and sold 5,120 acres (2,072 hectares). ADNR plans to continue hosting areawide lease sales on an annual basis.

2.8.4 Liberty Oilfield

BPXA is evaluating development of the Liberty oilfield. The Liberty reservoir is located in federal waters in Foggy Island Bay about 13 km (8 mi) east of the Endicott SDI. The project concept is to build a gravel island situated over the reservoir with a second manmade island nearby for relief well capability. Two primary development options are being assessed: 1) full on-island processing facility (similar to Northstar); or 2) well-pad type island with processing facilities located at SDI-pad or thru the existing Endicott Facility. Additional infrastructure would include a 12.9 km (8-mi) long subsea pipeline carrying sales oil or three-phase production fluids depending on the development option chosen and a mine site. Environmental, archeological, and geotechnical work activities will occur to support the development and help inform decisions. A Development Plan of Production is being submitted to BOEM and BSEE in December 2014. If the decision is made to proceed, first oil is estimated in 2020. This project concept supersedes the cancelled Liberty ultraextended-reach drilling project.

2.8.5 Alpine Satellites Development

In September of 2004, BLM released the Alpine Satellites Development Plan EIS, which evaluated the addition of up to five drill sites in the Alpine development area. Two of the drill sites, CD-3 (also known

as Fiord), and CD4 (also known as Nanuq), are in the Colville River Delta and were completed and brought online in 2006. The remaining three drill sites (CD5, GMT1 – formerly CD6, and GMT2 – formerly CD7) were envisioned as being routed back to the existing infrastructure at Alpine via a road and bridge over the Nigliq Channel of the Colville River. The CD5 development (also known as Alpine West) has received all the necessary permits and funding approvals and construction will begin in 2014. The other two drill sites are planned to be connected to CD-5 via road; however, the permitting for these developments has not been completed. CD5, GMT1 (Lookout prospect) and GMT2 (Rendezvous prospect) are located in the Northeast NPR-A, an area bordered by the Beaufort Sea coast to the north, and Brooks Range to the south. Gravel sources available for extraction are from an existing mine near Nuiqsut (owned by ASRC) and a potential new gravel mine site (Clover) near the Ublutuoch River in NPR-A. In addition to new drill site development in the NPR-A, expansion of the existing CRU drill sites is being considered to allow drilling of additional wells in-lieu of adding new drill sites in the Colville River Delta.

2.8.6 Shell Offshore Exploration Activities

Shell anticipates that it may conduct Beaufort Sea exploration drilling programs between 2016 and 2021 on its BOEM Alaska OCS leases and its State of Alaska offshore leases. As of July 2013, Shell held majority or partial interest in 138 OCS leases and 18 state leases in the greater Beaufort Sea area. Additional Shell exploration drilling programs may also occur on any offshore Beaufort Sea leases acquired by Shell at future lease sales held by the BOEM or the State of Alaska, or by Shell acquiring interest in leases held by other companies.

During the open water Arctic drilling season, Shell would conduct exploration and or/delineation drilling through use of a floating drilling vessel, along with attendant ice management and oil spill response (OSR) equipment. For the winter drilling season, Shell would conduct drilling through use of an ice island or bottom-founded structure, along with attendant OSR equipment.

2.8.7 Mustang – Western Region Expansion

BRPC is planning an expansion of the Mustang Development in the region around the Southern Miluveach Unit (SMU), located west of KRU, on the North Slope. These satellite developments will be processed through the Mustang Processing Facility. Four satellite drill sites are anticipated. Construction of one drill site per year is anticipated from 2017 and 2020.

Each of the four drill site pads will cover approximately 9 acres (3.6 hectares) and will be located in the region between the KRU and CRU. To provide year-round access, a gravel road will be built for each drill site connecting back to the Mustang anchor development. Approximately 32.2 km (20 mi) of gravel road will need to be constructed to tie in all four drill sites.

Production will be transported via pipeline back to the Mustang processing facility. Approximately 32.2 km (20 mi) of pipeline will be needed to tie each drill site back to Mustang and will run adjacent to the gravel road(s).

2.8.8 Telemark Development

BRPC plans to begin gravel construction on the first satellite road and pad in 2016. Each subsequent drill site will begin gravel construction one year later with expected production to begin in the following year.

BRPC is planning the Telemark Development, near the Badami Unit, to produce oil on the eastern North Slope. BRPC plans to leverage existing infrastructure to develop the field and expects to lay very little gravel for the development.

BRPC will construct a 2.4 km (1.5 mi) pipeline to transport recovered oil to the Badami surface facility for processing. Processed crude oil will be shipped through the Badami pipeline and eventually through TAPS.

2.8.9 Beechey Point / East Shore

BRPC is planning the East Shore Development Project to produce oil from several relatively small hydrocarbon accumulations on the central North Slope. The field lies adjacent to the Prudhoe Bay and Midnight Sun fields and BRPC plans to leverage nearby, existing infrastructure to develop this field. BRPC plans to utilize horizontal drilling technology to further minimize surface impact.

The East Shore pad will cover approximately 15 acres (6.07 hectares) and a gravel road of approximately 8.9 km (5.5 mi) will be constructed to connect to existing Prudhoe Bay infrastructure to provide year-round access to well and production facilities.

Sales oil will be transported via a ~ 1.6 km (~1 mi) pipeline from the East Shore pad to a lease automatic custody transfer (LACT) metering skid adjacent to the Northstar pipeline.

Gravel construction is expected to begin in 2018. Facilities will be constructed during 2019 and first oil is planned for 2020.

2.8.10 Tofkat

BRPC is proposing the Tofkat Development Project, in the Tofkat Unit (TU), to produce oil from a relatively small hydrocarbon accumulation on the western North Slope. BRPC plans to leverage nearby, existing infrastructure and produce from horizontal wells to minimize the surface impact of the facility.

The Tofkat gravel pad will cover approximately 15 acres (6.07 hectares) and a gravel road of approximately 8 km (5 mi) will be constructed to connect to future CRU infrastructure north of TU.

Sales oil will be transported via a 8 km (5 mi) pipeline from the Tofkat pad to a custody transfer (LACT) metering skid adjacent to the Alpine pipeline. Gravel construction is expected to begin in 2020.

2.8.11 Nuna

The Nuna project is located along the east side of the Colville River Delta; adjacent to KRU; and approximately 35.4 km (22 mi) northeast of Nuiqsut, Alaska. Pioneer proposes to construct two drill sites, then drill, produce, and transport 3-phase hydrocarbon resources to the existing OTP. An access road connection from existing infrastructure to the Nuna Drill Site 1 (NDS1) and Nuna Drill Site 2 (NDS2) would begin at KRU drill site 3S. Three gravel pads would be constructed:

- 22 acres (8.9 hectares) for NDS1 (25-50 wells)
- 13 acres (5.2 hectares) for NDS2 (10-15 wells)
- 0.5 acres (0.2 hectares) for the Nuna Tie-in Pad (NTP), which would include a pig launching and receiving facility for the aboveground flowlines

NDS1 would be constructed and developed for production before construction of NDS2, which could take approximately three to four years.

Expansion of OTP would increase the working surface area from 7.6 acres (3.07 hectares) to 9 acres (3.6 hectares) to provide surface facilities to support the NDS1. A new seawater line 8.4 km (5.2 mi) in length is proposed for installation from a new tie-in pad of 0.18 acres (0.07 hectare) near the KRU Central Processing Facility #3 to OTP to supply additional seawater for reservoir injection at both NDS1 and ODS.

2.8.12 West End Development

The Prudhoe Bay Unit owners are evaluating potential activities as part of the West End Development (WED) Program. The program consists of three components:

1. Improving capacity at existing facilities and infrastructure which may include modifications to Gathering Center 2 (GC2) separation and handling, increased capacity in the Eileen West End flowline and gas life transmission pipelines, and additional heat for fluids entering GC2
2. Constructing a new pad (I-Pad) in the far Northwest GC2 area, near the Milne Point Road, to access the Schrader Bluff and Kuparuk reservoirs, and potentially the Sag reservoir
3. Expanding S-Pad and drilling additional wells at both M and S-Pads to access the Schrader Bluff, Kuparuk, and Sag reservoirs

2.8.13 Potential Future Gas Pipeline

Two major partnerships are currently proposing to construct a natural gas pipeline that would transport natural gas from the North Slope. Only a small portion (40 km [25 mi] inland) of a pipeline would occur within the specified area of activity covered under this Petition. The two proposed projects are discussed below.

2.8.13.1 Alaska Liquefied Natural Gas

The Alaska Liquefied Natural Gas (AKLNG) project proposes to build a large diameter (45-106 cm [18-42 in]) natural gas pipeline from the North Slope to South-central Alaska. AKLNG is still in concept selection, and does not have detailed plans released to the public.

2.8.13.2 Alaska Stand Alone Gas Pipeline

The Alaska Stand Alone Gas Pipeline (ASAP) project is a 61-cm (24-in)-diameter natural gas pipeline with a natural gas flow rate of 500 million standard cubic feet per day (MMscfd) at peak capacity. The proposed pipeline will be buried, except from mileposts (MPs) 0 to 6 and at elevated bridge stream crossings, compressor stations, possible fault crossings, pigging facilities, and off-take valve locations. The pipeline system will be designed to transport a highly conditioned natural gas highly enriched in non-methane hydrocarbons.

The routing of the ASAP is from Prudhoe Bay following the TAPS and Dalton Highway corridors, generally paralleling the Dalton Highway corridor from the North Slope to near Livengood, northwest of Fairbanks. At Livengood, the pipeline route heads south, through Minto Flats, before joining the Parks Highway corridor west of Fairbanks, near Nenana. From there it continues south and terminates at MP 737, where it will connect at MP 39 of the Beluga Pipeline (ENSTAR's distribution system) near Big Lake. A lateral pipeline to Fairbanks (Fairbanks

Lateral) will take off from the main pipeline just a few miles north of Nenana, at Dunbar. The Fairbanks Lateral will travel northeast to Fairbanks, a distance of approximately 56.3 km (35 mi).

With the ASAP project, a Gas Conditioning Facility (GCF) would need to be constructed near Prudhoe Bay. This GCF is expected to require a large sealift of modules that will be off-loaded at West Dock. This sealift will likely require dredging a navigational channel to the West Dock dockhead that would be deeper than the existing navigational channel at West Dock. The sealift for the GCF modules would also require improvements to West Dock, including the placement of breasting dolphins and raising the height of the existing dockhead to accept the large modules.

2.8.14 Gas Hydrate Exploration and Research

There has been a growing interest in the North Slope's gas hydrate resource in the past 5 years. It is estimated that the North Slope has in excess of 85 trillion cubic feet of technically recoverable gas hydrate reserves (Collette 1995). Federal funds from the US Department of Energy support domestic gas hydrate exploration, research and development programs. US federal-industry partnerships are expected to begin long-term production testing on the North Slope in the next few years (Ruppel 2011). The State of Alaska has conveyed its support of gas hydrate research and development by establishing the Eileen hydrate trend deferred area near Milne Point, offering leases specifically for gas hydrate exploration and research.

A few recent gas hydrate exploration and test wells have been drilled within the Petition area. With both federal and state government agencies supporting this research, interest in gas hydrates is expected to grow during in the coming years. This interest may be somewhat moderated by the many questions regarding the economic viability of developing gas hydrate resources. For these reasons a relatively low, but an increasing level of gas hydrate exploration and research is expected during the Petition period.

3.0 DATES, DURATION, AND REGION OF ACTIVITIES

CFR § 18.27(d)(ii) The dates and duration of such activity and the specific geographical region where it will occur.

The geographic area of activity, illustrated in Figure 1-1, covers a total area of approximately 68.9 million acres (27.9 million hectares). The area of activity includes land on the North Slope and adjacent waters of the Beaufort Sea including state waters and OCS waters. The area extends from Point Barrow on the west to the U.S.-Canada border on the east. The onshore boundary is 40 km (25 mi) inland, excluding the area within ANWR. The offshore boundary is the BOEM Beaufort Sea Planning Area, approximately 322 km (200 mi) offshore.

Some of the activities to be conducted are expected to occur on a year-round basis. Anticipated types of activities are outlined in Chapter 2. Activities over the next five-year period can be expected to involve: continued operations in the existing, producing oilfields, in-field drilling, and maintenance activities to maximize production in the existing oilfields, seismic survey activities to determine the presence of new hydrocarbon deposits (both onshore and offshore), exploratory and appraisal drilling both onshore and offshore to verify hydrocarbon accumulations, development of new oilfields following exploratory activity, cleanup activities from decommissioning, and closeout of exploration and/or production facilities.

The locations of these activities are assumed, for the purpose of this Petition, to be approximately equally divided among the onshore and offshore tracts presently under lease and to be leased during the period under consideration. Remediation and closeout activities at decommissioned exploratory well sites or production facilities could occur at up to 10 sites annually at various locations across the North Slope, where activities have been previously conducted.

Because of the large number of variables influencing exploration activity, it is not possible to predict the exact dates and locations of the operations that will take place over the next five-year period. The specific dates and durations of the individual operations and their geographic locations will, however, be set forth in detail when requests for LOAs are submitted by industry applicants to USFWS.

The descriptions of existing and future activities presented in this Petition have been compiled from information supplied by AOGA member companies and the following non-members: CPAI, BRPC, and ASRC. These projections are also intended to encompass activities to be undertaken by companies not participating in this Petition (i.e., contractor and sub-contractor companies providing services to the oil and gas lease holders).

4.0 SPECIES, NUMBER, AND TYPE OF TAKE

CFR § 18.27(d)(iii)(A) Based upon the best available scientific information: An estimate of the species and numbers of marine mammals likely to be taken by age, sex, and reproductive conditions, and the type of taking (e.g., disturbance by sound, injury or death resulting from collision, etc.) and the number of times such taking is likely to occur.

Pursuant to Section 101(a)(5) of the MMPA, AOGA petitions the USFWS to renew regulations for taking of polar bear and Pacific walrus incidental to oil and gas exploration, development, and production operations and all associated activities on the North Slope (area shown in Figure 1-1) for the period of five years beginning August 3, 2016 and extending through August 3, 2021. Renewal of the regulations would allow the incidental, but not intentional, non-lethal taking of small numbers of polar bears and Pacific walruses in the event that incidental takes occur from oil and gas activities in the aforementioned area.

AOGA anticipates that all incidental takes addressed by this Petition will be non-lethal and is petitioning for incidental Level B harassment take authority for both polar bears and walruses. This Petition does not seek take authorization for intentional harassment, mortality and injury, or for Level A harassment (see supra § 1.2.1). Intentional harassment authorizations are separately applied for individually by each operating company and authorized pursuant to Sections 101(a)(4), 109(h), and 112(c) of the MMPA.

Not all the animals exposed to an activity will necessarily have a behavioral response to, or be disturbed by the activities described in this Petition. Further, not all behavioral responses will be to a degree of causing a disruption of behavioral patterns that constitute a take as defined in the MMPA. According to the USFWS's guidelines, behavioral responses may include subtle to obvious changes in behavior, movement, or displacement (76 FR 77782). The USFWS's guidelines provide that, to constitute a take, a behavioral response must be biologically significant in that migration, breathing, nursing, breeding, feeding, or sheltering of an animal is disrupted (76 FR 54433). If a behavioral response includes a momentary change in behavior or moving a small distance, the impacts are not likely biologically significant to the population (76 FR 77782). Therefore, because a behavioral response or disturbance does not necessarily constitute Level B harassment, the actual amount of ancitipated Level B harassment is a small subset of the total estimated responses described below.

4.1 Polar Bear

As discussed in detail in Chapter 6, the types of oil and gas activities having the potential to impact and result in an incidental take of a polar bear include noise disturbance, temporary or permanent physical obstructions, facility development and operations, human and vessel encounters, and spills. The potential for incidental take caused by these activities is generally greater during summer and fall when more bears are found near coastal areas of activity. Polar bear sightings may also be greater near denning areas onshore during winter and spring. Sows with cubs are most likely to be sighted after emerging from dens in the spring; however, a concerted effort is made by oil and gas operators to avoid dens by identifying and mapping their locations and by compliance with USFWS restrictions on the proximity of oil and gas activity to an active or potential den site (see Chapter 10).

Estimates of the number of polar bear responses that may occur within the Petition area in 2016-2021, and the number of these interactions that might result in polar bear behavioral disturbances, some of which could potentially result in Level B incidental take under the MMPA, are provided below. These estimates are based on polar bear sighting reports provided by industry, and projected future oil and gas activity levels. This analysis assumes that the level of activity within the Petition area is correlated with the

potential number of polar bear responses, and that an increase in the amount of onshore activity within polar bear habitat would likely increase the potential for interactions, thereby increasing the potential for incidental takes of polar bears.

Section 4.1.1 presents the results of a review of all reported polar bear observations from the geographical area of the Petition for 2008 to 2012 and an assessment of the portion of those observations that may have resulted in polar bear behavioral responses. The time period was extended back to 2006 for offshore activities, such as seismic surveys, shallow hazards surveys, and exploration drilling, because of small sample sizes in the period of 2008-2012. As discussed above, interactions that could potentially be considered takes under the MMPA are a subset of these behavioral responses. Section 4.1.2 provides projected estimates of the potential number of polar bear behavioral responses that might occur near oil and gas activities during the period of the Petition, based on future activity levels in comparison to 2008-2012 activity levels.

Oil and gas industry operators working in the Petition area provide reports of all polar bear sightings and summarize the sightings in annual reports to USFWS as required by conditions of their LOAs. Offshore operators also report the results of marine mammal monitoring efforts to NMFS and USFWS in the form of 90-day reports and comprehensive reports as required by ITRs, LOA, and IHA conditions. Observational reports from these documents provide data on the age/sex of the polar bear (if possible), number of bears, type of encounter, and any behavioral response (if observed) to the oil and gas activity. AOGA compiled all such reports that are available for the North Slope from 2008 to 2012 (and 2006 to 2012 for offshore activities). The reports were reviewed to summarize the number of polar bears observed by oil and gas operators during these past years and the documented behavioral responses of these polar bear observations. It is important to note that the same polar bear or group of polar bears can be seen (and reported) multiple times within a single day and/or on different days. Furthermore, non-industry related events (e.g. whale carcasses onshore) may cause spikes in polar bear sightings in the area.

4.1.1 Polar Bear Behavioral Responses during Past Activities

4.1.1.1 Polar Bear Responses during Past OCS Activities

Polar bear sightings and potential behavioral responses from oil and gas activities in the OCS were compiled from 90-day reports submitted by operators to NMFS and USFWS.

4.1.1.2 Seismic Surveys

Available 90-day monitoring reports indicate that seven seismic surveys were conducted from 2006 through 2012. Two of these surveys were ocean bottom cable surveys in open water conditions, two were 2D seismic surveys conducted in both open water and ice conditions, two were 3D seismic surveys conducted in open water conditions and one was a 2D survey conducted only in open water conditions. A total of 19 polar bears were observed during these survey programs. In the 90-day reports, no behavioral responses were noted or recorded by observers during the monitoring efforts for these programs.

4.1.1.3 Shallow Hazards Surveys

Available 90-day reports indicate that four shallow hazards surveys were conducted in the Beaufort Sea from 2006 to 2012. A total of 72 polar bears were observed during these surveys. No reactions or responses were recorded for most observed polar bears, and potential behavioral responses to project activities were recorded by observers. These responses were noted in fewer

than 6 percent of the 72 observed bears and are considered behavioral responses for the purposes of this analysis.

4.1.1.4 Exploration Drilling

Thirty-five exploration wells have been drilled in Federal waters of the Beaufort Sea OCS from the 1980s to 2014. A single exploration drilling program was conducted in the Beaufort Sea OCS during the period from 2008 through 2012. This drilling program consisted of the top portion of a single well. A total of 104 polar bears (29 sightings) were observed during the drilling program. Thirty-nine of the polar bears (13 sightings) were observed from moving vessels, and 65 polar bears (16 sightings) were observed from stationary vessels. Only four of the polar bears (two sightings) were observed from the sound source vessels (drilling unit, anchor handler). Many polar bears were seen onshore. All of the sightings of polar bears in water involved single individuals. Group sizes of polar bears on ice or land ranged from 5 to nearly 20 animals feeding on a whale carcass.

The polar bears were noted as looking at the vessel when observed during about 25 percent of the observations, but this was not considered a behavioral response for the purposes of this analysis. No other types of responses or reactions were observed and reported.

4.1.1.5 Polar Bear Responses during Past Onshore / Coastal Activities

Polar bear sightings and potential behavioral responses to onshore and coastal oil and gas activities were compiled from annual reports and polar bear sighting forms prepared by North Slope operators. These polar bear sighting reports represent the most comprehensive data set regarding polar bear interactions with oil and gas industry activities on the North Slope.

Summary reports of polar bear observations from 2008 through 2012 were received from five operators in the ITR geographic region. Based on these reports, a total of 588 polar bear sightings, representing 941 individual bears, were recorded from 2008 through 2012 (Table 4-1). A single sighting report sometimes represents more than one bear. For instance, the sighting of a sow with two cubs would be reported as one sighting of three bears. These numbers also include repeated sightings of the same polar bear. A single polar bear may be sighted and reported multiple times during the year, or even multiple times in the same day by different operators or different observers.

Table 4-1. Polar Bear Sightings at North Slope Oil and Gas Units in 2008-2012

Year	Alpine	Badami	Endicott Liberty	Kuparuk	North Star	Milne Point	Nikaitchuq	Oooguruk	Prudhoe Bay	Point Thomson	All
2008	2	1	21	5	3	5	12	5	16	0	70
2009	2	3	39	6	4	5	8	3	37	25	132
2010	0	0	6	8	1	3	0	0	7	28	53
2011	4	0	76	1	8	0	28	3	1	1	122
2012	1	0	67	2	10	0	39	2	75	15	211
All	9	4	209	22	26	13	87	13	136	69	588

We reviewed information available for the 588 sightings (941 observed bears) in an effort to determine how many of the observed interactions may have resulted in polar bear behavioral responses. Interactions that could potentially be considered takes under the MMPA would be a subset of these behavioral responses.

For each observation, we estimated the shortest distance between the polar bear and the observer (or activity). Out of the total of 941 observed polar bears, 133 polar bears (14.2 percent of total) were at distances greater than 1,000 m (3,281 ft). Polar bear sightings that took place at distances greater than 1,000 m (3,281 ft) were not further analyzed in detail. This distance is greater than the setbacks required by agencies, including USFWS, for aircraft and vessel traffic, which were designed to avoid disturbances and incidental takes. There was no sighting distance recorded for 128 of the observed polar bears; however, a review of the observational data for these 128 polar bears indicate no or subtle behavioral responses occurred, and thus would likely not rise to the level of a take.

Observations of the remaining 680 polar bears, consisting of sightings within 1,000 m (3,281 ft) were reviewed for behavioral response. Two data fields in the observation reports were closely examined during this review: 1) initial and subsequent behavior of the polar bear, and 2) description of the encounter. The types of reported behavioral activities that were generally considered to represent evidence that the bear had exhibited a behavioral response are identified in Table 4-2. Each encounter was reviewed individually to determine which polar bears may have displayed a behavioral response[1]. The analysis indicates that a total of 32 (4.7 percent) of the 680 observed polar bears may have exhibited some type of behavioral response to the oil and gas activity, an average of 6.4 potential behavioral responses per year.

[1] Behavioral descriptors are inherently subjective and directly based on sightings recorded by observers. Some behaviors may fall under one or more categories and USFWS may categorize behaviors differently than the analysis presented here.

Table 4-2. Descriptors of Polar Bear Behavior from Observations on the North Slope in 2008-2012[1]

Polar Bear Behavior Descriptors in Observation Reports		
Descriptors Likely Representing Normal Behavior – Not Indicating a Response	**Descriptors Possibly Representing a Change in Behavior – Possibly Indicating a Response**	**Descriptors Representing a Change in Behavior – May Indicate a Response**
beachcombing, calm, crossing road, curious, difficulty, digging, eating, feeding, floating, foraging, hunting, laid down, laying down, lethargic, loitering, moving, moving with limited movement, passing by, playing, resting, searching for food, sleeping, sleepy, smelling, stationary, swimming, traveling, walking, walking on beach, wandering around	arrived at area, looking, running, sitting up, standing, standing up in water, walking around buildings, walking towards rig	aggressive, alert, avoid contact, changed activity, changed course of travel, departed/disappeared, left area, left island, skittish, swam away, swam (in a different direction)

[1] Behavioral descriptors are inherently subjective and directly based on sightings recorded by observers. Some behaviors may fall under one or more categories and USFWS may categorize behaviors differently than the analysis presented here.

4.1.2 Projected Polar Bear Behavioral Responses 2016-2021

The following section presents estimates of the number of polar bear behavioral responses that may occur within the geographic area of the Petition from oil and gas activities in 2016 to 2021. These estimates are based on the rates of polar bear observations and observed responses or reactions identified above in Section 4.1.1.1 and 4.1.1.2 and on possible future oil and gas activity levels as identified below.

4.1.2.1 Future OCS Oil and Gas Activities

AOGA expects combined levels of all OCS oil and gas activities to remain at similar levels to those experienced in 2006 through 2012.

The results of the analyses presented above in Section 4.1.1.1 indicate that OCS oil and gas activities from 2006 to 2012 may have resulted in behavioral responses by fewer than 3 percent of the observed polar bears. Given that the level of oil and gas activity in the OCS is expected to remain at levels similar to those experienced from 2006 to 2012, we project that oil and gas activities during the Petition period of 2016 to 2021 will result in a similar number (approximately one per year) of polar bear responses.

4.1.2.2 Future Onshore / Coastal Oil and Gas Activities

Past onshore and coastal oil and gas acreages of infrastructure were calculated to determine the historic level of increase of activity between 2007 and 2012. The total area of infrastructure of onshore and coastal oil and gas activities in 2007 was 18,129 acres (7,337 hectares) and increased 1.8 percent (327 acres [132 hectares]) to 18,456 acres (7,469 hectares) in 2012 (Table 4-4), resulting in an average annual increase of about 0.4 percent.

Table 4-3. Hectares (acres) of Onshore / Coastal Oil and Gas Infrastructure in 2007 and 2012

Type of Infrastructure	2007	2012	Difference	% Change
Gravels road and causeways	1,250 (3,089)	1,261 (3,116)	11 (27)	0.84%
Airstrips (gravel or paved)	124 (306)	130 (321)	6 (15)	4.56%
Offshore gravel pad/island	67 (166)	82 (203)	15 (37)	21.69%
Gravel pads	2,339 (5,780)	2,359 (5,829)	21 (52)	0.88%
Other affected area	831 (2,053)	861 (2,128)	30 (74)	3.60%
Gravel mines	2,726 (6,736)	2,777 (6,862)	51 (126)	1.87%
Total impacted area	7,337 (18,130)	7,469 (18,456)	132 (326)	1.80%

This average annual level of increase in infrastructure is expected to remain approximately the same over the Petition's time period. To include a margin of error to the uncertainty of future activity levels, we assume that the acreage of infrastructure would increase 0.5 percent per year over the time period of this Petition.

As indicated above in Section 4.1.2.2, human / polar bear interactions at onshore / coastal oil and gas infrastructure and activities may have resulted in about 32 polar bear behavioral responses from 2008 to 2012, an average of 6.4 polar bear behavioral responses per year. Assuming that polar bear / human interactions and polar bear responses are directly correlated with oil and gas activity levels and infrastructure acreages, a 0.5 percent per year increase in infrastructure over the Petition's time period would result in an average of seven potential behavioral responses per year.

4.1.2.3 Total Potential Polar Bear Behavioral Responses 2016-2021

The total projected potential polar bear behavioral responses associated with oil and gas activities in the geographic area of the Petition from 2016 to 2021 based on the above analyses are presented below in Table 4-4. It should be emphasized that these are only projected behavioral responses, many of which would not rise to the level of Level B take under the MMPA.

Table 4-4. Total Potential Polar Bear Behavioral Responses

Time Period	Oil and Gas Activity		
	OCS	Onshore / Coastal	All
2016-2017	1	7	8
2017-2018	1	7	8
2018-2019	1	7	8
2019-2020	1	7	8
2020-2021	1	8	9
2016-2021	5	36	41

4.2 Pacific Walrus

As discussed in Chapter 5, the Beaufort Sea is considered extralimital for Pacific walruses. Accordingly, only very small numbers of walruses are expected to be encountered within the area addressed by this Petition, and only during the open water season. Walruses have been encountered in limited numbers during offshore oil and gas activities in the Beaufort Sea (see Section 5.2.2). Prior to 1995, no more than five walruses were encountered during oil and gas monitoring activities (LGL and Greeneridge 1996). From 2006-2012, no more than 30 walruses were sighted (Beland et al. 2011; LGL et al. 2013). Although it seems that more walruses have been seen in recent years, this might be attributed to increased activity level and thus encounter rate. Although there have been occasional sightings of walruses hauled out on shore, there are no important foraging, haulout, or rookery habitats for this population within the Petition area Few, if any, takes have been documented in the past, or are expected during the five-year period of the proposed ITRs. The types of oil and gas activities that have the potential for an incidental take of walruses include noise disturbance, human and vessel encounters, and spills. A detailed description of these activities and their potential impact on walruses and their habitat is presented in Chapters 6 and 8.

5.0 STATUS, DISTRIBUTION, AND SEASONAL DISTRIBUTION OF SPECIES

CFR § 18.27(d)(iii)(B) A description of the status, distribution, and seasonal distribution (when applicable) of the affected species or stocks likely to be affected by such activities.

5.1 Polar Bear

5.1.1 Population Status and Trend

Polar bears are marine mammals subject to the protections of the MMPA under the administration of the USFWS. In May 2008, the USFWS listed the polar bear as threatened under the ESA. The USFWS determined that polar bear habitat, principally sea ice, is declining throughout the species' range, that this decline is predicted to continue for the foreseeable future, and that the predicted loss of sea ice threatens the species throughout all of its range (USFWS 2008a). Once a species is listed, the ESA requires the USFWS to prepare a recovery plan. As a result of a recent court order, there is currently no critical habitat designated for the polar bear.

The worldwide abundance of polar bears is estimated to be between 22,000 and 32,000 animals (PBSG 2013). These estimates were derived from information gathered by the International Union for Conservation of Nature (IUCN) Polar Bear Specialist Group (PBSG). The worldwide abundance of polar bears during the development of the previous Petition was 20,000-25,000 animals (Aars et al. 2006). The PBSG identified 19 relatively discrete subpopulations, three of which may be found in the U.S. and surrounding waters in and adjacent to northern Alaska. The polar bear populations that occupy the area of activity addressed in this Petition include the SBS population, and to a lesser extent, the CS population. The CS population overlaps with the SBS population in some northwestern areas of Alaska, particularly between Point Hope and Barrow, which is outside this Petition's geographic area; however, the CS population may extend as far east as the Colville River Delta in the Beaufort Sea (Amstrup et al. 2005). The western boundary of the SBS population is reported to be near Point Hope, Alaska (Amstrup et al. 2005), which is also outside the geographic area addressed in this Petition. Only limited information is known about the Northern Beaufort Sea population, which overlaps with the SBS population in northwestern Canada. The reported western boundary for this population does not extend beyond the western border of Canada (Stirling et al. 2007), which is also outside the geographic area addressed here.

The potential polar bear interactions described in this Petition may occur with bears from either the SBS population or the CS population. Because the petitioned area overlaps with only a small portion of the CS population's range, we expect that the vast majority of the interactions (if not all) that occur will involve SBS bears and that a very small proportion, if any, of the interactions will involve CS bears. The relative proportions of the interactions that occur with each population will be small in relation its overall population size[2], and will have no more than a negligible impact on each population. Moreover, in the event that all interactions were to occur with a single population, those interactions would be small in relation to the size of the overall population (whether the SBS or the CS population) and would have no more than a negligible impact on the population. The remaining analyses in this Petition focus on the SBS population since all, or almost all, of the potential interactions are expected to occur with the SBS population.

[2] The CS polar bear population is estimated to be at least 2,000 bears (Walton et al. 2013; PBSG 2013). See Section 5.1.1.1 for information on the SBS population size.

5.1.1.1 Southern Beaufort Sea Population

Amstrup et al. (1986) estimated the size of the SBS subpopulation to be approximately 1,800 bears. A revised population assessment derived from capture-recapture data collected during 2001 to 2006 estimated 1,526 (95 percent Confidence Interval [CI] = 1,211 to 1,841) polar bears in the SBS population (Regehr et al. 2006). A decline in the population cannot be concluded as the two estimates cannot be statistically differentiated (Regehr et al. 2006). Although not statistically concluded, the status of the subpopulation is designated by USFWS as reduced and the predicted trend is declining (Aars et al. 2006). A recent analysis of the body condition of adult polar bears and cub survival suggests that SBS polar bears may be experiencing a decline in nutritional status that may be related to changing sea ice conditions (Rode et al. 2013; Rode et al. 2007). More studies are required to address the status and trend of the population before firm conclusions can be made. As described above, the polar bear species (which includes the SBS population) was determined to be "threatened" primarily because of threats associated with projected future habitat loss resulting from the projected effects of climate change.

5.1.2 Distribution and Seasonal Distribution

Polar bears are unevenly distributed throughout the circumpolar Arctic and are most often located on the annual ice over the waters of the continental shelf where their main prey, ringed seals (*Phoca hispida*), are most abundant (Amstrup et al. 1986; Stirling and Derocher 2007; Pilfold et al. 2012). Polar bear distribution in most areas varies annually and seasonally with the extent of sea ice cover and availability of prey (Figure 5-1).

The SBS polar bear population is shared between Canada and Alaska. The population occurs between Point Hope, Alaska on the western boundary and Pearce Point, Northwest Territory, Canada (Amstrup et al. 1986; Amstrup and DeMaster 1988; Stirling et al. 1988; Amstrup et al. 2000).

The distribution of some polar bear populations during the open water and early fall seasons have changed in recent years. In the Beaufort Sea, only a small percentage of the polar bear population actually comes ashore, but in recent years, more are being found onshore (Schliebe et al. 2006; Regehr et al. 2010; Rode et al. 2012). This is likely related to the increasing numbers of bowhead whale (*Balaena mysticetus*) carcasses left by the Iñupiat hunters at Cross Island and Kaktovik, which provide a readily available food source for the bears in these areas (Schliebe et al. 2006), and may also result from the increased observations and reporting required by USFWS in MMPA ITRs. Durner et al. (2007) and Rode et al. (2013) suggest that the future distribution of polar bears may be linked to the loss of their preferred habitat, sea ice. Analyses from satellite tracking data of female polar bears and new spatial modeling techniques indicated the boundary between the Northern Beaufort and the SBS populations needs to be adjusted, probably expanding the area occupied by bears from the Northern Beaufort Sea and retracting that of the SBS (Amstrup et al. 2005; Aars et al. 2006). The boundary change is proposed and under consideration by members of the Polar Bear Management Agreement (Inuvialuit Game Council of Canada and the North Slope Borough of Alaska – USFWS 2010).

Each fall/winter, polar bears migrate south with the sea ice, then advance north with the retreat of sea ice in spring/summer. In the winter, polar bears den and feed on the sea ice and along the northern coastline (Amstrup and Gardner 1994); bears that don't stay onshore retreat with the ice during summer. Sea ice disappears from the Bering Sea and is greatly reduced in the Chukchi Sea in the summer, and polar bears occupying these areas move as much as several thousand km to stay with the pack ice (Garner et al. 1990). Sea ice provides a platform from which to hunt seals; to seek mates and breed; as a platform for maternity denning and as a platform on which to move to terrestrial maternal denning areas; and as a substrate on which to make long distance movements (Stirling and Derocher 1993).

Data from telemetry studies on female polar bears indicate that their movements are not random, nor do they passively follow ocean currents on the ice as previously thought (Mauritzen et al. 2003). Results show strong fidelity to broad activity areas used over multiple years (Ferguson et al. 1997). Activity areas have not been determined for many of the populations, and what information is available reflects movement data collected prior to the recent changes of ice conditions.

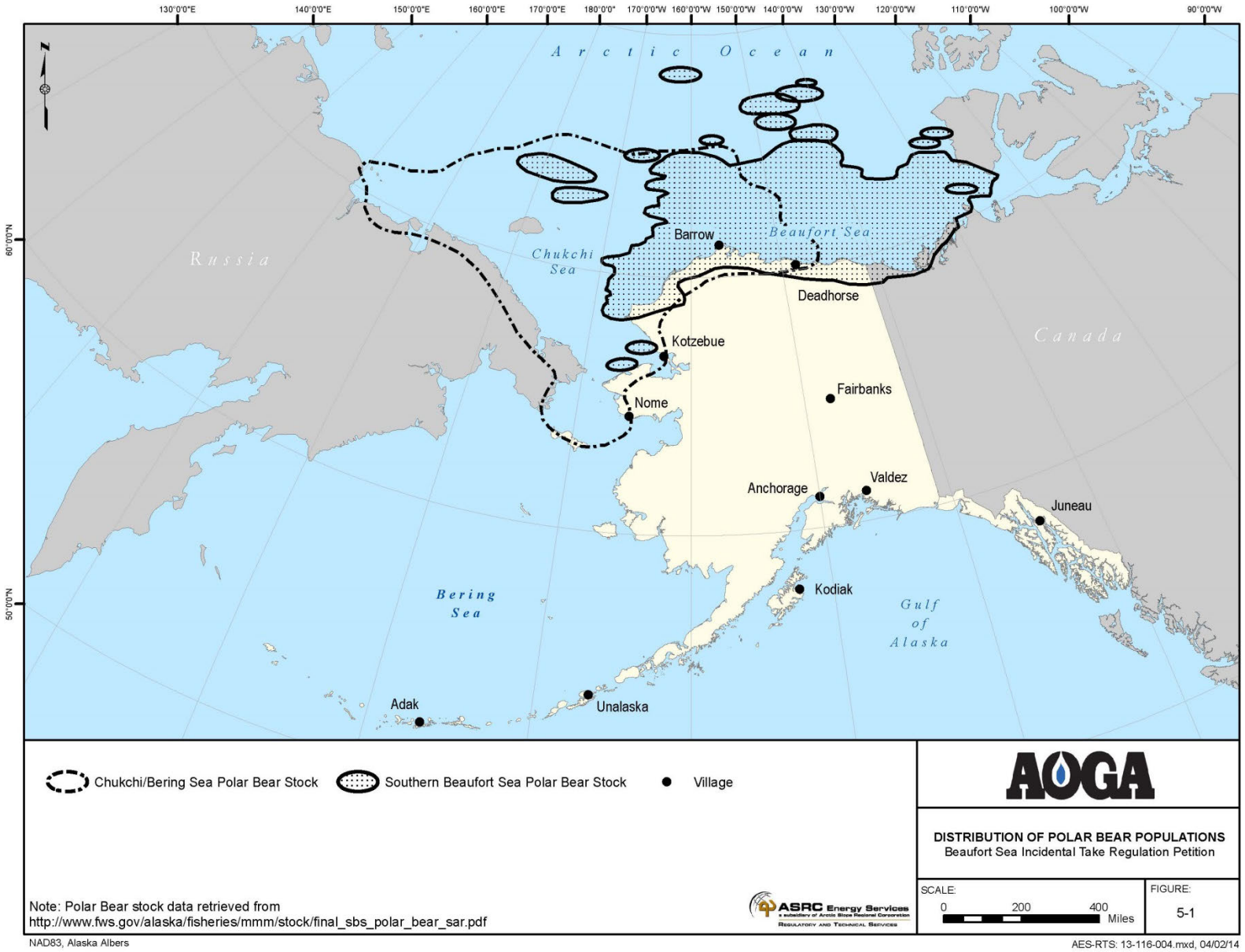


Figure 5-1. Distribution of Polar Bear Populations (USFWS 2010).

Radio collar studies indicate that male and female polar bears have similar activity areas on a monthly basis, but males may travel farther than females (Amstrup et al. 2000). Telemetry data from radio-collared females indicate some individuals occupy home ranges (or "multi-annual activity areas") which they seldom leave (Amstrup 2003). The size of a polar bear's home range is determined, in part, by the annual pattern of freeze-up and break-up of sea ice, and therefore by the distance a bear must travel to obtain access to prey (Stirling 1988; Durner et al. 2004). A bear that has consistent access to ice, leads (channels of open water through areas of ice), and seals may have a relatively small home range; while bears in areas such as the Barents, Greenland, Chukchi, Bering or Baffin seas may move many hundreds of kilometers each year to remain in contact with sea ice from which they can hunt (Born et al. 1997; Mauritzen et al. 2001; Ferguson et al. 2001; Amstrup 2003; Wiig et al. 2003). Individual home ranges are large, averaging 149,000 square km (58,000 square mi) in the Beaufort Sea (Garner et al. 1990; Amstrup et al. 2000).

5.1.3 Feeding Ecology

Polar bears are carnivorous and are the top predator of the arctic marine ecosystem. Polar bears prey heavily on ice seals, predominantly ringed seals and, to a lesser extent, bearded seals (*Erignathus barbatus*). The relationship between ringed seals and polar bears is so close in some areas that ringed seal abundance may regulate polar bear densities, while polar bear predation regulates ringed seal density and reproductive success (Hammill and Smith 1991; Stirling and Øritsland 1995). In December 2012, NMFS listed certain subspecies and "distinct population segments" of ringed and bearded seals as threatened under the ESA (NMFS 2013a).

Over half the caloric content of a seal is located in the layer of fat between the skin and underlying muscle (Stirling and McEwan 1975). Polar bears show their preference for fat by quickly removing the fat layer from beneath the skin after catching a seal. On average, an adult polar bear needs approximately 2 kg (4.4 lb) of seal fat per day to survive (Best 1985). Polar bears hunt along pressure ridges in the fast ice and often break into seal birth lairs to take newborn pups (Stirling and Archibald 1977; Furgal et al. 1996).

Polar bears are opportunistic feeders and feed on a variety of other foods and carcasses including beluga whales (*Delphinapterus leucas*), arctic cod (*Arctogadus glacialis*), Canada geese (*Branta canadensis*) and their eggs, walruses, and bowhead whales (Smith 1985; Jefferson et al. 1993; Smith and Hill 1996; Derocher et al. 2000). Lunn and Stenhouse (1985) report possible cannibalism among polar bears. Derocher et al. (2004) and Rode et al. (2013) hypothesized that prey availability to polar bears may be altered due to reduced prey abundance, changes in prey distribution, and changes in sea ice availability as a platform for hunting seals. Some polar bears in northern Alaska have begun to arrive near sites where subsistence hunters consistently leave the carcasses of harvested bowhead whales at Kaktovik and Cross Island; these discarded bowhead carcasses may provide a substantial proportion of the annual energy requirements for polar bears (Schliebe et al. 2006).

5.1.4 Reproduction

Females give birth to one or two, and occasionally three cubs, an average of every 3.6 years (Jefferson et al. 1993; Lentfer and Hensel 1980). Cubs remain with their mothers for 1.4 to 3.4 years (Derocher et al. 1993; Ramsay and Stirling 1988). Mating occurs from April to June followed by a delayed implantation during September to December. Females give birth usually the following December or January (Harington 1968; Jefferson et al. 1993). In general, females six years of age or older successfully wean more young than younger bears; however, females as young as four years old can produce offspring (Ramsay and Stirling 1988).

In the Beaufort Sea, ringed seal densities are lower than in some areas of the Canadian High Arctic and Hudson Bay. As a possible consequence, female polar bears in the Beaufort Sea usually do not breed for the first time until they are five years of age (Stirling et al. 1976; Lentfer and Hensel 1980). Females that are over 20 years old have a very high rate of cub loss or do not successfully reproduce. The maximum reproductive age reported for Alaskan polar bears is 18 years (Amstrup and DeMaster 1988).

Regehr et al. (2007) determined that the survival and breeding success of polar bears in the Southern Beaufort Sea were high from 2001 to 2003 and markedly lower for 2004 and 2005. Although there is uncertainty regarding these data, one possible explanation is that these declines were associated with increases in the duration of ice-free period over the continental shelf (Regehr et al. 2010; Rode et al. 2013).

5.1.5 Denning

Pregnant female polar bears excavate dens in snow on land and on pack and shorefast sea ice in the fall-early winter period and enter the dens from October to early November (Amstrup and Gardner 1994). Successful denning by polar bears requires an accumulation of sufficient snow combined with winds to cause snow accumulation leeward of topographic features that create denning habitat (Harington 1968). The common characteristic of all denning habitat are topographic features that catch snow in the autumn and early winter (Durner et al. 2003). In the central Beaufort Sea, Amstrup and Gardner (1994) found that polar bear dens were concentrated near or north of the Beaufort Sea coastline in eastern Alaska and the Yukon Territory. More recent research indicates dens are scattered throughout the Beaufort Sea region of Alaska, concentrated along rivers and coastline (Durner et al. 2010; USGS 2013). Of 22 terrestrial dens examined on the coastal plain of northern Alaska, dens were located on or associated with pronounced landscapes (primarily coastal and river banks, but also a lake shore and an abandoned oil field gravel pad) that were readily distinguishable from the surrounding terrain in summer and physically suited to catch snow in the early winter (Durner et al. 2003).

More than 80 percent of maternal dens found on land by radio telemetry in the Alaskan Beaufort Sea were within 10 km (6.2 mi) of the coast and over 60 percent were right on the coast or on coastal barrier islands (S.C. Amstrup, unpublished data cited in Feldhamer et al. 2003).

Fidelity to denning locales was investigated by Amstrup and Gardner (1994), in which 27 females were located at up to four successive maternity dens. Bears that denned once on pack ice were more likely to den on pack ice than on land in subsequent years. Similarly, bears were faithful to general geographic areas – those that denned once in the eastern half of the Alaska coast were more likely to den there than to move to the west in subsequent years.

Polar bears give birth in the dens during mid-winter (Kostyan 1954; Harington 1968; Ramsay and Dunbrack 1986). Survival and growth of the cubs depends on the warmth and stability of the environment within the maternal den (Blix and Lentfer 1979). Family groups emerge from dens sometime between late February and early April when cubs are about three months old and able to survive outside the den (Blix and Lentfer 1979, 1992; Smith et al. 2007).

Predicted declines and large seasonal swings in habitat availability and distribution may impose greater impacts on pregnant females seeking denning habitat or leaving dens with cubs than on any other age group (Durner et al. 2007). Fischbach et al. (2007) evaluated the changes in distribution of polar bear maternal dens in the Beaufort Sea between 1985 and 2005, using satellite telemetry. The proportion of dens on pack ice declined from 62 percent between 1985 and 1994, to 37 percent between 1998 and 2004, and among pack ice dens fewer occurred in the western Beaufort Sea after 1998. The study hypothesized that the proportion of polar bears denning in coastal areas may increase until autumn ice retreats far

enough from the shore that it precludes offshore pregnant females from reaching the Alaska coast in advance of denning. Regehr et al. (2010) found polar bear breeding rates and cub litter survival declined with increasing duration of the ice-free period.

5.1.6 Survival

Polar bears are long-lived mammals not known to be susceptible to disease, parasites, or injury (Schliebe et al. 2006). The oldest known female polar bear in the wild was 32 years of age and the oldest known male was 28, although few bears in the wild live beyond 20 years (Stirling 1990). Survival rates increase up to a certain age, with cubs-of-the-year having the lowest rates and prime age adults (between 5 and 20 years of age) having survival rates that can exceed 90 percent (Schliebe et al. 2006; USFWS 2008c). Amstrup and Durner (1995) report that high survival rates (exceeding 90 percent for adult females) are essential to sustain populations. Survival of cubs is dependent upon their weight when they exit dens (Derocher and Stirling 1992), and most cub mortality occurs early in the period after emergence from the den (Amstrup and Durner 1995; Derocher and Stirling 1996), with early age mortality generally associated with starvation (Derocher and Stirling 1996; Robinson et al. 2012). Survival of cubs to weaning stage (generally 27 to 28 months) is generally estimated to range from 15 to 56 percent of births (Schliebe et al. 2006). Although infanticide by male polar bears has been well documented (Hansson and Thomassen 1983; Larsen 1985; Taylor et al. 1985; Derocher and Wiig 1999), it is thought that this activity does not account for large percentage of the cub mortality.

Population age structure data indicate subadults (two to five years old) survive at lower rates than adults (Amstrup 1995), probably because their hunting and survival skills are not fully developed (Stirling and Latour 1978). Eberhardt (1985) hypothesized adult survival rates must be in the upper 90 percent range to sustain polar bear populations. Studies using telemetry monitoring of individual animals (Amstrup and Durner 1995) estimated adult female survival in prime age groups may exceed 96 percent, and survival estimates are a reflection of the characteristics and qualities of an ecosystem to maintain the health of individual bears (Schliebe et al. 2006). Polar bears that avoid serious injury may become too old and feeble to hunt efficiently and most are generally believed to die of old age.

Injuries sustained in fights over mates or in predation attempts can lead to mortalities of polar bears (Amstrup et al. 2006). In an extensive review of ursid parasites, Rogers and Rogers (1976) found that seven endoparasites had been reported in polar bears. Only *Trichinella* spp., however, had been observed in wild polar bears. Certain species of nematodes and cestodes reported in captive polar bears have not occurred in the wild. *Trichinella* can be quite common in polar bears and has been observed throughout their range. Concentrations of this parasite in some tissues can be high, but infections are not normally fatal (Rausch 1970; Dick and Belosevic 1978; Larsen and Kjos-Hanssen 1983; Taylor et al. 1985).

5.1.7 Sea Ice and Climate Change

As described in Section 5.1, polar bears are an ice-obligate species that rely on sea ice as a habitat to hunt, feed, seek mates and breed, den, and rest. Recent years have seen record low September Arctic sea ice extent, and the shallow continental shelf waters of the Chukchi Sea experienced a rapid retreat of sea ice during the summers of 2007 and 2012 (National Snow and Ice Data Center 2013). The 5th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) is due in October 2014, but the 4th Assessment Report (IPCC 2007; http://www.ipcc.ch/ipccreports/ar4-syr.htm) observed that decreases in snow and ice extent are consistent with climate warming, and that satellite data since 1978 show that annual average Arctic ice extent has shrunk by 2.7 percent (90 percent CI = 2.1 to 3.3 percent) per decade, with larger decreases in summer of 7.4 percent (90 percent CI = 5.0 to 9.8 percent) per decade.

Recent studies have indicated that changes in the sea ice are likely to affect the distribution and abundance of polar bears throughout their range as well as impact many aspects of their life history. Declines in sea ice extent and degrading ice in the southern Beaufort Sea have been associated with an increasing shift toward land-based denning (Fischbach et al. 2007); declines in cub survival (Regehr et al. 2006); and observations of drowned, emaciated, and cannibalized polar bears (Amstrup et al. 2006). Regehr et al. (2007) concluded that in 2002, the ice-free period over the continental shelf in the southern Beaufort Sea region was relatively short (mean 92 days) and survival of adult female polar bears was high (approximately 0.99, 90 percent CI = 0.10 to 1.0). In 2004 and 2005, the ice-free period was longer (mean 135 days) and survival of adult female polar bears was lower (approximately 0.77, 90 percent CI = 0.53 to 0.94). Breeding and cub-of-the-year litter survival also declined from high rates to lower rates in latter years of the study. Regehr et al. (2007) further concluded that although the precision of estimated vital rates was low, subsequent analysis (Hunter et al. 2007) indicated the declines in vital rates associated with longer ice-free periods have ramifications for the probability of persistence of the SBS population of polar bears.

Many of these studies also suggest other factors could have caused or contributed to the reported changes in polar bear life history features, including changes in prey distribution and abundance, disease, readily available food sources, and hunting patterns. The carrying capacity of the Beaufort Sea is not known, which could have a major influence on any changes in polar bear life history. Accordingly, while sea ice changes are well documented, our understanding of the response of polar bears and their prey to changing sea ice conditions remains uncertain.

Amstrup et al. (2007) grouped the 19 polar bear subpopulations into four ecological regions in order to forecast the range-wide status of polar bears in the 21st century based on their ecological relationship to sea ice. These included the Polar Basin Divergent Ecoregion that encompasses the SBS subpopulation. Amstrup et al. (2007) incorporated projections of future sea ice in each ecoregion into two models of polar bear habitat and potential response. Under both modeling approaches, polar bear populations were forecast to decline throughout all of their range during the 21st century.

5.2 Pacific Walrus

5.2.1 Population Status and Trend

The Pacific walrus is not listed as threatened or endangered under the ESA or classified as depleted or a strategic stock under the MMPA (Angliss and Outlaw 2008), although the USFWS has designated it as a "candidate" species under the ESA. Pacific walruses are found throughout Arctic waters, typically associated with the offshore pack ice (USFWS 2007). The walrus stock is found throughout the northern Bering and Chukchi Seas, occasionally moving into the East Siberian and Beaufort Seas (USFWS 2013a). Estimates of the pre-exploitation population of the walrus range from 200,000 to 250,000 animals (Angliss and Outlaw 2008). Over the past 150 years, the population has been depleted by over-harvesting and then periodically allowed to recover (Fay et al. 1989; USFWS 2013a).

The current size of the walrus population is unknown, but the best available minimum population estimate, based on aerial surveys between the U.S. and Russia is 129,000 walruses (95 percent CI = 55,000-507,000) (Speckman et al. 2011). This is considered an underestimate because some areas known to be important to walruses were not surveyed due to poor weather (Speckman et al. 2011; USFWS 2013a). Between 1975 and 1990, aerial surveys were also carried out by the U.S. and Russia at five-year intervals, producing population estimates ranging from 201,039 to 234,020 animals. These are considered conservative population estimates and are not useful for detecting trends (Hills and Gilbert 1994; Gilbert et al. 1992). Efforts to survey the walrus population have been intermittent due to

unresolved problems with survey methods that produced population estimates with unacceptably large confidence intervals (Gilbert et al. 1992; Gilbert 1999).

5.2.2 Distribution and Seasonal Distribution

The Pacific walrus inhabits the moving pack ice over the shallow waters of the continental shelf of the Bering and Chukchi seas. Walruses summering in the Chukchi Sea are very widespread, and they occur across the pack ice from Wrangel Island to the coast of Alaska (Estes and Gilbert 1978) although recently concern has increased about the number using coastal haulouts (Kavry et al. 2008; Garlich-Miller et al. 2011). Walrus are rare in the Alaskan Beaufort Sea east of Point Barrow. Walrus migrate north and south following the annual advance and retreat of the pack ice. The distribution of walrus is shown on Figure 5-2.

Adult male walruses remain in the Bering Sea year round, while females, pups, and juveniles summer in the Chukchi Sea. Pacific walrus use 21 major haulout sites in Alaska (USFWS 2013b). An unusually light ice year in 2007 resulted in walruses that summered in the Chukchi Sea hauling out between Point Lay and Point Barrow. Walruses retreated to the shoreline after the pack ice retreated north of the shallow OCS waters (Ireland et al. 2008). There are currently no known haulout sites from Point Barrow to Demarcation Point on the Beaufort Sea coast (USFWS 2013b).

The migration pattern varies annually. During winter, large concentrations of walrus occur south of the Bering Strait and southwest of St. Lawrence Island near the ice edge. Smaller concentrations occur east of the Pribilof Islands and southwest of Cape Navarin along the Koryak coast. Fay (1982) suggested those adult females, their young, and a few adult males winter in the center of the pack ice while juveniles and sub-adults occupy the periphery. These animals follow the retreating ice in spring and summer, and as a result, congregate between Barrow and Wrangel Island in the Chukchi Sea. Recently coastal haulouts along the Alaska and Russian coasts have increased dramatically, from hundreds to greater than 100,000 (Kavry et al. 2008; Garlich-Miller et al 2011; Jay et al. 2011).

Walrus sightings in the Beaufort Sea have consisted solely of widely scattered individuals and small groups. While walrus have certainly been encountered and are present in the Beaufort Sea, there were only five sightings of walrus between 146º and 150º West longitude during MMS and LGL Research Associates (LGL) aerial surveys conducted from 1979 to 1995 (LGL and Greeneridge 1996). Aerial and vessel surveys conducted by LGL between Harrison Bay and Kaktovik in 2006 and 2007 reported no walrus in 2006 and fewer than 15 in 2007 (Ireland et al. 2008). More recent industry monitoring surveys have reported a combined total of less than 30 walrus sightings from 2006-2012 (LGL et al. 2013). These results confirm that walruses are very uncommon in the Beaufort Sea.

5.2.3 Feeding Ecology

Walruses can have a large effect on their prey and play an important role in the Arctic ecosystem by influencing the structure of benthic invertebrate communities. They mainly feed on bivalve mollusks obtained from bottom sediments along the shallow continental shelf, typically at depths of 80 m (262 ft) or less (Fay 1982). They can eat more than 50 clams during a single seven-minute dive to the seafloor and consume 35 to 50 kg (77 to 110 lb) of food per day. Pregnant and nursing walruses consume even more food (Fay 1985; Born et al. 2003).

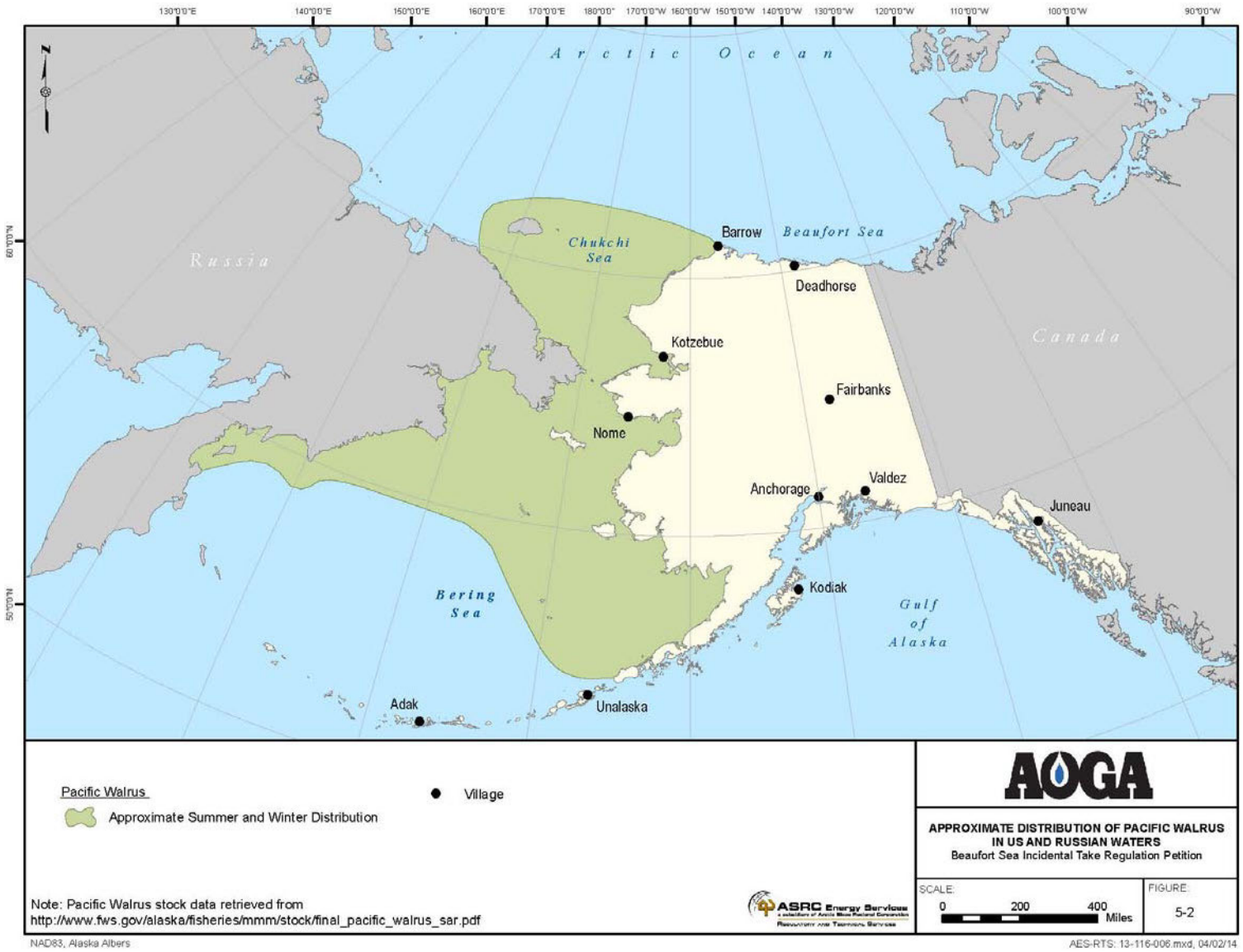


Figure 5-2. Approximate Distribution of Pacific Walrus in U.S. and Russian Waters (USFWS 2010).

Walruses also feed on a variety of benthic invertebrates, including worms, snails, shrimp, and some slow moving fish (Jefferson et al. 1993). Walruses have been reported to feed on seals and small whales (Jefferson et al. 1993), and even on seabirds (Gjertz 1990). They mainly feed between June and November when the young are growing and adult females are accumulating fat stores for the breeding season (Fay 1982).

Hauling out on moving ice provides significant advantages for foraging walruses, including proximity to varying food supplies, and relative freedom from disturbance when resting (Fay 1974). Since the walrus feed on benthic invertebrates, which are distributed in patches, this continually moving ice facilitates their feeding over a larger area without much effort.

As walruses root along the seafloor in search of food, they plow through large quantities of sediment (Nelson and Johnson 1987; Nelson et al. 1994; Bornhold et al. 2005). They remove large quantities of prey from the seafloor, affect the size structure of clam populations, mix bottom sediments while foraging, create new microhabitats from discarded shells, and generate food for seafloor scavengers from uneaten scraps of prey (Oliver et al. 1983).

5.2.4 Reproduction

Male walruses reach sexual maturity between 8 and 10 years, but usually do not breed until age 15 (Fay 1985). Females reach sexual maturity around six to eight years of age (Fay 1985).

Mating usually occurs between January and March. Implantation is delayed until June or July (Fay 1982). Gestation lasts 11 months (a total of 15 months after mating) and birth occurs between April and June during the annual northward migration. Calves weigh about 63 kg (139 lb) at birth and are usually weaned by age two (Fay 1982). Females give birth to one calf every two or more years (Fay 1982).

5.2.5 Survival

Although the reproductive rate described in the previous section is much lower than other pinnipeds, some walrus may live to age 35 to 40 and remain reproductively active until age 26 (Fay 1982; Born 2001).

Walrus are preyed upon by polar bears, killer whales, and subsistence hunters. The magnitude of natural mortality is unknown but is assumed to be low, given the population's low productivity. Eskimo hunters from St. Lawrence Island have described walruses becoming emaciated after becoming entrapped in heavy ice. It is probable that in some instances those walruses starve to death but no documentation of such events exists. Rock slides are a hazard to walruses on terrestrial haulouts and occasionally result in mortality (USFWS 2008d).

Serious injury and death can result from intra-specific interactions, mainly involving strikes with tusks and trampling. Skin lacerations and subcutaneous hemorrhages resulting from tusk strikes are common in both sexes and all age classes. The most serious wounds are observed on males during the breeding season when they wound each other during vigorous fights in the water. Trampling can result in abortion, injury, and death during stampedes at crowded haulouts and has been observed at Wrangel Island in the Chukchi Sea and the Punuk Islands in the Bering Sea (USFWS 2008d).

5.2.6 Climate Change

The specified geographic area to which the proposed ITR applies (the Beaufort Sea) is outside of the primary habitat of the Pacific walrus. Only widely scattered individuals and small groups are present and

then only during open water periods. Accordingly, there is no present evidence or prediction that the consequences of climate change, particularly sea ice recession, pose a direct threat to the abundance, distribution or significant behaviors of Pacific walrus that infrequently inhabit the Southern Beaufort Sea region.

The USFWS conducted a status review of the Pacific walrus in 2011 and concluded that its listing as threatened or endangered under the ESA is warranted but was precluded by higher priority actions. The status review analyzed the potential future impacts of climate change on Pacific walruses and concluded that walrus responses to low-ice years may include an increased use of coastal haulouts and a shift in habitat use patterns (Garlich-Miller et al. 2011).

As discussed earlier in this section, sea ice plays an important role in the life history of the Pacific walrus. As detailed in Section 5.1.7, sea ice is more frequently disappearing from the continental shelf of the Chukchi Sea. Jay and Fischbach (2008) hypothesize that when the sea ice recedes over the deep ocean basin, walruses must either continue to haul out on the sea ice with little access to food, or abandon the sea ice and move to coastal areas where they can rest on land. During the minimum sea ice extent in the summers of 2007 and 2013 (National Snow and Ice Data Center 2013), the Chukchi Sea shelf contained little ice for approximately 80 days and several thousand walruses hauled out on the shores of northwestern Alaska, which had not been previously documented (Jay and Fischbach 2008; Garlich-Miller et al. 2011).

During fall 2007, tens of thousands of female and young walruses began using resting areas along the northern coast of Chukotka, after sea ice was no longer available. A few thousand mortalities were reported at this location, apparently from trampling due to disturbances that caused adults to stampede into the water (Jay and Fischbach 2008).

As more walruses haul out on land instead of sea ice, nearshore prey populations may be subjected to greater predation pressure. Today, it is unknown whether more concentrated foraging by walrus will change or deplete nearshore prey communities, or if walrus energetics will be affected if prey do become less abundant. A better understanding of walrus movement and foraging patterns is necessary to determine the effects of decreasing availability of sea ice on walrus and the prey upon which they depend.

6.0 ANTICIPATED IMPACT ON SPECIES

CFR § 18.27(d)(iii)(C) The anticipated impact of the activity upon the species or stocks.

This section provides an overview of the potential impacts of proposed oil and gas exploration activities expected to occur in the Beaufort Sea region from 2016 to 2021. Anticipated effects on polar bears and walruses are limited to include temporary and localized changes in behavior, with no long-term consequences or detectable effects at the population level. The footprint of these activities is small compared to the ranges of polar bears and walruses in the region. Industry will implement mitigation measures to minimize any potential impacts to these species (see Section 10.0 Mitigation Measures).

The following sections provide an overview of acoustic terminology, a discussion of the general effects of sound on wildlife, a description of factors associated with oil and gas activities (e.g. noise, drilling, facilities, and humans), and the potential impacts of oil and gas associated activities on polar bears and walruses.

6.1 Polar Bear

6.1.1 Noise

The following sections provide an overview of noise terminology, a general background of noise effects on wildlife, a brief description of noise sources associated with oil and gas activities, and potential impacts of noise on polar bears.

6.1.1.1 Noise Background

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air or water. The disturbed particles of the media move against undisturbed particles causing an increase in pressure. This increase in pressure causes adjacent undisturbed particles to move away, spreading the disturbance away from its origin. This combination of pressure and particle motion makes up the acoustic wave.

The intensity of sound is characterized by decibels (dB). The mathematical definition of a decibel is the base 10 logarithmic function of the ratio of the pressure fluctuation to a reference pressure. Decibels are measured using a logarithmic scale, so sound levels cannot be added or subtracted directly. For example, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus: 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB. The decibel measures the difference in orders of magnitude (x 10), so 10 dB means 10 times the power, 20 dB means 100 times the power, 30 dB means 1,000 times the power, and so on.

Because the decibel is a relative measure, any absolute value expressed in dB is meaningless without the appropriate reference. The metric that describes the change in pressure (amplitude) is the pascal (Pa), approximately equivalent to 0.0001465 psi. In this Petition, all underwater sound levels are expressed in decibels referenced to 1 micro Pascal (dB re 1 μPa) and all airborne sound levels are expressed in dB re 20 μPa. It is possible to convert between the reference pressures, in this instance 26 dB. However, the efficiencies of sound generation and reception in air and water differ greatly, so simply adding a constant to the underwater sound pressure level (SPL) will not allow a reasonable assessment of how the sound is perceived by the receiver.

The method commonly used to quantify airborne sounds consists of evaluating all frequencies of a sound according to a weighting system that reflects that human hearing is less sensitive at low frequencies and extremely high frequencies than at the mid-range frequencies. This is called "A" weighting, and the decibel level measured is called the A weighted sound level (dBA). Sound levels to assess potential noise impacts on wildlife, airborne or underwater, are not weighted and measure the entire frequency range of interest.

Hertz (Hz) is a measure of how many times each second the crest of a sound pressure wave passes a fixed point. For example, when a drummer beats a drum, the skin of the drum vibrates a number of times per second. When the drum skin vibrates 100 times per second, it generates a sound pressure wave that is oscillating at 100 Hz, and this pressure oscillation is perceived by the ear/brain as a tonal pitch of 100 Hz. Sound frequencies between 20 and 20,000 Hz (or 20 kHz) are within the range of sensitivity of the best human ear. The hearing sensitivities of the animals of interest in this Petition will be discussed for each species in the text below.

As sound propagates out from the source, there are many factors that change the amplitude. These include the spreading of sound over a wide area (spreading loss), loss to friction between particles that vibrate (absorption), and scattering and reflections from objects in the path (including surface or seafloor). The total propagation including these factors is called the transmission loss (TL). Transmission loss parameters vary with frequency, temperature, wind, sea conditions, source and receiver depth, water chemistry, and bottom composition and topography.

Table 6-1 summarizes commonly used terms to describe underwater sounds. Two common descriptors are the instantaneous peak SPL and the root-mean-square (rms) over a defined averaging period. The peak pressure is the instantaneous maximum or minimum overpressure observed during each sound event. The rms level is the square root of the energy divided by a defined time period.

Table 6-1. Definition of Acoustical Terms

Term	Definition
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for water is 1 micro Pascal (µPa) and for air is 20 µPa (approximate threshold of human audibility).
Sound Exposure Level, SEL	Sound exposure level is the total noise energy produced from a single noise event and is the integration of all the acoustic energy contained within the event. SEL incorporates both intensity and duration of a noise event. SEL is expressed in dB re 1 μPa^2 and is also described as "energy-based" measure that may become more utilized during the period of this Petition.
Sound Pressure Level, SPL	Sound pressure is the force per unit area, usually expressed in µPa (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 m^2. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressure exerted by the sound to a reference sound pressure. Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz or kHz	Frequency is expressed in terms of oscillations, or cycles, per second. Cycles per second are commonly referred to as Hertz (Hz). Typical human hearing ranges from 20 Hz to 20,000 Hz (or 20 kHz).
Peak Sound Pressure (unweighted)dB re 1 µPa	Peak sound pressure level is based on the largest absolute value of the instantaneous sound pressure over the frequency range from 20 Hz to 20,000 Hz. This pressure is expressed in this Petition as dB re 1 µPa.

Term	Definition
Root-Mean-Square (rms) dB re 1 µPa	The rms level is the square root of the energy divided by a defined time period. For pulses, the rms has been defined as the average of the squared pressures over the time that comprise that portion of waveform containing 90 percent of the sound energy for one impulse.
A-Weighting Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A or C-weighting filter network. The A-weighting filter de-emphasizes the low and high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective human reactions to noise.
Ambient Noise Level	The background sound level, which is a composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.

6.1.1.2 Potential Effects of Noise on Wildlife

General effects of noise on wildlife may range from direct effects, such as physical injury to the auditory system, to indirect effects, such as change in habitat use. Noise may directly affect reproductive physiology or energetic consumption as individuals incur energetic costs or lose mating or foraging opportunities by repeatedly reacting to or avoiding noise. Animals may also be forced to retreat from favorable habitat in order to avoid aversive anthropogenic noise levels. Though the direct effects of noise on wildlife may be the most obvious, noise may also have indirect effects on population dynamics through changes in habitat use, courtship and mating, reproduction and parental care, and possibly migration patterns. Excessive noise may also affect mortality rates of adults by causing hearing loss, a serious hazard in predator-prey interactions. Other effects of noise on wildlife may be more subtle, such as those affecting heart rate or communication. In species that rely on acoustic communication, anthropogenic noise may adversely affect individual behavior by making signal detection difficult and thus altering the dynamic interaction between the producers and perceivers of communicative signals.

In assessing potential effects of noise, Richardson et al. (1995) has suggested four criteria for defining zones of influence. These zones are shown below from greatest influence to least:

- ***Zone of hearing loss, discomfort, or injury –*** the area within which the received sound level is potentially high enough to cause discomfort or tissue damage to auditory or other systems. This includes temporary threshold shifts (TTS, temporary loss in hearing) or permanent threshold shifts (PTS, loss in hearing at specific frequencies or deafness). Non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to strong underwater sound include stress, neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage.
- ***Zone of masking –*** the area within which the noise may interfere with detection of other sounds, including communication calls, prey sounds, or other environmental sounds.
- ***Zone of responsiveness –*** the area within which the animal reacts behaviorally or physiologically. The behavioral responses of marine mammals to sound is dependent upon a number of factors, including: 1) acoustic characteristics of the noise source of interest; 2) physical and behavioral state of animals at time of exposure; 3) ambient acoustic and ecological characteristics of the environment; and 4) context of the sound (e.g., does it sound like a predator) (Richardson et al. 1995; Southall et al. 2007). However, temporary behavioral effects are often simply evidence that an animal has heard a sound and may not indicate lasting consequence for exposed individuals (Southall et al. 2007).
- ***Zone of audibility –*** the area within which the marine mammal might hear the noise. Marine mammals as a group have functional hearing ranges of 10 Hz to 180 kHz, with best

thresholds near 40 dB (Ketten 1998; Southall et al. 2007). Hearing capabilities of the species included in this Petition are discussed further below.

In addition, habituation of animals to their environment also is a significant factor in assessing potential impacts of noise. The definition of habituation is "the elimination of the organism's response to often recurring, biologically irrelevant stimuli without impairment of its reaction to others." Habituation is ubiquitous in the animal kingdom (Peeke and Petrinovich 1984). No study takes place without subjects habituating to their environments. More predictable sources of disturbance can lead to greater habituation in situations than less predictable ones. Situations in which similar noise-producing activities occurring in the same habitat at frequent intervals may therefore affect locally breeding wildlife less than less-frequent or less-predictable activities (National Research Council [NRC] 2003).

6.1.1.3 Hearing Abilities of Polar Bear

There is limited information on the hearing of polar bears. The noise levels required to cause TTS or PTS have not been determined for polar bears; however, they are likely beyond the sounds produced by oil and gas activity, except close to the source of underwater seismic airguns. Polar bears are not known to communicate underwater and studies have not been conducted to determine the effects, if any, on polar bear from underwater noise.

Nachtigall et al. (2007) measured the in-air hearing of three polar bears using evoked auditory potentials. Measurements were not obtainable at 1 kHz and best sensitivity was found in the range from 11.2 to 22.5 kHz. Behavioral testing of hearing indicates that they can hear down to at least 14 Hz and up to 25 kHz, with the best sensitivity between 8 and 14 kHz (Owen and Bowles 2011).

6.1.1.4 Description of Noise Sources

Sources of sound in the area of activity are comprised of multiple sources, including physical noise, biological noise, and man-made noise. Physical noise includes wind, atmospheric noise, earthquakes, waves and currents, and ice. Biological noise includes sounds produce by marine mammals, fish, and invertebrates. Man-made noise consists of air and vessel traffic, seismic surveys, icebreakers, supply ships, drilling, and noise from operations at production facilities. In the arctic environment, wind has the greatest influence on the overall ambient noise levels, due to its effect on the ice and water. In addition, calls of bearded seals in the spring significantly contribute to ambient noise levels. Ice cover at the ocean surface can alter the underwater noise characteristics dramatically. The factors influencing acoustic properties include type and degree of ice cover; whether it is shorefast pack ice, moving pack ice, or at marginal ice zone; chemical characteristics of the ice itself; and decreased air temperatures that can result in cracking of rigid ice (NRC 2003).

Underwater ambient noise levels in the Beaufort Sea region were measured to be between 95 and 110 dB re 1 μPa between 20 and 1,000 Hz (Greene 1997, 1998; Greene et al. 2001; Burgess and Greene 1999; LGL et al. 2007). In-air ambient noise levels measured by Blackwell et al. (2004a, 2004b) near Northstar were approximately 65 dB re 20 μPa.

During the open water season, industry sound sources can include production facilities, geotechnical and geophysical surveys, exploratory drilling, and vessel and aircraft traffic. During the ice-covered season, noise sources can include production facilities, ice road and ice pad construction, vibroseis, exploratory drilling, and on-ice vehicle and aircraft traffic. Noise sources

can be categorized into either stationary or mobile sources. Stationary sources include construction, maintenance, repair, and remediation activities; operations at production facilities; flaring excess gas; and drilling operations from onshore or offshore facilities. Mobile sources include vessel and aircraft traffic, open water seismic exploration; winter vibroseis programs; geotechnical surveys; ice road construction and associated vehicle traffic, including tracked vehicles and snowmobiles; dredging; and icebreakers.

Construction

Construction activities may generate both underwater and airborne noise. Greene et al. (2008) measured underwater and airborne noise during construction of a gravel island at Northstar. The study measured noise from ice road construction, heavy equipment operations (ditchwitch machine, gravel trucks, and backhoe), augering, and pile driving (vibratory and impact). Underwater sound levels from construction ranged from 103 dB re 1 µPa at 100 m (328 ft) for augering to 143 dB re 1 µPa at 100 m (328 ft) for pile driving. Most of the energy of these sounds was below 100 Hz. Airborne sound levels from these activities ranged from 65 dB re 20 µPa at 100 m (328 ft) for the bulldozer and 81 dB re 20 µPa at 100 m (328 ft) for the pile driving. Most of the energy for in-air levels was also below 100 Hz.

Drilling

Noise from drilling operations varies with drilling equipment type, support vessels, and types of support activities. Richardson et al. (1995) and NRC (2003) provide a limited summary of drilling noise. Based on the results of drillship sounds from the *Northern Explorer II* and a support vessel recorded in the 1980s, the aggregate broadband source level for a drillship and support vessel is 175 dB re 1 µPa at 1 m based on precautionary interpretation of the third-party measurement data (Greene 1987; Miles et al. 1987). More recent measurements of drilling sounds in the Beaufort Sea in the absence of nearby vessel noise revealed a broadband source level of 181 dB re 1 µPa at 1 m (Austin et al. 2013). Auxiliary noise is also created during drilling operations from supply vessels and aircraft. Underwater and airborne drilling noises from Northstar were measured by Blackwell et al. (2004b). They found that underwater noise levels increased between the bands of 60 and 250 Hz and 650 to 1,400 Hz. Airborne noise levels were indistinguishable over the typical production island sounds.

Seismic

As discussed in Section 2.2.2, seismic reflection profiling uses sound to derive information about geological structures beneath the surface of the earth. The amount of acoustic energy released is directly proportional to the operating pressure and number of airguns. A review of literature on airgun acoustics by NRC (2003) reported a maximum output peak SPL of 260 dB re 1 µPa at 1 m (3.3 ft) in the vertical far field. The location of where this peak SPL would be received by a marine mammal is dependent on the makeup of the array, water depth, and physical properties of the water.

Vessel Traffic

Vessel traffic is a major contributor to underwater noise (Richardson et al. 1995; NRC 2003). Noise is created primarily by propeller cavitation, but other machinery (e.g., diesel engines, generators, pumps, fans, etc.) also contribute to the overall noise level. Vessel noise is a combination of narrowband tonal sounds at specific frequencies and broadband sounds with energy spread over a range of frequencies. Sound levels and frequencies are related to vessel size, design, speed, and load. Broadband source levels range from 150 to 180 dB re 1 µPa at 1 m (3.2 ft), with components extending to 100 kHz, but usually peaking between 50 and 150 Hz.

Dredging

Dredges can be a strong source of continuous noise in the coastal region. Underwater noise from dredging is strongest at low frequencies, but because low frequencies attenuate rapidly in shallow water, dredge noise is typically undetectable at ranges beyond 20 to 25 km (12.4 to 15.5 mi) (Richardson et al. 1995). Broadband source levels range from 150 to 170 dB re 1 µPa at 1 m (3.3 ft), with most of the energy below 1,000 Hz.

Icebreakers

Icebreaking ships produce louder and more variable sounds than typically produced by vessels of similar size or power, causing substantial increases in noise levels out to at least 5 km (3.1 mi) during icebreaking activities (Richardson et al. 1995). The primary source of increased noise is the propeller cavitation during alternating periods of ramming and backing. Broadband source levels have been measured to be approximately 180 dB re 1 µPa at 1 m (3.3 ft), with dominant tones at 50 Hz.

Production Islands

Blackwell et al. (2004b) measured underwater and airborne noise from Northstar during production operations. Underwater broadband levels were similar with and without production, but there was a peak between 125 and 160 Hz that could be from production. Noise sources from the production islands include generators, turbines, vehicles, pumps, and general human activity. Most mechanical noise is below 500 Hz, but traffic noise is typically up to 1,500 Hz. Airborne sound levels will vary depending on the amount of activity.

6.1.1.5 Potential Impacts on Polar Bear

Stationary Sources

Noise from stationary sources, including drilling, may result in several types of responses in polar bears. It may attract bears to the area, as they are known to be curious. Attracting the bears to a facility could result in a human encounter, which could result in unintentional harassment, lethal take, or intentional deterrence. Conversely, noise may act as a deterrent to keep bears from coming into the area. Although this would reduce the number of potential human encounters, it may also deter females from denning in the area if the noise and habitat were coincident. However, polar bears have been known to den in close proximity to industrial activities. For example, two polar bears denned near Flaxman Island without any observed impact to the polar bears (MacGillivray et al. 2002). It is also possible that human disturbance may have caused a polar bear to abandon a den due to rolligon traffic, however, this impact could not be confirmed (USFWS 2006). This type of event has occurred very infrequently and will likely continue to be infrequent due to the extensive measures the oil and gas industry undergoes to identify dens prior to any construction activities (see Chapter 10).

Vessel Traffic

During the open water season, polar bears typically remain offshore in the pack ice and are not usually present in the more frequent vessel traffic area, which is south of the pack ice. There is a potential that an occasional polar bear on ice floes could encounter a vessel, but the presence of the vessel is likely to cause a disturbance, rather than the airborne noise. Due to the solitary nature and widespread distribution of the polar bear, disturbance from vessel traffic would be short-term and temporary and limited to a few individuals.

Oil and gas activities during the open water season are generally limited to vessel-based exploration activities. There is a potential that polar bears on ice floes could encounter a vessel, but the presence of the vessel is more likely to cause the disturbance to a polar bear, rather than the airborne noise generated by the vessel. Moreover, most vessel activity would occur south of the sea ice used by polar bears. Due to the solitary nature and widespread distribution of the polar bear, disturbance from vessel traffic would be short-term, localized, and temporary and limited to a few individuals. Therefore, the anticipated impact on the polar bear SBS and CS populations is anticipated to be negligible.

Little information is available on the effects of seismic activity on polar bears. Monitoring during seismic surveys have documented the presence of polar bears and reported that polar bears typically reacted to the vessels by moving away (either on ice or in the water) (USFWS 2008c). The most likely response would be short-term, temporary behavioral avoidance of seismic vessels. There has never been more than a temporary behavioral disturbance recorded for polar bears exposed to seismic operations in the Alaskan Arctic. Marine mammals that show behavioral avoidance of seismic vessels are unlikely to incur auditory impairment (USFWS 2008c). Furthermore, implementation of the mitigation measures during seismic surveys to shut down when a marine mammal enters the safety zone of 190 dB re 1 µPa rms would further reduce the likelihood a polar bear would be injured from seismic surveys (see Chapter 10). Therefore, the anticipated impact from seismic noise is anticipated to be negligible on the SBS and CS populations.

Aircraft Traffic

Behavioral reactions of polar bears to aircraft depend on distance and type of aircraft. Polar bears often run away from aircraft passing at low altitudes. Routine aircraft traffic may result in short-term, temporary disturbance to a few individual polar bears, but the impact, if any, on the SBS population is expected to be no more than negligible.

Amstrup (1993) reported most polar bears in dens continue to occupy the dens after close approaches by aircraft (Amstrup 1993). Although the snow attenuates some aircraft noise (Blix and Lentfer 1992), it is possible that repeated overflights may cause polar bears to abandon or depart their dens. However, required mitigation measures including minimum flight elevations over polar bear areas and flight restrictions around known polar bear dens would reduce the potential for bears to be disturbed by aircraft.

6.1.2 Physical Obstruction

There is a limited chance that physical obstructions caused by oil and gas activities would have an impact on polar bears. Physical obstructions have the potential to impact polar bears by displacing animals; however, if this were to occur, it would likely be temporary and localized and have a negligible impact, if any. Most oil and gas facilities are located further inland where polar bears are found infrequently (USFWS 2006). Offshore and coastal facilities are most likely to be approached by polar bears.

The Endicott Causeway and West Dock facilities have the greatest potential to interfere with polar bear movements because the facilities extend continuously from the coastline to offshore facilities (USFWS 2006). However, polar bears have little or no fear of man-made structures (Stirling 1988) and can easily climb and cross gravel roads and causeways. Bears have frequently been observed crossing existing roads and causeways in the oilfields. Offshore production facilities, such as Northstar, have been approached by polar bears, but due to the design (i.e., continuous sheet pile walls around the perimeter) the bears have limited ability to gain direct access to the facilities (USFWS 2006).

Physical obstructions may present a small-scale, local obstruction to polar bears; however, it is anticipated that this will have no more than a negligible impact on individual polar bears and a negligible impact, if any, on the SBS and CS populations.

6.1.3 Human Encounters

AOGA anticipates that the small number of human encounters from oil and gas activities is likely to have a temporary impact on individual polar bears and a negligible impact, if any, on the SBS and CS populations. Encounters with humans can be dangerous for both polar bears and oil and gas industry personnel. Human encounters could potentially result in harassment, increased stress, or (rarely) death of polar bears. Since the ITRs went into effect in 1993, thousands of sightings have been reported by industry

Human encounters are more likely to occur during fall and winter periods when greater numbers of bears are found in the coastal environment searching for food and denning habitat (Amstrup and Gardner 1994). Offshore units such as Prudhoe Bay, Endicott-Liberty and Northstar typically document higher numbers of polar bear sightings than onshore facilities. Endicott-Liberty, Northstar, and Prudhoe Bay units reported between four and 158 sightings of polar bears annually from 2008 to 2012 at each facility. Some of these sightings are very likely repeated observations of the same animals resulting in a lower actual number of bears at these facilities. These sightings were comprised mostly of single adult and sub-adult bears and fewer sows with cubs. Polar bear sightings have generally increased since the inception of the incidental take regulations. The USFWS attributes this pattern in part to increased monitoring efforts throughout the years (USFWS 2006). Development of future offshore and nearshore production facilities could potentially increase polar bear-human encounters.

There is also the potential for oil and gas activities to disturb polar bear dens. The oil and gas industry makes a concerted effort to avoid known polar bear dens found as a result of locating USGS-radio-collared, pregnant females or documentation by Forward Looking Infrared (FLIR) surveys around the oil fields. These dens, monitored by the USFWS, represent only a small percentage of the total active polar bear dens located in the Southern Beaufort Sea (USFWS 2006). LOA conditions require oil and gas operations to avoid known polar bear dens by 1.6 km (1 mi). From 2006 to 2010, two previously unknown maternal dens were encountered by the oil and gas industry during project activities (Durner et al. 2010). The oil and gas industry reports unknown dens to the USFWS who then establishes mitigation measures, such as the 1.6 km (1 mi) exclusion zone, to minimize the potential disturbance from oil and gas activities (see Chapter 10).

Human-bear interactions are governed by polar bear interaction plans developed by and in collaboration with USFWS and oil and gas companies. The plans provide guidance for minimizing polar bear encounters through personnel training, polar bear guards, lighting, snow clearance, waste management and garbage control, agency communication, site clearance, and site-specific safety briefings for polar bear awareness. Employee training programs are designed to educate field personnel about the dangers of human-bear encounters and to implement safety procedures in the event of a bear sighting. Personnel are instructed to leave an area when bears are seen in the vicinity.

6.1.4 Spills

In a recent analysis of a potential very large oil spill (VLOS) in the Chukchi Sea, BOEM found that the chance of such a spill occurring during oil and gas exploration activities is very low (BOEMRE 2011a). Further, in the recent Point Thomson EIS, the U.S. Army Corps of Engineers (USACE) conducted a detailed analysis of spill occurrences and the future likelihood of a catastrophic discharge event and their potential impacts to marine mammals (USACE 2012). Both BOEM and the USACE concluded events such as a VLOS are highly unlikely to occur (BOEMRE 2011a; USACE 2012). USFWS cannot authorize takes from a large oil spill (nor are any such takes requested in this petition); however, this section is included to acknowledge the very low likelihood of impacts from a VLOS on polar bears.

Although there have been no known oil spills that have impacted polar bears, the potential impacts that oil, fuel, and waste product spills could have on polar bears and other marine mammals is a serious concern. In the unlikely event of an oil spill, depending on the quantity, the season, and other characteristics of the spill, polar bears could be exposed to spilled substances.

Oil, production waste, and non-hydrocarbon spills, if encountered by bears, have the potential to directly impact them. The indirect effects of oil spills on polar bear habitat are discussed in Chapter 8. Operational spills may occur during transfer of fuel, refueling, handling of lubricants and liquid products, and general maintenance of equipment. Polar bears may be impacted by external contact with oil, ingestion of oil, or inhalation of fumes. Polar bears could encounter oil spills during open water and ice-covered seasons in the offshore or onshore habitat (USFWS 2006).

Effects on experimentally oiled captive bears have included acute inflammation of the nasal passages, marked epidermal responses, anemia, anorexia, biochemical changes indicative of stress, renal impairment, and death (USFWS 2006; Øritsland et al. 1981). Oiling could cause significant thermoregulatory problems by reducing the insulation value of the pelt (Øritsland et al. 1981; Hurst and Øritsland 1982). In experimental oiling, many effects did not become evident until several weeks after exposure to oil (USFWS 2006).

Oil ingestion by polar bears through consumption of contaminated prey and by grooming or nursing could have pathological effects, depending on the amount of oil ingested and the individual's physiological state (USFWS 2006). In April 1988, a large adult male polar bear was found dead on a barrier island north of Prudhoe Bay. The cause of death was determined to be poisoning from ingestion of a mixture that included ethylene glycol and Rhodamine B dye (USFWS 2006). In September 2012, two polar bears were found dead on a barrier island east of Prudhoe Bay. According to a newsletter published by the USFWS, samples from the bears and nearby soil and driftwood indicated the presence of Rhodamine B dye and acetic acid, but the cause of death and source of the chemicals is unknown (USFWS 2013c). Although some hazardous substances are used during oil production activities, these substances, if spilled, would most likely be spilled on land where oil and gas industry procedures require immediate clean up.

It is likely that polar bears swimming in or walking adjacent to an oil spill will inhale petroleum vapors. Inhalation of highly concentrated vapors, such as gasoline in excess of 10,000 parts per million (ppm), is typically fatal (Boesch and Rabalais 1987). At lower concentrations, up to 1,000 ppm, humans and laboratory animals can develop inflammation, hemorrhaging, and congestion of the lungs (Boesch and Rabalais 1987). Øritsland et al. (1981) reported on the effects of vapor inhalation on captive polar bears. Their report indicated inhalation of hydrocarbons from crude oil in a confined space may have been a factor in the death of two of three polar bears exposed to oil in their experiments.

Small, localized spills on land or in the water are typically cleaned up quickly and pose little to no threat to polar bears. Large spills, however, may pose a potentially more serious threat to polar bears. Historically large spills associated with Alaskan oil and gas activities on the North Slope have been production-related and have occurred at production facilities or pipelines connecting wells on land (USFWS 2006). The probability of a large oil spill (> 1,000 bbl) occurring on the North Slope is low. To date, only one major oil spill has occurred on the North Slope. In March 2006, approximately 5,054 bbl of crude oil was released onto the snow-covered tundra from the GC2 transit pipeline in Prudhoe Bay. The spill covered about 2 acres (0.8 hectares) of the snow-covered tundra. A Tundra Treatment Plan was developed and implemented to remove the hydrocarbons and to minimize the potential for long-term damage to the tundra. The site is currently being successfully re-vegetated and rehabilitated. Other mitigation measures discussed in Chapter 10 will also be implemented to reduce the likelihood and impact of a spill.

BOEM released the Final Programmatic Environmental Impact Statement (FPEIS) for Oil and Gas Leasing Programs in June 2012, which contains a broad assessment of spill probabilities and response techniques for OCS oil and gas activities (BOEM 2012). This is discussed in more detail in Section 10.3.

6.1.5 Summary of Anticipated Impacts

Impacts on polar bears by oil and gas industry activity during the past 45 years have been negligible, as shown by the small number of documented incidents. Polar bears have been encountered at or near coastal and offshore production facilities, or along roads and causeways linking these facilities to the mainland.

Although there are limited specific data regarding the hearing of polar bear, the long-term consequences of all effects of oil and gas activity in the action area are reliably known to be no more than localized, short-term, and temporary changes in behavior with no effect on recruitment or survival of the SBS population. Accordingly, it may be logically inferred that noise impacts from oil and gas activity, as a subset of all effects, have not had more than a negligible adverse impact on the SBSpopulation.

The majority of actual incidental take to polar bears are expected to result from direct human encounters. The implementation of polar bear interaction plans has helped raise employee awareness about the importance of bear avoidance and has minimized the impact of human encounters on polar bears. With over 45 years of oil and gas exploration and development in Alaska, the existing data reliably demonstrate that with proper management, the potential negative effects of oil and gas industry activities on polar bears can be minimized and, at most, have been negligible (USFWS 2006; USFWS 2008a; USFWS 2013d). With the implementation of effective mitigation measures, oil and gas industry activities are anticipated to have a short-term, temporary impact on a small number of individual polar bears and no more than a negligible impact, if any, on the SBS and CS populations.

Due to the solitary nature of polar bears, their widespread distribution, the small number of polar bears being incidentally harassed, and the measures taken by industry to mitigate the potential for incidental harassment, it is anticipated that physical obstructions, facility development and operations, noise, human encounters, and spills will only result in a small number of incidental takes of polar bears, and the impact will be temporary, short-term, and localized to the immediate area of activity. As such, it is anticipated that incidental takes will have no more than a negligible impact on individual polar bears and a negligible impact on the SBS and CS populations.

6.2 Pacific Walrus

6.2.1 Noise

The following sections discuss the potential noise impacts on walrus. The noise sources discussed in Section 5.1.1 are also applicable for walrus.

6.2.1.1 Hearing Abilities of Walrus

Walruses hear sounds both in air and in water. Kastelein et al. (1996) tested the in-air hearing of a walrus from 125 Hz to 8 kHz and determined the best sensitivity was between 250 Hz and 2 kHz. Walruses were able to hear at all frequency ranges tested. Kastelein et al. (2002) tested the underwater hearing and determined that the best sensitivity was at 12 kHz. Their best range of hearing was between 1 and 12 kHz. Most of the noise sources discussed, other than the very high frequency seismic profiling, would be audible to walruses; however, the noise levels required to cause TTS or PTS have not been determined for walrus.

6.2.1.2 Potential Impacts on Pacific Walrus

Stationary Sources

Noises produced from stationary sources, including drilling, are within the hearing range of the walrus and could result in disturbance to a small number of walruses. However, because walrus are rarely observed in the vicinity of these facilities, the likelihood of disturbance is low. Furthermore, in the few instances where walrus have been observed near Northstar and Endicott, there is no indication that they avoided the noise. Therefore, noise from stationary sources is anticipated to disturb no more than a few individuals with no impact to the population.

Vessel Traffic

The behavioral response of walrus to vessel traffic is extremely variable. Richardson et al. (1995) reviewed various studies on walrus reactions to ships and boats and reported that some studies reported no reaction, while other studies showed that high-frequency noise from outboards may be more disturbing than low frequency noise from diesel engines. Richardson et al. (1995) summarized that walrus response to ships depend strongly on distance and ship speed, as well as previous exposure to hunting. Females with young are typically more wary than adults, and walruses in open water are less responsive than those on ice.

Walruses in water appear to be even less readily disturbed by vessels than walruses hauled out on land or ice (Fay et al. 1984). They also reported that walruses in the water showed little concern about an approaching vessel unless the ship was actually about to run over them. Even then, they simply dove and swam away. Fay observed that when a ship was stationary, walruses often swam to within 20 m (66 ft). Frequently, they dove under the ship and surfaced on the other side.

The mobile source most likely to result in noise exposure of walrus is seismic surveys that take place during the open water season. Airgun arrays may be audible several km (mi) from the source and source levels of the array may be loud enough to cause hearing damage in walruses in proximity to the source. However, seismic survey operators employ monitoring programs that require shut down of airgun arrays if a walrus enters the safety zone of 180 dB re 1 μPa rms (see Chapter 10). Implementation of this mitigation would minimize the potential for walrus to be injured during seismic surveys. Furthermore, because open water seismic activities typically occur in ice-free areas where walrus are not typically found, the likelihood of noise disturbance from this activity is considered extremely low and would be limited to no more than a few individuals. Therefore, impacts, if any, to the population are expected to be negligible.

Underwater noise from vessel traffic has the potential to mask sounds of walruses very close to the source, when walrus are present in the region. However, due to the low numbers of walruses observed in the area, impacts, if any, from vessel traffic would be limited to no more than a few individuals and would have no more than a negligible impact, if any, to the population.

Aircraft Traffic

The behavioral response of walruses to aircraft traffic also varies with distance, type of aircraft, flight pattern, age, sex, and group size. Richardson et al. (1995) reviewed responses of walruses to aircraft and summarized that individual responses to aircraft can range from orientation (i.e., looking at the aircraft) to leaving the haulout. In general, small herds on a haulout sites (terrestrial and pack ice) seem more easily disturbed than large groups, and that adult females and calves are more likely to enter the water during disturbance. Stronger reactions occur when the aircraft is flying low, passes overhead, or causes abrupt

changes in sound. The greatest potential impact of aircraft is when the disturbance causes a stampede into the water by all of the walrus at a haulout site, which may result in the crushing of calves.

Most aircraft traffic in the area of activity normally occurs inland and at altitudes that are unlikely to affect walrus. Additionally, there are no rookeries located in the area of activity and generally there is a low occurrence of walruses in the Beaufort Sea. Therefore, aircraft traffic would have no more than a negligible impact, if any, on the individual or walrus population.

6.2.2 Physical Obstruction

It is unlikely that walruses would be negatively impacted by a physical obstruction caused by oil and gas activities. There have been no recorded instances of take of walrus within the activity area from a physical obstruction. Small numbers of walruses have been observed to haul out on Northstar Island and Endicott (USFWS 2006; BPXA 2008). There is no evidence that these animals were disrupted or displaced by oil and gas activities. It is unlikely that stationary offshore facilities and artificial islands would affect the movement of walrus. In the event that walruses are encountered on a stationary facility, the oil and gas industry will record and report the interaction.

6.2.3 Human Encounters

Human encounters with walruses are rare in the Beaufort Sea. Aerial and vessel surveys conducted by LGL between Harrison Bay and Kaktovik in 2006 and 2007 reported no walrus in 2006 and fewer than 15 in 2007 (Ireland et al. 2008). Industry reports from vessel and aerial based surveys from 2008 to 2012 reported less than 30 total walrus sightings. In the event that an individual or small group of walrus is encountered on a stationary facility the oil and gas industry will record and report the interaction and implement the necessary precautions to minimize any effect on walrus. Vessels that encounter walruses typically divert around the animals wherever practical and make every effort to avoid disturbing the animals. Close approaches to walruses are prohibited. Given the small number of walruses in the Beaufort Sea, human encounters are expected to have no more than a negligible impact on individual walruses and a negligible impact, if any, on the Alaskan stock.

6.2.4 Spills

USFWS cannot authorize takes from a large oil spill. This section is included to acknowledge the very low likelihood of impacts from a VLOS on walruses. As discussed previously, the chance of a VLOS occurring from oil and gas activities in the Chukchi and Beaufort Seas is very low (BOEMRE 2011a; USACE 2012), however, impacts on walruses from such an unlikely event remain a serious concern. Depending on the quantity, season, and other characteristics of a spill, there is the potential for walruses to be impacted by external contact with oil or contaminants, ingestion of oil, or inhalation of fumes.

Onshore oil spills would not impact walruses unless the spill moved into the offshore environment or near a haulout area (USFWS 2006). Little is known about the effects of oil or other chemical compounds on walrus; however, oil and production waste spills have been documented to cause a range of physiological and toxic effects on other pinnipeds. Components of oil can burn eyes, burn skin, irritate or damage sensitive membranes in the nose, eyes, and mouth (USFWS 2006). If ingested, it can damage red blood cells, suppress immune systems, strain the liver, spleen and kidneys and interfere with the reproductive system of animals (Australian Maritime Safety Authority [AMSA] 2002). Walrus do not exhibit grooming behavior which lessens the chance of ingestion of oil (USFWS 2006). After a period of exposure, inhalation of hydrocarbon fumes can cause pulmonary hemorrhages, inflammation, congestion, and nerve damage (USFWS 2006). Walrus calves may die as a result of abandonment. If the mother

cannot identify its pup by smell in the large colony, the mother may reject attempts by the pup to suckle (AMSA 2002).

Given the small number of walruses present in the Beaufort Sea, the low probability of a large oil or production waste spill, and the measures that will be taken to mitigate the impact of any spill, it is anticipated that oil and production waste spills will have no more than a negligible impact, if any, on individual walrus or the Alaska walrus stock as a whole.

6.2.5 Summary of Anticipated Impacts

It is unlikely that oil and gas activities will result in any noise, physical obstructions, human encounters, or oil and production waste spills that would have a negative impact on more than a very few individual walruses. Walrus are not present in the region of activity during the ice-covered season and occur infrequently in the region during the open water season.

As with polar bears, although there is limited specific data regarding the effects of noise on walruses, the long-term consequences of all effects of oil and gas activity in the action area are reliably known to be no more than localized, short-term and temporary changes in behavior with no effect on recruitment or survival of the Pacific walrus. Indeed, adverse impacts to walruses within the Petition area have not been observed. Accordingly, it may be logically inferred that noise impacts from oil and gas activity, as a subset of all effects, have not had more than a negligible adverse impact, if any, on Pacific walruses.

Available information shows that no more than a very small number of walruses, if any, will be encountered during the five-year period of the proposed regulations. The likelihood of incidental takes of walruses in the Beaufort Sea is extremely low; any potential response from walrus encounters will be short-term and localized, with no more than a negligible impact on individual animals and a negligible impact on the Alaska stock of Pacific walrus. To date, there have been no recorded instances in which oil and gas activity has caused more than a temporary, short-term impact on a few walruses in the Beaufort Sea. The limited potential for incidental take during the period of the proposed regulations will be further mitigated by implementation of management measures required by USFWS (Chapter 10).

7.0 ANTICIPATED IMPACT ON SUBSISTENCE

CFR § 18.27(d)(iii)(D) The anticipated impact of the activity on the availability of the species or stocks for subsistence uses.

7.1 Subsistence Species Synopsis

Subsistence hunting is considered integral to the way of life of northern Alaska communities. The subsistence harvest provides food, clothing, and materials that are used to produce arts and crafts. These subsistence products have substantial material and economic importance, since the subsistence goods would have enormous replacement costs if alternatives had to be purchased. However, the subsistence way of life also has important cultural and socio-economic benefits. Subsistence harvest activities express and reproduce central cultural values, including respect for and generosity with the foods of the natural world, as shown in the widespread patterns of sharing, trading, and bartering of subsistence foods.

The annual cycle of subsistence harvests shows effort directed at a wide array of resources, at strategic times and places when animals are abundant and may be harvested efficiently. In this sense, the composition of the subsistence harvest represents an ecological adaptation to available resources. All of the subsistence resources are important at some time of the annual cycle, even though certain resources provide much greater quantities of food. The three communities in the area of activity, Barrow, Nuiqsut, and Kaktovik, have a particularly high level of reliance on marine mammals, especially bowhead whales. Caribou are also an important food resource, along with fish and birds. Polar bears and walruses are also important subsistence resources. Though harvested infrequently, they contribute small quantities of food and important byproducts. Polar bears are primarily hunted for their fur, which is used to craft cold weather gear such as boots, mitts, and coats. Their meat is also consumed (MMS 1990). Walrus provide meat as a food resource, and ivory as a valuable byproduct used to manufacture traditional arts and crafts (MMS 1990).

7.1.1 Polar Bear

Historically, polar bears have been killed for subsistence and handicrafts by Alaska Native hunters and for recreation by others (non-Alaska natives). The harvest quotas of the SBS population are shared by the Iñupiat of Alaska and Inuvialuit of Canada under the Polar Bear Management Agreement of 1988 (Snow et al. 2013). Based on skins shipped from Alaska, an average of 120 polar bears were taken annually by natives between 1925 and 1953. Trophy hunting from aircraft was initiated in the 1950s, and as a result, the annual harvest rate by natives and sport hunters more than doubled to an average of 260 polar bears each year between 1961 and 1972 (Amstrup et al. 1986; Schliebe et al. 1998). After enactment of the MMPA in 1972, the annual subsistence harvest of polar bears decreased, ranging from 29 to 181 between 1973 and 1984 (Amstrup et al. 1986). From 1990 to 2007, the total number of harvested polar bears from Beaufort Sea communities has ranged between 29 and 368 animals. However, the harvest of polar bears continues to play an important role in Iñupiat communities where they utilize parts of the bears to make traditional handicrafts and clothing (Nelson 1981). USFWS has concluded that the continuing subsistence harvest of polar bears by native Alaskans is sustainable and is not a present threat to the SBS population. According to USFWS, the number of unreported kills of polar bears from the SBS population since 1980 is thought to be negligible.

7.1.2 Pacific Walrus

The walrus has cultural and subsistence significance to the Iñupiat of the North Slope, but harvests east of Barrow are uncommon, as this is outside of the common range of the species. Alaskan communities

harvest few walruses in the southern Beaufort Sea along the northern coast of Alaska, including Barrow, Nuiqsut, and (rarely) Kaktovik. Small numbers of walruses migrate through the area annually and are harvested seasonally (ADNR 2009). Current harvest estimates (including those killed in fisheries) do not exceed estimated recruitment levels (USFWS 2014).

7.2 Subsistence Harvests by Community

7.2.1 Kaktovik

Kaktovik, located on Barter Island, is approximately 145 km (90 mi) west of the Canadian border and 447 km (278 mi) southeast of Barrow with a population of approximately 250. The village is on the northern edge of ANWR. Like other coastal communities, Kaktovik relies on maritime resources other than walruses and polar bears, primarily bowhead whales, but hunters also take caribou and fish. Bowhead whales, fish, and caribou comprise approximately 64 percent, 13 percent, and 11 percent of the total annual harvest (by edible pounds), respectively (NMFS 2013b). Other marine mammal species comprise a very small percentage of the overall harvest.

Polar Bear

Polar bears are primarily harvested during fall and winter on the pack ice and along open leads. Bears may be pursued seaward of the barrier islands for 16 km (10 mi) or more (MMS 2003). Compared to other North Slope communities, the overall harvest of polar bears is relatively low. The polar bear harvest by Kaktovik from 2008 through October 2012 averaged two polar bears per year (Table 7-1). This is close to the average of 1.8 polar bears for the period 2004 to 2008.

Walrus

Walruses rarely occur near Kaktovik and thus are rarely harvested. However, boat crews hunting for seals in open water (currently July and August) along the coast east and west of the village occasionally harvest walrus. Kaktovik hunters did not harvest any walrus from 2004 to 2012, as summarized in Table 7-2.

7.2.2 Nuiqsut

Nuiqsut is located approximately 29 km (18 mi) south of the Nechelik Channel entrance, which is the head of the Colville River at the Beaufort Sea, and 219 km (136 mi) southeast of Barrow with a population of approximately 410. Nuiqsut is an inland community, but the community maintains an active whaling and marine mammal harvest pattern, accounting for 31.8 percent of subsistence foods. Caribou and fish are very important, representing by edible pounds 58 percent and 30 percent, respectively. The use of polar bears and walruses for subsistence is relatively low (MMS 2003).

Polar Bear

Most polar bear hunting occurs from September through April from Nuiqsut. The overall harvest of polar bears is lower than Barrow and Kaktovik. The annual polar bear harvest for Nuiqsut from 2008 through October 2012 averaged one (Table 7-1), higher than the average of 0.4 bears per year reported for the period 2004-2008.

Table 7-1. Subsistence Polar Bear Harvests Reports by Year and Village

Village	Calendar Year					
	1987-2007[1]	2008[1]	2009[1]	2010[1]	2011[1]	2012[2]
Kaktovik	47	3	3	0	0	4
Barrow	368	11	8	6	12	4
Nuiqsut	29	0	1	0	0	4

[1] Polar bears reported and tagged as harvested and tagged by Alaska Native subsistence hunters in accordance with the Marine Mammal Marking, Tagging, and Reporting Rule (50 CFR 18.23). Source: USFWS 2012
[2] Source for 2012 (through October 27): USFWS 2013c

Table 7-2. Subsistence Walrus Harvests Reports by Year and Village

Village	Calendar Year					
	1989-2007	2008	2009	2010	2011	2012
Kaktovik	2	0	0	0	0	0
Barrow	447	24	10	2	4	0
Nuiqsut	0	0	0	0	0	0

Walrus reported as harvested and tagged by Alaska Native subsistence hunters in accordance with the Marine Mammal Marking, Tagging, and Reporting Rule [50 CFR 18.23].
Source: USFWS 2012

Walrus

Walruses are occasionally harvested by Nuiqsut hunters during the open water season from June to early October. Hunts have occurred throughout the entire coastal range, from Cape Halkett to Anderson Point, but walruses are seldom encountered for harvest. No tagged walruses were reported from Nuiqsut hunters for the years 2004 to 2012, as shown in Table 7-2 (USFWS 2012).

7.2.3 Barrow

Barrow is the economic, transportation and administrative center for the NSB with a population of approximately 4,350. Located on the Chukchi Sea coast, Barrow is the northernmost community in the U.S. The majority of the annual subsistence harvest by edible pounds for Barrow is composed of caribou and bowhead whales (22 percent and 39 percent, respectively; Alaska Department of Fish and Game [ADFG 2001]). Walruses comprise approximately nine percent of the annual harvest (by edible pounds), and polar bears account for approximately 2.2 percent of the annual subsistence harvest (by edible pounds) for Barrow (ADFG 2001).

Polar Bear

Barrow residents hunt polar bears on the sea ice or along leads from October to June. In 1989, 2.2 percent of the total subsistence harvest (by edible pounds) for Barrow was composed of polar bears (ADFG 2001). Since it is a large community, Barrow often has the highest number of polar bear takes on the North Slope. The polar bear harvest for Barrow from 2008 through October 2012 averaged 8.2 per year (Table 7-1). This is a reduction from the reported annual average of 13.6 bears for the period 2004 to 2008. The reason for this decline is unknown.

Walrus

Barrow residents hunt walrus from boats, during the marine mammal hunts west and southwest of Point Barrow to Peard Bay, generally no more than 24 to 32 km (15 to 20 mi) from the community (MMS 2003). Most walrus hunting occurs from June through September, and peaks in August, when the landfast ice breaks up and hunters can access the walruses by boat as they migrate north on the retreating pack ice (MMS 1990). The average annual walrus harvest for Barrow from 2008 to 2012 was eight animals (Table 7- 2). This is less than the reported average of 22.6 walruses taken annually for the period 2004 to 2008. The reason for this decline is unknown.

7.3 Summary of Anticipated Impacts

The impact of oil and gas exploration, development, and production on the availability of polar bears and walruses for subsistence harvest has been, and is anticipated to remain, negligible. Polar bears are hunted primarily during the ice-covered period. Oil and gas activities during the period of the proposed ITR are expected to have a negligible impact, if any, on the distribution, movement, and numbers of polar bears in this area. Oil and gas activities are also expected to have a negligible impact on the distribution, movement, and numbers of walruses in the region. Mitigation and regular communication between the industry and native communities will further reduce the likelihood of interference with subsistence harvest. All operators work with the communities to reduce the interference of activities on the availability of these animals for subsistence uses, as discussed in more detail in Chapter 10.

8.0 ANTICIPATED IMPACT ON HABITAT

CFR § 18.27(d)(iv) The anticipated impact of the activity upon the habitat of the marine mammal populations and the likelihood of restoration of the affected habitat.

8.1 Polar Bear

Though there is the potential for oil and gas activities to impact polar bear habitat, the documented impacts by the oil and gas industry during the past 45 years have been negligible. Given the mitigation measures in place and their likely continued use in the future, the low level of oil and gas activities occurring in polar bear habitat and the temporary and localized nature of many of the oil and gas activities, it is anticipated that oil and gas industry will have a negligible impact on polar bear habitat.

As described in Chapter 5, habitats that are important to polar bears include pack ice, landfast ice, and coastal areas. Open water by itself is not considered to be a habitat type frequently used by polar bears, because life functions such as feeding, reproduction, or resting do not occur in open water (USFWS 2008a). However, open water is a fundamental part of the marine system that supports seal species, the principal prey of polar bears, and seasonally refreezes to form the ice needed by the bears (USFWS 2008a).

8.1.1 Noise

The primary potential impacts from noise on polar bear habitat are impacts on prey, the bearded seal, ringed seal, and spotted seal (*Phoca largha*). As discussed in Section 5.1, anthropogenic noise may affect marine mammals in various ways, from small behavioral changes to physical injury. Noise associated with oil and gas activities has the potential to result in disturbance of the seals on which polar bears prey. The primary source of noise disturbance to these species would be from the air and vessel traffic associated with exploration activities, including supply boats, seismic survey operations, icebreakers, and aircraft. Secondary sources would be drilling and production operations, although most of this noise is relatively low frequency and at low sound levels.

The vessel and aircraft traffic could potentially cause behavioral disturbance of the seals hauled out on the ice. However, the numbers of seals potentially affected is expected to be small due to the low number of disturbance events and the relatively dispersed distribution of seals in the area of activity. Furthermore, seals in the region are likely habituated to industrial noise. Blackwell et al. (2004a) reported that ringed seals exhibited tolerance to industrial noise associated with construction activities, including pile driving, at Northstar.

Noise from seismic surveys could also result in temporary disturbance to seals. Similar to vessel traffic, seismic activities are likely to result in startle responses near the sound source, but the disturbance is likely to be limited to a few seals in the localized area due to their scattered distribution. Furthermore, mitigation programs that require shut down of seismic activity if a marine mammal enters the 190 dB safety zone would reduce the numbers of seals that may be impacted by seismic noise (see Chapter 10). In addition, Moulton et al. (2002) and other studies (Moulton and Lawson 2002; Miller et al. 2005; Ireland et al. 2008) report that the distribution of ringed seals did not change after seismic operations.

8.1.2 Facility Development and Operations

Facility development and operation has the potential to cause some degradation and fragmentation effects on polar bear habitat. As discussed in Chapter 6, the operation of existing facilities represents a small

scale, local obstruction to polar bears and the anticipated impact of these facilities on polar bear foraging and breeding habitat is considered no more than negligible. The majority of existing facilities are located inland where polar bears are found infrequently (USFWS 2006). Areas of landfast ice adjacent to existing offshore production facilities, including Northstar, the Salt Water Treatment Plant on the West Dock Causeway, and the Endicott production island, provide marginal hunting habitat due to their low seal densities (USFWS 2006). Furthermore, these facilities do not impact the adjacent landfast ice habitat used by ringed seals (Williams et al. 2001, 2002). Since pack ice is in constant motion by the winds and tides, structures are not constructed on this type of ice.

The development of future facilities, particularly offshore and nearshore coastal facilities may have a potential local impact on polar bear foraging or denning habitat. As more permanent structures are built, there is a potential to reduce the amount of habitat that may be utilized by polar bears. Female polar bears tend to select secluded areas for denning, presumably to minimize disturbance during the critical period of cub development (USFWS 2008a). Terrestrial denning sites have specific prominent features (e.g., coastal bluffs, river banks, and abandoned pads), which help to accumulate snow for den excavation and expansion (Harington 1968; Durner et al. 2003). Over 80 percent of maternal dens on land were within 10 km (6.2 mi) of the coast and over 60 percent were on the coast or coastal barrier islands (Schliebe et al. 2006). While direct disturbance may cause abandonment of occupied dens before their cubs are ready to leave (USFWS 2008a), the consistent features and distance from the coast of potential denning areas have enabled the USFWS to map potential denning habitats along the coast for avoidance by industrial activities. Therefore, activities such as expansion of the network of roads, pipelines, well pads, and infrastructure associated with oil and gas activities are expected to have a negligible effect on denning habitat.

The potential effects of human activities are greater in areas where there is a high concentration of dens. The oil and gas industry makes a concerted effort to locate, monitor, and avoid known polar bear denning habitat around existing and future facilities. This habitat is also monitored by the USFWS, and mitigation measures require oil and gas operations to avoid known polar bear dens by 1.6 km (1 mi).

The operation of existing facilities is not anticipated to impact polar bear habitat. There is a potential for future development or for expansion of existing facilities to impact polar bear habitat; however, the USFWS will evaluate these impacts through a requested LOA and apply suitable conditions. The oil and gas industry also maintains best practices in mitigating the potential impacts of operation and development on polar bear habitat. Mitigation techniques that have been instituted, and will be modified as necessary, have proven to be highly successful in providing for polar bear conservation in Alaska (Chapter 10).

8.1.3 Spills

The possibility of spills from oil and gas activities and the subsequent potential impacts on polar bears are a concern (USFWS 2006). Oil spills can have an indirect effect on polar bears by altering their feeding, breeding, or resting habitat as well as the availability and distribution of prey species.

The potential impact of a larger spill on polar bear habitat would depend on multiple factors, including the time of year, environmental conditions, the magnitude of the spill, the origin of the spill, and the success of clean-up efforts. Oil spills in the fall or spring during the formation or break-up of sea ice present a greater risk because of difficulties associated with clean up during these periods, and the presence of bears in the prime feeding areas over the continental shelf (USFWS 2008a). Amstrup et al. (2000) concluded that the release of oil trapped under the ice from an underwater spill during the winter could be catastrophic during spring break-up if bears were present (USFWS 2008a). During the autumn freeze-up and spring breakup periods, any oil spilled in the marine environment would likely concentrate and

accumulate in open leads and polynyas, areas of high activity for both polar bears and seals (USFWS 2008a).

The main potential impact oil spills may have on polar bear habitat is through the reduction of suitable foraging habitat and prey availability. However, the biology of the polar bear and its prey greatly minimizes the potential population impacts from an oil spill. For instance, polar bears and their prey are widespread in low densities in the Beaufort Sea occurring in many different habitats in the sea ice. Ringed seals use shorefast ice, pack ice, and offshore pack ice, which cover a broad geographic area. Similarly, polar bears, often solitary, inhabit these ice types, traveling long distances in search of prey. Polar bears have also been reported to adapt to changing prey conditions by switching to other seal species including bearded seals (Iverson et al. 2006; Stirling and Parkinson 2006). Consequently, these and other life history features of polar bears and their prey would greatly reduce the potential for any impacts on polar bears from oil spills in their habitat. Any impacts would be localized to a small amount of habitat relative to that available in the Beaufort Sea.

The potential impact of a major oil spill on polar bear habitat is of great concern, although the probability of a large oil spill occurring is very low. Small spills, if any, are expected to be localized and cleaned up quickly, minimizing potential impact on the habitat. In the event that a large oil spill occurs, existing detection, containment and recovery procedures, and waste holding practices provide adequate protection to minimize impacts to polar bear habitat.

8.2 Pacific Walrus

Proposed oil and gas activities on the North Slope and in the Beaufort Sea are not expected to impact the habitat of walruses. Habitat important to the walrus is located outside of the area of activity addressed in this Petition. During summer months, the walrus inhabits the moving pack ice over the shallow waters off the continental shelf of the Bering and Chukchi seas. Walruses are rare in the Alaskan Beaufort Sea east of Point Barrow. Recent light ice years in 2007, 2011, and 2013 resulted in walrus haulouts between Point Lay and Point Barrow in the Chukchi Sea. Walruses retreated to the shoreline after pack ice retreated north of the shallow OCS waters (Ireland et al. 2008; Clarke et al. 2011). There was no evidence of walruses moving into the Beaufort Sea during these unusual events, suggesting that walruses are not likely to shift their distribution from the Chukchi Sea to the Beaufort Sea during years of light ice conditions.

8.2.1 Noise

There is little information on how or if noise from oil and gas activities affects the prey of walrus. As reviewed in NRC (2003), cephalopods (octopods and squid) and crabs have statocysts that may detect low-frequency sounds. Marine invertebrates do not hear in the same manner as vertebrates, but they are able to sense vibrations and movements associated with sound production to allow detection of potential predators, prey, and the activity of tides and currents (Discovery of Sound in the Sea 2008). They accomplish this with special sensory organs known as chordotonal organs, a type of internal mechanoreceptor. These organs sense pressure, movement, and tension. They detect cues generated from vibrations that may be associated with sound. However, because there are no important feeding grounds in the area of activity, noise from oil and gas activities is not expected to impact prey species comprising walrus feeding habitat.

8.2.2 Spills

Spills near or around Barrow may indirectly affect the walrus by impacting the benthic invertebrates on which they feed. Oil settling on the ocean floor has the potential to reduce the availability of benthic

invertebrates as a food source due to smothering and toxicity (USFWS 2006). Some polynuclear aromatics, that are carcinogenic and toxic, may also become concentrated in the food chain (Etkin 1997). However, little or no contamination of benthic food organisms and bottom feeding habitats of walrus would be expected to occur, because little oil would likely reach offshore feeding areas. Given the small number of walruses using the Beaufort Sea and the small proportion of total available habitat affected by a spill, the probability of oil or waste products having more than a negligible impact on important feeding areas from an oil and gas industry oil spill is very low. Mitigation measures undertaken by industry and highlighted in Chapter 10 would assist in further reducing any impact on the benthic environment.

8.3 Climate Change

The Council on Environmental Quality (CEQ) has issued guidance under NEPA indicating that climate change is a reasonably foreseeable impact of GHG emissions. As acknowledged in prior chapters of this Petition, USFWS has determined that climate change poses a threat to the survival of the polar bear species throughout its range because of the resulting modification (recession) of Arctic sea ice habitat upon which the polar bear is dependent. In addition, the USFWS has found that climate change poses an indeterminate potential threat to Pacific walrus, albeit primarily in areas outside of the area specified for the proposed ITR (USFWS 2011). This section summarizes information regarding the potential contribution of the activity described in this Petition to GHG emissions and climate change, and the potential for climate change to alter the environmental consequences of oil and gas activities in a manner adverse to the North Slope habitat of polar bear and Pacific walrus.

8.3.1 GHG Emissions

GHG emissions are currently regulated by the Clean Air Act and by Alaska law under the PSD and Title V air permit requirements. USEPA published emission factors for various types of fuel to be used in GHG emission calculations. There are also programmatic GHG emissions estimates, such as the estimated contribution of OCS oil and gas activities to GHG emissions analyzed in the EIS for the 2012-2017 OCS Leasing Program.

The underlying oil and gas activities, and the use of the produced hydrocarbons by consumers for energy, are sources of GHG emissions; however, it is not possible to meaningfully assess the contribution of such activities to global climate change in general, and in the Arctic in particular, for several reasons.

- The activity to which this proposal relates will be occurring in the future, from August 2016 to August 2021. It is an added and important element of significant complexity and speculation to attempt to predict what North Slope GHG emissions sources will exist during this time period, what regulatory programs may exist at that time, and what emissions may result from the existing sources as authorized under then-existing regulatory programs. To the extent that new requirements regulating GHG emissions are enacted, any activities subject to these programs will, in the future, perform project-specific and site-specific air emissions analyses and modeling, and GHG emissions reduction and mitigation measures appropriate to the location, activity, and equipment will be developed as warranted.
- Current science and modeling cannot link individual actions that contribute to atmospheric carbon levels to specific responses of species or specific impacts to their habitats. Accordingly, the available scientific information does not enable us to establish a connection, let alone to assess the relative extent of the connection, between specific sources and locations of GHG emissions, and specific impacts to polar bears or walruses arctic habitats.

- The USFWS is evaluating the effect of incidental take. It does not have the authority under the MMPA to regulate GHG emissions.
- The impacts of GHG emissions from energy consumption are well outside the scope of this proposed ITR and the authority of federal agencies implementing the MMPA.
- The same or more GHG emissions would result from domestic consumption of oil and gas without North Slope oil and gas activity. Oil and gas is projected to remain a significant energy source during the five-year period of proposed regulations, and for the foreseeable future thereafter. Were oil and gas activity on the North Slope curtailed, most of the lost production would be replaced by a combination of imports, fuel switching, and increased onshore production, not by reductions in energy needs or consumption of oil. Any projected decrease in GHG emissions resulting from a reduction in North Slope oil and gas production due to conservation measures would be offset by increases in GHG emissions resulting from transportation of foreign oil via tanker to domestic markets.

8.3.2 Effects of Climate Change on Oil and Gas Activities

It is not possible to predict from existing information the specific locations or extent of climate change on oil and gas activities for the Petition period. However, changing environments on the North Slope are expected to be a greater topic of discussion during the period of these regulations than during past regulatory periods.

Continuing recession of sea ice is likely to affect the distribution and abundance of polar bears throughout their range and a potential increased presence in nearshore areas (as discussed in Section 5.1.7), thereby creating the potential for more frequent bear-human encounters (USFWS 2008a). Because of the many uncertainties associated with the pace and effects of climate change, it is not possible to precisely or reliably predict to what extent an increase in interactions with polar bears may arise during the five-year period of the proposed ITR. However, with over 45 years of documented experience in conducting oil and gas operations within polar bear habitat, it is reliably expected that with proper training, management, and monitoring under the proposed ITR, the potential for adverse effects to polar bears and stocks from oil and gas activities will be minimized. Based upon the anticipated level of activity during the five-year period, the wide distribution and low onshore density of polar bears, it is still reasonably expected that the number of incidental takes will be small and that such takes will involve non-lethal, short-term changes in behavior that do not have more than a negligible impact on individual bears or on the SBS and CS polar bear populations.

Changes to weather and the related effects upon infrastructure and coastlines is not expected to alter the potential for incidental interactions or the expected intensity of such interactions with Pacific walruses in offshore open water areas. Pacific walruses are very uncommon in the specified area and are not known to use coastal beaches or uplands of the North Slope where affected infrastructure may be located.

9.0 ANTICIPATED IMPACT OF HABITAT LOSS OR MODIFICATION ON SPECIES

CFR § 18.27(d)(v) The anticipated impact of the loss of the habitat on the marine mammal populations involved.

Chapter 8 discussed the anticipated impact of oil and gas activity upon the habitat of polar bears and Pacific walruses. The chapter identified several potential losses or modifications to polar bear or walrus habitat that could result from oil and gas exploration or production activities in the proposed area of activity. For the polar bear, based on the broad geographic distribution, low density, and high mobility of polar bears; the small proportion of the total area of habitat potentially affected by oil and gas activities; and the short-term, temporary, and localized nature of oil and gas activities; combined with existing and future mitigation measures, we conclude that the oil and gas industry will have no more than a negligible effect on polar bear habitat. Further, we conclude that oil and gas activities will have no more than a negligible impact, if any, on the habitat of the walrus, as the Beaufort Sea is considered extralimital for the walrus.

Consequently, it is anticipated that due to the negligible loss of habitat as a result of oil and gas activities, there will be no more than a negligible impact on the SBS and CS polar bear populations or the Alaska stock of Pacific walruses.

Finally, we note that this section addresses "habitat" generally, as that term is used under applicable MMPA regulations. The ESA separately provides for the designation of "critical habitat." Currently, there is no ESA critical habitat designated for either the polar bear or the walrus.

10.0 MITIGATION MEASURES

CFR § 18.27(d)(vi) The availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their habitat, and on their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance.

This section describes mitigation measures that have been used in the past and may continue to be used to reduce impacts on polar bears and walruses. Industry will coordinate with the appropriate federal, state, and local regulatory agencies to develop mitigation measures to minimize potential impacts to polar bears and walruses. These measures will be approved by the appropriate regulatory agencies before implementation.

10.1 Mitigation Measures

The following section lists the actions and measures the oil and gas industry has historically used to and may continue to implement in the future to reduce impacts or the risk of impacts on polar bears and walruses. Each operator will continue to coordinate with USFWS and others to develop and implement any additional measures, if needed:

- Operators designate a qualified individual or individuals to observe, record, and report the effects of their activities on polar bear and walrus.
- Operators develop a polar bear and walrus interaction plan and works with the USFWS to approve the plan prior to beginning any activities. Plans must be filed with USFWS and retained on site. The plans identify the following:
  - The type of activity including when and where the activity will occur
  - A food and waste management plan
  - Personnel training materials and procedures
  - Site at-risk locations and situations
  - Snow management plan
  - Polar bear and walrus observation and reporting procedures
  - Polar bear and walrus avoidance and encounter procedures
- Operators must minimize the effect on subsistence uses. Each operator, to the extent practicable, will use methods and conduct activities to minimize adverse impacts to polar bears and walruses, their habitat, and their availability for subsistence uses.
- Operators will consult, as needed, with affected subsistence communities and marine mammal management groups to discuss potential conflicts with subsistence polar bear and walrus hunting.
- If required by USFWS, a Plan of Cooperation will be developed by the operator to ensure activities will not interfere with subsistence hunting and adverse effects on the availability of polar bear or walrus will be minimized.
- Aircraft will maintain a minimum altitude as based on peer-reviewed science from hauled out walruses, to the extent practicable.

- Trained Protected Species Observers (PSOs) may be used for some marine activities. PSOs may be required to monitor impacts of activities on polar bear and walrus.
- When required by USFWS, operators will identify the location of potential polar bear dens when conducting activities during the denning season in the coastal areas of the Beaufort Sea through the use of best available technology, such as FLIR imagery or polar bear scent-trained dogs.
- Operators will limit disturbance around known occupied dens by timing of activities. A minimum of 1.6 km (1 mi) exclusion buffer will surround known dens. If dens are occupied, this exclusion buffer will limit disturbance or operators will conduct activities after the female bears emerge from their dens. Extenuating circumstances will require a separate review on a case-by-case basis.
- USFWS will be allowed to, in its discretion, place an observer on site to monitor impacts of activities on polar bears.
- Offshore seismic exploration mitigation measures may include the following:
  - Space activities to maintain a minimum distance as based on peer-reviewed science between activities to mitigate impacts to resting, feeding, and migrating walruses.
  - Maintain an exclusion zone at and below the surface of the water within a radius defined by USFWS.
  - Monitor the exclusion zone using trained PSOs for avoidance and take behaviors.
  - For multiple airgun arrays, ramp up procedures may be implemented.

10.2 Spill Prevention

The Alaska Department of Environmental Conservation (ADEC) Division of Spill Prevention and Response (SPAR) is responsible for regulating oil and hazardous substance spills by preventing, responding to, and ensuring the cleanup. Each operator is required to submit a contingency plan that outlines their methods for preventing, responding to, and ensuring the cleanup. The following text summarizes the mission of SPAR from the ADEC website (http://www.dec.state.ak.us/spar/about.htm):

> ***Prevention*** **–** ensures spill prevention through the review and approval of prevention plans for oil terminals, pipelines, tank vessels and barges, railroads, refineries, and exploration and production facilities; the underground storage tank spill prevention program; technical assistance to industry and the public; risk reduction measures; inspections; and education in proper spill prevention and response methods.
>
> ***Preparedness*** **–** ensures response preparedness through the review and approval of oil discharge contingency plans; inspections; spill drills and exercises; partnerships with local communities and other state and federal agencies; pre-positioning of response equipment for local use; maintenance of statewide and regional spill response plans; and implementation of the Incident Command System for spill response.
>
> ***Response*** **–** ensures an effective response through the identification and rapid abatement of dangerous acute human exposures to hazardous substances; timely characterization and remediation of chronic health exposure risks from hazardous substance releases; mitigation of the effects of spills on the environment and cultural resources; and restoration of property value and usability through adequate cleanup.

The oil and gas industry considers spill prevention a vital part of typical operations. Regular maintenance, inspections, and accurate record keeping by trained personnel are integral. Details of each operators' prevention programs are located in the contingency plans approved by ADEC. Contingency plans typically include, but are not necessarily limited to, details on the following:

- Prevention training programs
- Substance abuse policy
- Medical programs
- Security programs
- Well control and emergency shutdown procedures
- Fluid transfer procedures
- Operating requirements for exploration and production facilities
- Storage tank requirements
- Description of secondary containment
- Facility piping corrosion program
- Leak detection system monitoring
- Discharge detection procedures

To provide an example of the prevention techniques, the following text provides information on prevention of a well blowout. Operators apply a rigorous multi-layer well control management system that has proven successful in preventing escalation of a well control incident to a blowout situation. These measures result in an extremely low probability of an uncontrolled well release. Mitigation measures are taken to ensure that oil is not released into the environment. Preventive layers are as follows:

- ***Layer I***. Layer I includes proper well planning, risk identification, training, routine tests and drills on the rig (e.g., blowout preventer [BOP] tests, pit drills, and trip drills), which build a strong foundation.
- ***Layer II.*** Layer II includes early kick detection and timely implementation of kick response procedures. Continuous monitoring including the use of a Real Time Operations Center provides early kick detection. When a kick is detected, the general response is to immediately shut down the pumps, perform a flow check, shut in the well, and kill the well.
- ***Layer III.*** Layer III involves the use of mechanical barriers, including, but not limited to, BOPs, casing, and cement. Testing and inspections are performed to ensure competency.
- ***Layer IV.*** Layer IV represents relief well drilling, which would be implemented if a blowout were to occur, despite the first three layers of protection. Contingency plans include dynamic surface control measures and the methods of drilling a relief well.

10.3 Spill Response

The history of offshore operations around the world confirms that large spills are extremely rare events. As reported by NRC (2003), only 1 percent of the oil discharges in North American waters are related to the extraction of petroleum, and only a fraction of this is from drilling operations. There has never been an oil spill caused by a blowout from offshore exploration and production drilling in state and federal waters off Alaska or in the Canadian Arctic. Using the BOEM classification of a large spill, there have been only four large spill incidents (greater than or equal to 1,000 bbl) from U.S. exploration or production platforms since 1974 (Anderson et al. 2012). Wells will be thoroughly evaluated and designed to employ advanced multiple well-control barriers and systems. Rigorous planning, continuous downhole monitoring, and multi-layer control systems ensure that the probability of an exploration blowout remains extremely unlikely.

From 1982-2013, a total of 39 exploration wells have been drilled within the Chukchi and Beaufort seas of Alaska's OCS (BOEM 2013). No large spills have occurred on Alaska's OCS from exploration drilling. The historical spill record from all 39 Chukchi and Beaufort Sea Exploration wells reveals a combined total spill volume of 26.7 bbl with an estimated 24 bbl recovered (MMS 2008; BOEMRE 2011b). Based on this, the most likely spill event would be small and confined to a relatively small area of impact during exploration drilling operations. Any possible adverse effects upon polar bears and walruses would be short-term and mitigated through containment and recovery actions.

BOEM released the Final SEIS for the Chukchi Sea Lease Sale 193 in 2011, which includes a thorough assessment of spill probabilities and trajectories (BOEMRE 2011a). Appendices B and D of the Final SEIS provide a discussion of oil spill types, their behavior, spill models and estimates, and a VLOS simulation for the Chukchi Sea. The analyses used a hypothetically large volume spill over a long duration to estimate the probabilities that oil generating from a certain area would contact a certain resource or land area over different time periods. BOEM further acknowledged that that the chance of a VLOS occurring is very low based on historical OCS records (BOEMRE 2011a).

BOEM also released the FPEIS for Oil and Gas Leasing Programs in June 2012, which contains a broad assessment of spill probabilities and response techniques for OCS oil and gas activities (BOEM 2012). Using historically high volumes of oil and long durations of release, BOEM provided catastrophic discharge scenarios for OCS program areas and determined that the type of drill rig, timing of drilling, and rig availability to drill a relief well were the primary factors affecting the duration of a very large spill in the Beaufort Sea (BOEM 2012). Based on historical large spills and hypothetical analyses, the probability of a very large spill occurring is very low. BOEM has recently implemented enhancements to oil spill safety, inspection, and prevention program through research, regulations, and Notices to Lessees.

Smaller spills (< 500 bbl) have historically occurred from pipeline, vehicle, or gravel pad activities and are typically caused by leaks or faulty equipment (BLM 2005). From 1989-2009, 16 percent of spills were approximately 1 gallon, 54 percent were approximately 5 gallons, 82 percent were approximately 1 bbl, and 98.5 percent were less than 25 bbl (BLM 2012). The mean size is 2.8 bbl. The estimated rate for small crude spills on the North Slope is 178 spills per billion bbl produced (BLM 2005). Using this estimated spill rate, a mean spill volume of 3 bbl, and the maximum amount of resources (bbl), BLM estimated a total spill volume of 426 bbl over the production life of the northeast NPR-A (BLM 2012). In October 2013, BOEM released a report detailing small North Slope spill occurrences from 1971 to 2011 and used statistical modeling to estimate future potential spills based on several production variables (Robertson et al. 2013). Small spills are generally restricted to a small area of tundra and winter spills can be cleaned up before reaching the tundra (BLM 2005). Thus, a small spill event would likely be confined to a small area of impact and effects to polar bears and walruses mitigated through containment and recovery actions.

10.3.1 Oil Fate and Behavior in Arctic Waters

Spill response in ice conditions is different than spill response in open water. However, experience has shown that low temperatures and ice can enhance spill response and reduce the potential for environmental impacts under certain conditions. For example:

- Low air and water temperatures generally lead to higher oil viscosity and greater oil equilibrium thicknesses that result in reduced spreading rates and smaller impacted area. These beneficial effects greatly reduce the potential for direct oil contact with natural resources, while providing an opportunity for much higher oil encounter/removal rates using mechanical recovery and controlled in situ burning operations.
- Evaporation rates are reduced in cold temperatures and ice. As a result, the lighter and more volatile components remain for a longer time, thereby enhancing the ease with which the oil can be ignited.
- The regional presence of ice dampens wave action and often limits the fetch over which winds might otherwise create larger fully developed waves.
- During ice conditions, responders may operate with short-boom extensions and skimmers to maneuver among ice pieces and intercept oil in open areas.
- Ice can serve as a natural barrier to the spread of oil and help concentrate it for recovery with stationary skimmers dipped into discrete pockets of oil. The natural containment of oil against ice edges leads to thicker oil films that enhance the effectiveness of controlled in situ burning.

10.3.2 Spill Response Techniques

10.3.2.1 Detection and Monitoring

Tracking of an oil spill can be accomplished through airplane and helicopter surveys, FLIR surveys, GPS, digital cameras, and possibly unmanned aerial vehicles. In addition, tracking buoys and various types of radar reflectors can be launched from vessels on location at the beginning of a spill and at appropriate intervals thereafter to help track the oil. Specialized ice-strengthened beacons have been used successfully for many years to track ice movements over an entire winter season throughout the polar basin.

Techniques for detecting and tracking oil under ice include drilling holes and trenches in ice, using Autonomous Underwater Vehicles (AUVs), or surface operated, portable Ground Penetrating Radar (GPR). Several GPR systems are capable of detecting and mapping oil under the ice surface. Alaska Clean Seas (ACS) acquired a GPR system in 2006 and personnel are trained on its use and readings.

10.3.2.2 Open Water Offshore Response

Mechanical Containment & Recovery

Oil skimmers are widely used to collect oil at the water surface and transfer it to a storage container. Skimmers are the most efficient method for recovering thick oil slicks. When safety considerations permit, mechanical recovery tactics include the use of broad-swath, open-apex booms to intercept oil and funnel it to skimming vessels equipped with large skimmers. Mechanical recovery is the first line of oil spill response widely accepted within the U.S. and abroad.

Controlled In Situ Burning

Controlled in situ burning provides a unique way to eliminate oil quickly, efficiently, and safely. Oil slicks contained to a thickness greater than 3 millimeter (mm) (<1 in) by fireproof booms, ice, or a shoreline can be ignited to burn oil off the water surface. On average, about 80 to 95 percent of oil volume is eliminated as gas, 1 to 10 percent as soot, and 1 to 10 percent remains as a residue. Residue is much less toxic than the original oil as most of the toxic components have low molecular weight and burn off first. Concentration of combustion products in the air is short lived and carefully monitored. Igniters can be deployed from a helicopter, eliminating the need for personnel or equipment exposure. In open water and light-ice conditions, controlled in situ burning with fire booms provides a valuable alternative strategy to mechanical recovery.

Relatively small burn areas can yield high elimination rates. For example, a 9.3 square m (100 square ft [ft²]) pool could burn at 10 bbl of oil per hour (boph) or more, and an 743 square m (8,000 ft²) pool (only 30.5 m [100 ft] in diameter) could burn on the order of 1,000 boph or more. The consensus of research on spill response with controlled in situ burning of oil on open water and with solid and broken ice is that burning is a highly effective technique, with removal rates of 85 to 95 percent or more in most situations.

Dispersants as a Possible Future Arctic Response Option

Dispersants reduce the oil/water interfacial tension, thereby decreasing the energy needed for an oil slick to break into small particles and mix into the water column. Specially formulated products containing surface-active agents are sprayed (at concentrations of 1 to 5 percent by volume of the oil) from aircraft or boats onto an oil slick. Dispersed oil droplets are then colonized by bacteria and biodegrade naturally. Dispersants are used to rapidly remove large volumes of oil from the water surface therefore providing greater protection to birds and marine mammals, which otherwise may come into contact with surface oil. Dispersing oil rapidly decreases oil concentration and prevents an oil slick from reaching the shore.

There is growing evidence from scientific testing that dispersants could play a significant role in future Arctic spill response plans. The application of chemical dispersants is recognized worldwide as an environmentally acceptable and highly efficient means of rapidly eliminating spilled oil offshore under the right conditions. Furthermore, numerous laboratory and field studies have demonstrated that a decision to use dispersants can provide a clear net environmental benefit compared to the impacts of not using the dispersant. Dispersants may provide a valuable response option when strong wind and sea conditions make mechanical cleanup and controlled in situ burn techniques unsafe and/or ineffective. Under these conditions the treatment of spilled oil with chemical dispersants is actually enhanced by the mixing energy provided by breaking waves that hinder other response operations. This advantage, combined with the potential to treat large areas quickly with aerial application systems, makes dispersants an essential tool for most offshore oil spill response organizations.

10.3.2.3 Broken Ice Offshore Response

As ice concentrations increase, the containment lost through ice interference with conventional open water booms is replaced by the natural containment provided by the close proximity of individual ice floes. Even relatively thin ice can provide an effective barrier to oil spreading.

Light ice concentration may be addressed by use of Ice Deflection or Ice Management Techniques. Using vessels as physical barriers or prop wash from an icebreaker allows deflecting ice away from the spill site, thus creating a relatively open space where open water strategies can be used.

Mechanical Response in Broken Ice

As ice concentrations increase beyond very open drift conditions (10 to 30 percent), response strategies generally move toward smaller, more maneuverable vessels with side arms to continue to recover oil at reduced encounter rates for some time after operations with the larger systems have ceased. Continued operations with containment boom may become impractical. At this point, mechanical recovery can then continue with over-the-side skimmers (e.g., brush and rope mop) to access pockets of oil trapped between ice cakes and floes or in leads. In high ice concentrations, ice acts as a natural barrier preventing oil from spreading and maintaining it at a thickness suitable for mechanical recovery.

Controlled In Situ Burning in Broken Ice

Heavy ice concentrations can actually aid controlled in situ burning. The ice tends to dampen waves, reduce surface spreading, and increase slick thickness. Under these conditions, there is an increased potential for the accumulation of oil on water at thicknesses that can support sustained combustion. In this case, igniters can be deployed from a helicopter eliminating the need for personnel exposure to a dynamic ice field.

Dispersants in Broken Ice

Recent tests have demonstrated that dispersants are efficient even in cold waters. While ice floes tend to dampen the waves and decrease energy input needed for the dispersion, icebreaker prop wash can be used to break oil into small droplets and mix them into water column. This energy input is so powerful that the efficiency of oil dispersion is far greater than in the natural breaking wave conditions, even for weathered oils. The size of oil droplets dispersed with the prop wash is smaller than that of naturally dispersed oil, which facilitates natural biodegradation.

10.3.2.4 Response to Oil in Solid Ice

Oil under solid ice occupies a much smaller area than it would if allowed to spread on the water surface. Oil can be exposed through the use of icebreakers, drilling holes, or cutting trenches in the nearshore ice. Once oil is exposed, vacuum pumps, skimmers, and controlled in situ burning can be used in procedures similar to the broken ice scenario.

If oil is released onto the surface of solid stable ice, snow and ice berms and trenches are used to prevent oil from spreading. Vacuum tracks, sorbents, or manual cleanup can be used for the cleanup. Personnel from ACS are highly experienced in nearshore and solid ice clean up. A comprehensive manual of various response techniques can be found on ACS' website at: http://www.alaskacleanseas.org/.

10.3.2.5 Nearshore Response

Response to offshore spills aims at recovering oil in the ocean and preventing it from reaching the shore. In the nearshore, shallow draft boats, as well as deflection and exclusion booms, are used to protect sensitive shoreline areas and collect oil in the designated locations. Then oil is collected using skimmers, vacuum tracks, sorbents, and manual labor.

Landfast ice that forms at the first signs of cold weather and is last to melt provides invaluable protection to the nearshore areas. It acts as a natural barrier concentrating oil and preventing it from reaching the shore. Mechanical response and in situ burning can be conducted at the ice edge using conventional techniques.

10.3.2.6 Spring Recovery

When oil accumulates under ice during the freeze-up, it can get quickly encapsulated into an ice sheet, which isolates oil from the environment. This protects wildlife from coming into contact with oil and prevents oil from weathering. Tracking buoys may be frozen into contaminated ice to monitor its location. In the springtime, when ice starts to melt, pools of encapsulated oil penetrate through the brine channels and form pools on top of the melting ice. Controlled in situ burning with ignition from helicopters can be used to treat these pools of oil. If a large amount of oil becomes exposed, mechanical recovery can be used in procedures similar to the broken ice scenario.

10.3.3 Wildlife Management

During oil spill response, every effort is made to minimize the potential for environmental damage and prevent wildlife from coming into contact with oil. A wildlife management plan will be developed and implemented, which may include wildlife monitoring, hazing, wildlife capture and stabilization, maintenance of subsistence levels, etc. These activities are conducted in close collaboration with the incident Unified Command, which includes Federal, State, and Local representatives. The USFWS is also included in this collaboration.

In 2010, Alaska Clean Seas formed an informal working group for Marine Mammal Response on the North Slope. The workgroup's mission is to *enhance communications, identify and improve capabilities, and develop/improve procedures with organizations responsible for marine mammal response on the North Slope of Alaska* (ACS 2012). Participants in the workgroup include the USFWS, NMFS, ADEC, NSB, Alaska Sealife Center, Alaska Zoo, Pet Stop, Alaska Clean Seas, Alaska Chadux, and other industry representatives. Since its formation, the workgroup has conducted animal handling, transport, cleaning, and stabilization simulations during spill response drills (ACS 2014).

The oil and gas industry may follow the guidance of Annex G of the Alaska Regional Response Team (ARRT) Wildlife Protection Guidelines for Alaska (2010) and the USFWS Oil Spill Response Plan for Polar Bears in Alaska (USFWS 1999) in responding to an oil spill that could affect polar bears or their habitat. These policy documents both outline a three-tier strategy characterized by the following:

- ***Primary response*** for protecting polar bears from an oil spill is to prevent the oil from reaching sensitive areas such as denning sites, feeding sites, or areas where animals are concentrated. Known den sites should be avoided by all personnel at all times to minimize disturbance;
- ***Secondary response*** is to deter or haze polar bears from the area of the oil slick or contaminated habitat. This response is appropriate under all circumstances and may be incorporated with primary response activities. The degree of risk associated with the animal actually contacting oil before secondary response strategies are initiated should be considered. If the spill occurs when polar bears are believed to be present, an aerial survey should be conducted to locate potentially affected animals; and
- ***Tertiary response*** is the treatment of polar bears contaminated with oil. The components of tertiary response are the capture, handling, transport, treatment, holding, and release of polar bears. The tertiary response involving capture of polar bears may only be undertaken by the USFWS or with their authorization.

10.3.4 Ongoing Research and Development of New Technologies

Oil companies spend millions of dollars every year to advance oil spill response capability in arctic and ice-infested waters. Some of the ongoing arctic research and development projects include the following:

- Use of icebreaker prop wash to facilitate oil dispersion in broken ice; recent tests have shown high effectiveness of this technique.
- New formulation of a dispersant that is more efficient under cold temperatures and on viscous oils. It is more viscous than conventional dispersants and will float on the water surface together with a slick rather than dissolving into the water column.
- A Joint Industry Project (JIP) has been formed to address stakeholders concerns by studying the effect of dispersed oil on arctic marine organisms specific to the Beaufort and Chukchi seas. This research will provide comprehensive information that will facilitate the Net Environmental Benefit Analysis by comparing the effect of use of dispersants to other response techniques.
- Ice deflection: a series of tests were conducted to demonstrate how vessels can be used to deflect ice away from the response operations and create an open water area where conventional response techniques can work with greater efficiency.
- Assess feasibility of Nuclear Magnetic Resonance Radar to detect oil under ice.
- Assess the feasibility of using Unmanned Aerial Systems (UAS) to monitor ice movement and surface oil slicks using varying optics capabilities
- A comprehensive JIP managed through SINTEF Norway (a Scandinavian research organization), took place from 2006-2009 and aimed at developing improved arctic spill response techniques. Follow-up programs and projects are expected, but some of the completed projects included:
  - Feasibility of using airborne radar with sufficient power and resolution to detect and map oil trapped under ice from a low-flying helicopter. This project also evaluated the capabilities of different remote sensing systems such as laser fluorosensor, GPR, ultraviolet/infrared (UV/IR), side-looking airborne radar (SLAR), radar satellites, and enhanced marine radar to detect and map oil in a variety of ice conditions.
  - Improve the efficiency of mechanical recovery in broken ice. Improve, “winterize,” and test in the field state-of-the-art skimmer designs.
  - Analyze weathering of oil in ice and snow and evaluate feasibility of controlled in situ burning under variable response conditions.
  - Use of herders to facilitate controlled in situ burning. “Herder” is a chemical similar to dispersant that reduces surface tension of water. When applied in small quantities around the edges of a slick, it makes an oil slick contract and increases its thickness several fold. Controlled in situ burning can then be used on this herded slick. Recent tests show that herders work well in calm water and may be used in a broken ice field where ice concentration prevents use of booms, but is not high enough to contain oil to a desired thickness.
  - Analyze dispersant “window of opportunity” and develop new application equipment that would allow targeted application of dispersant between ice floes avoiding spraying dispersant on clean ice.
  - Develop a Generic Arctic Spill Response Guide summarizing available information on feasibility of response techniques.
  - Conduct field tests to validate JIP findings in a real arctic environment in broken ice.

11.0 MONITORING AND REPORTING

CFR § 18.27(d)(vii) Suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species through an analysis of the level of taking or impacts and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity.

The following section lists the monitoring and reporting measures the oil and gas operators may undertake to increase the knowledge of the species and monitor potential impacts of activities.

11.1 Monitoring

- Monitoring plans are site specific and dependent on location and timing of activity relative to the habitat (den sites, travel corridors, and food sources).
- Monitoring plans document when and how polar bears and walruses are encountered, the number encountered, and their behavior.
- All sightings of polar bears and walruses must be recorded for all exploration, development, and production activities, including seismic. To the extent possible, group size, age, sex, reaction, duration of interaction, and closest approach to activity will be recorded.
- Polar bear monitors will be required if polar bears are known to frequent the area or known polar bear dens are present.

11.2 Reporting

- Each operator must submit an "after action monitoring report" to the USFWS Alaska Regional Director, Marine Mammals Management Office for exploratory and development activities within 90 days of completion of the activity. For production activities, each operator will submit an annual report for the preceding year's activities. The reports must include the following information:
  - Dates and times of activities
  - Dates and locations of polar bears and walruses activities related to monitoring activities
  - Results of monitoring activities including take estimates, as applicable
  - Dates and locations of polar bear and walrus activities related to operation activity when the sightings occurred
- In the event a bear is observed, the operator must submit a report within 24 hours to the USFWS Alaska Regional Director, Marine Mammals Management Office.

12.0 COORDINATION OF RESEARCH EFFORTS

CFR § 18.27(d)(viii) Suggested means of learning of, encouraging, and coordinating research opportunities, plans and activities relating to reducing such incidental taking from such specified activities, and evaluating its effects.

To minimize the potential for impacts to the species, stocks, and subsistence use of polar bears and walruses, all oil and gas activities will be conducted in accordance with all federal, state, and local regulations. Additionally, all operators will continue to cooperate with USFWS and other appropriate federal agencies (i.e., BOEM, BLM, NMFS), the State of Alaska, NSB, the potentially affected communities, and other monitoring programs to coordinate research opportunities and assess all measures than can be taken to eliminate or minimize any impacts from these activities.

The operators may also cooperate with marine mammal researchers in the Beaufort Sea area in sharing data on polar bears and walruses and other marine mammal species that occur in the project area. This information will also be shared with other relevant governmental and private groups conducting studies. At their discretion, the operators will also continue to support research to further the knowledge of the species and interactions with oil and gas activities. Recent research activities supported by operators include:

- Acoustic monitoring of construction and operation noise associated with oil and gas exploration and production, both underwater and airborne.
- Hearing studies on polar bears.
- Acoustic monitoring of marine mammals.
- Aerial (manned and un-manned) surveys and vessel surveys to determine distribution and abundance of species both onshore and offshore.
- Satellite tagging of species to determine distribution and behavior.
- FLIR surveys to identify den sites.

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From: Kohout, Jenifer
To: Wilson, Ryan
Cc: Christopher Putnam; Mary Colligan; Patrick Lemons; James Wilder
Subject: Re: Help with Arctic 1002 EA
Date: Wednesday, November 15, 2017 12:51:00 PM
Attachments: Affected_Environment_PB.jk.docx

Thanks Ryan. I had a few minor suggestions but think this aligns well with what we discussed yesterday with Refuges (Tracy).

Jim, Patrick and Mary, please take a look and see if there are any other items you think should be mentioned about polar bears in the "Affected Environment" portion of the 1002 Area EA.

On Tue, Nov 14, 2017 at 4:11 PM, Wilson, Ryan <ryan_r_wilson@fws.gov> wrote:

> Hi Jennifer,
> Here's my first hack at the 'Affected Environment' section. Please let me know if you think anything should be added/deleted as this is the time I've ever worked on one of these.
> Thanks,
> Ryan
>
> On Tue, Nov 14, 2017 at 11:37 AM, Wilson, Ryan <ryan_r_wilson@fws.gov> wrote:
>
> > Sounds good.
> > Ryan
> >
> > On Tue, Nov 14, 2017 at 11:28 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:
> >
> > > Ryan and Christopher,
> > >
> > > Thanks for your help on this. Hopefully it feels manageable given the short length. If you could get me your drafts as early tomorrow (Wed) as possible, I'll take the lead on coordinating review by Jim, Patrick and Mary before we send to Refuges.
> > >
> > > Make sense?
> > >
> > > On Tue, Nov 14, 2017 at 11:23 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:
> > >
> > > > Hi Tracy,
> > > >
> > > > Just following up on our conversations this morning.
> > > >
> > > > Ryan will draft the "Affected Environment" section focusing on status of the Southern Beaufort Sea subpopulation and use of the 1002 Area, particularly in the winter. He'll rely on USGS population surveys, the ESA critical habitat designation, and a recent publication showing more land-based denning, etc.
> > > >
> > > > Christopher will tackle the "Environmental Consequences" section. Assuming that the nature of the activity is exploratory (seismic) work in the winter, Christopher will pull in information from our SBS incidental take regulations/EA and will incorporate by reference mitigation measures that would reduce potential impacts on polar bears denning in the area. In this section, we will also touch on potential indirect consequences (e.g. impact of increased barge traffic) and cumulative impacts (e.g. climate change - sea ice loss - access to prey -- more nutritionally stressed bears on land, etc).

We understand that you need our 1-2 page entries by Thurs (Nov 16) at 12 noon.

--Jenifer

On Tue, Nov 14, 2017 at 8:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Hi,
>
> As Karen mentioned, we are in a big push to get a beefed up EA done for the regulation change that would open the 1002 for oil & gas exploration.
>
> Would you be able to break someone free to write a relatively short 1-2 page Affected Environment section and environmental consequences section for polar bears?
>
> I'll be in the office at 9, if folks have questions. I'll be working on trying to outline a hypothetical exploration plan based on a state proposal from 2015.
>
> Thank you!
> -Tracy
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
>
> Hours: Mon - Thurs 9:15 am to 3:15 pm
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> Region 7 GeoPDF Map Portal

--
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Of the two polar bear subpopulations (or stocks) found in the United States, pPolar bears in the Southern Beaufort Sea (SBS) subpopulation are the most likely to occur in the 1002 area of the Arctic National Wildlife Refuge. The subpopulation is shared by the U.S. and Canada. The boundary of the SBS subpopulation, as recognized by the Polar Bear Specialists Group, is Icy Cape, Alaska to the west and south of Banks Island and east of the Baillie Islands, Canada to the east (Obbard et al. 2010). The SBS subpopulation had an estimated population size of approximately 900 bears in 2010 (Bromaghin et al. 2015). This estimate represents a significant reduction from previous estimates of approximately 1,800 in 1986 (Amstrup et al. 1986), and 1,526 in 2006 (Regehr et al. 2006). Although there was some evidence in the 2010 estimate that the population might be showing signs of the subpopulation beginning to increase (Bromaghin et al. 2015). AIn addition, analyses of over 20 years of data on the size and body condition of bears in this subpopulation demonstrated declines for most sex and age classes (Rode et al. 2010, 2014).

Population declines and the size and body condition of bears in the SBS subpopulation have been linked to declining sea ice conditions in the Beaufort Sea (Regehr et al. 2006; Rode et al. 2010, 2014, in press; Bromaghin et al. 2015). Declining sea ice conditions in the Beaufort Sea have also led to an increase in the proportion of the subpopulation coming onshore in summer and autumn (from 5.8% during 1986-1999 to 20% during 2000-2014) and a 30 day increase in time spent on land (Atwood et al. 2016). While on land, polar bears typically do not feed (Rode et al. 2015), although bears in the SBS subpopulation are drawn to bowhead whale remains from subsistence harvest, particularly adjacent to the community of Kaktovik, Alaska (Wilson et al. 2017). These whale remains may be helping offset lost hunting opportunities for bears in the SBS subpopulation due to sea ice loss (Herreman and Peacock 2013, Atwood et al. 2016).

In addition to a higher proportion of the SBS subpopulation occurring on shore during summer and autumn, there is also an increasing trend towards more bears denning on land (Olson et al. 2017). Between 1985-2013, the percent of bears denning on land in the SBS subpopulation increased from 34 to 55%, linked to sea ice declines. Designated Critical Denning Habitat overlaps with 77% of the 1002 area of the Arctic National Wildlife Refuge (U.S. Fish and Wildlife Service 2010). There is also 38% more denning habitat available in the coastal plain of the Arctic National Wildlife than in the region immediately west of the refuge (Durner et al. 2006). Polar bears have been shown to den in the 1002 area with greater frequency than expected based on available habitat (Amstrup 1993). Based on known den locations from 2000-2010, 22% of dens for bears in the SBS subpopulation occurred within the 1002 area (Durner et al. 2010). Thus, the 1002 area has been documented to be an important area for denning by polar bears and will likely increase in importance as the percent of bears denning on land increases with sea ice loss (Olson et al. 2017).

Minimizing disturbance while bears are in dens is important because timing of den emergence is significantly related to cub survival (Rode et al. in review). Females observed with cubs in spring emerged 15 days later than females observed without cubs (Rode et al. in review). Land-based denning also appears to be important for polar bears, as bears that den on land have significantly higher reproductive success (Rode et al. in review).

Commented [KJ1]: This point might be more appropriately placed in the "Environmental Consequences" section.

Commented [KJ2]: How about starting this paragraph with a paragraph about when polar bears typically den?

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From: Wilderness Watch
To: joanna_fox@fws.gov
Subject: Take Action: NO oil drilling or leasing in the Arctic Refuge!
Date: Wednesday, November 15, 2017 1:02:36 PM

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The Arctic Refuge provides critical habitat for polar bears, huge migrating herds of caribou, muskoxen, wolves, Dall sheep, brown

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Unfortunately, the Trump Administration—and some in Congress—are pushing a 2018 budget plan, which includes provisions that would open the coastal plain of the Arctic National Wildlife Refuge for oil and gas drilling. This is the heart of the area in which the 200,000+ members of the Porcupine caribou herd migrate over 400 miles every spring to reach their traditional, critical calving and forage grounds on the refuge.

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Subject: Re: Comment by COB Nov 15: Final Reports to the Range States on CWG action 2015-2017
Date: Wednesday, November 15, 2017 1:33:01 PM

Good point Susi. The Table part is in reference to the "baseline conditions" when we started, so it is accurate. But I added text in the narrative to indicate those were completed.

I accepted all your edits to 7.

I think tourism will be captured elsewhere. Thanks!

On Tue, Nov 14, 2017 at 1:42 PM, Miller, Susanne <susanne_miller@fws.gov> wrote:

> Hi Jim,
> On Action item 22, the way the table reads is that Terms of Reference and Requirements documents were never completed, but I think they were, both in 2016; see attachments. So that might need to be added to Accomplishments section.
>
> On action item 7, I edited the citation section; please feel free to accept/reject as you see appropriate.
>
> There is nothing currently included on tourism management or polar bear viewing, but we have made some significant progress that is worth mentioning, e.g. viewing guidelines, interaction guidelines, Arctic Refuge's efforts to implement a PB viewing management strategy for their jurisdiction. Not sure if that should go in either of these categories but to me, it's worth mentioning at the RS level (perhaps elsewhere?).
>
> hope this helps
>
> Susanne (Susi) Miller, Wildlife Biologist, Polar Bears
> U.S. Fish and Wildlife Service
> Marine Mammals Management
> 1011 E. Tudor Road, MS-341
> Anchorage, AK 99503
> Tel. 907-786-3828
> Fax 907-786-3816
>
> On Mon, Nov 13, 2017 at 12:31 PM, Wilder, James <james_wilder@fws.gov> wrote:
>
> > Dear CWG,
> >
> > Attached are our final reports to the Range States' Heads of Delegation regarding the Circumpolar Action Plan actions we were assigned for the 2015-2017 period.
> >
> > I will submit these to the HoD on Nov. 16.
> >
> > If you have any additional comments, please let me know by COB Nov. 15.
> >
> > Note- I have not received any information from Russia or Greenland on action #7.
> >
> > Best, Jim

> --
> James M. Wilder
> Marine Mammals Management, Polar Bear Project Leader
> U.S. Fish and Wildlife Service
> 1011 E. Tudor Rd., MS341
> Anchorage, AK 99503
>
> Office Phone: (907) 786-3913
> Email: james_wilder@fws.gov
> Fax: (907) 786-3816

--
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Anchorage, AK 99503

Office Phone: (907) 786-3913
Email: james_wilder@fws.gov
Fax: (907) 786-3816

From: Putnam, Christopher
To: Kohout, Jenifer
Cc: Wilson, Ryan; Mary Colligan; Patrick Lemons; James Wilder
Subject: Re: Help with Arctic 1002 EA
Date: Wednesday, November 15, 2017 2:03:47 PM
Attachments: Polar bears and seismic surveys.docx

Hi Jenifer,

Here is my summary of the effects of seismic survey activities to polar bears. I've made it a very brief summary, but if more detail is needed I can certainly add it. Let me know what you think.

Christopher Putnam
Supervisory Fish and Wildlife Biologist
Marine Mammals Management
U.S. Fish & Wildlife Service
1011 East Tudor Rd, MS 341
Anchorage, AK 99503-6199
907-786-3844 office
907-268-0577 mobile
907-786-3816 fax

"All that is gold does not glitter, not all those who wander are lost; the old that is strong does not wither, deep roots are not reached by the frost."
-- J.R.R. Tolkien

On Wed, Nov 15, 2017 at 10:50 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:

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Make sense?

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On Tue, Nov 14, 2017 at 8:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

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Polar bears present in the Arctic National Wildlife Refuge 1002 area may be affected by oil and gas industry seismic survey activities in various ways. Noise, vibrations, sights, and smells produced by seismic survey activities may elicit a wide range of responses in individual polar bears. Polar bear responses to disturbance are highly variable and are influenced by an individual bear's previous experiences and tolerance level. Polar bears are most likely to respond to the majority of seismic survey activities with short-term behavioral and physiological responses such as avoidance, increased vigilance, increased heart rate, and other stress responses. Disturbance during resting may result in increased energy expenditure or adverse physiological responses, but short-term reactions like these will rarely affect the health or survival of individual animals or the population. Chronic disturbances, extreme reactions, or disruption of key behaviors such as feeding or denning are more likely to affect health or survival. Polar bears directly interacting with seismic survey activities increase the risk of human-bear encounters, conflicts, and injury or lethal take of polar bears.

Seismic survey activities disturbing female polar bears at maternal den sites are of great concern. Female polar bears entering dens and females in dens with cubs are more sensitive to noises than other age and sex groups. Disturbance during the early stages of denning may cause a female polar bear to abandon the den site in search of another one. A female polar bear may locate another suitable den site and continue her reproductive process. However, premature den site abandonment after the birth of cubs and before the cubs are able to survive outside of the den, or if the female abandons the cubs after they emerge from the den, will result in cub mortality. The potential for disturbance increases once the female emerges from the den. She is more vigilant against perceived threats and easier to disturb.

The requirements of incidental take authorizations under the Marine Mammal Protection Act, such as polar bear interaction plans, training, monitoring, and mitigation measures have proven effective at reducing the effects of oil and gas industry activities, including seismic surveys, on polar bears in other areas of northern Alaska. Mitigation measures, including a pre-activity den survey and a 1.6-km (1-mi) operational exclusion zone around known dens help to limit disturbance of denning female polar bears. The current incidental take regulations for oil and gas industry activity in the Beaufort Sea and adjacent areas of northern Alaska, published in the Federal Register on August 5, 2016 (81 FR 52276), include a comprehensive analysis of the effects of oil and gas industry activity to polar bears, as well as mitigation, monitoring, and reporting requirements. A detailed description of mitigation measures that limit the effects of seismic surveys on polar bears is available at title 50 of the Code of Federal Regulations, part 18, subpart J, section 18.128.

From: Colligan, Mary
To: Kohout, Jenifer
Cc: Wilson, Ryan; Christopher Putnam; Patrick Lemons; James Wilder
Subject: Re: Help with Arctic 1002 EA
Date: Wednesday, November 15, 2017 2:08:02 PM

I don't have any other edits - thanks for putting this together so fast!

On Wed, Nov 15, 2017 at 10:50 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:

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cell: 907-223-5945

From: Wilder, James
To: Kohout, Jenifer
Cc: Wilson, Ryan; Christopher Putnam; Mary Colligan; Patrick Lemons
Subject: Re: Help with Arctic 1002 EA
Date: Wednesday, November 15, 2017 2:11:38 PM

Nice job. No comment from me.

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Office Phone: (907) 786-3913
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Fax: (907) 786-3816

From: Kevin Proescholdt
To: George Nickas
Cc: Dawn Serra; Jeff Smith; Gary Macfarlane; Dana Johnson; Matthew Koehler; George Wuerthner; Fran Mauer; Roger Kaye
Subject: Re: From Greenwire -- ARCTIC: Senate panel approves opening refuge to drilling
Date: Wednesday, November 15, 2017 2:19:59 PM

I just saw the ad on Minnesota TV today over lunch The ad targeted Erik Paulsen, a Republican House member from the Twin Cities suburbs His district is pro-environment, but he is not

On 11/15/17 3:16 PM, George Nickas wrote:

> *The League of Conservation Voters today announced a $550,000 multistate television ad campaign urging lawmakers to reject efforts to drill in ANWR. The ads are running in the Washington area as well as parts of Minnesota, Maine and New York.*

Sounds more like a fundraising campaign than a campaign to stop drilling. The delegations in hose states are 100 percent with us on the issue.

George Nickas
Executive Director
Wilderness Watch
PO Box 9175
Missoula, MT 59807
p- 406-542-2048
www.wildernesswatch.org

On Nov 15, 2017, at 12:03 PM, kevinp <email_this@eenews.net> wrote:

This Greenwire story was sent to you by: kevinp@wildernesswatch.org

GREENWIRE

AN E&E NEWS PUBLICATION

ARCTIC

Senate panel approves opening refuge to drilling

Kellie Lunney, E&E News reporter
Published: Wednesday, November 15, 2017



The Senate Energy and Natural Resources Committee today approved legislation that would open the Arctic National Wildlife Refuge to drilling. Senate Energy and Natural Resources Committee

Updated at 1:55 p.m. EST.

A Senate panel this morning approved legislation that would allow drilling in a portion of the Arctic National Wildlife Refuge, an important step toward realizing a decadeslong goal for the Alaska delegation and a setback for conservation groups and other opponents of energy development in the region.

The Energy and Natural Resources Committee passed a measure 13-10 that would make the coastal plain of ANWR — a 1.5-million-acre portion of the 19-million-acre refuge — available for oil and gas drilling. The vote was largely along party lines, with all Democrats other than West Virginia's Joe Manchin opposing it and every Republican supporting it. The panel's two independents, Angus King of Maine and Bernie Sanders of Vermont, also voted against the legislation.

Manchin said that while he supported Chairwoman Lisa Murkowski's (R-Alaska) legislation to open drilling in ANWR's so-called 1002 area, he strongly opposed its insertion into the budget reconciliation process as part of Republicans' tax plan.

Sen. Bill Cassidy (R-La.) offered a successful amendment that would increase the share of money that coastal states like Louisiana receive through revenue sharing with the federal government and would direct more funding toward restoring Louisiana's coastlands.

Democrats offered several unsuccessful amendments, some of which Murkowski ruled nongermane, including one from Sanders that sought to increase permits for renewable rather than fossil fuel energy development.

The seven rejected amendments included provisions from New Mexico's Martin Heinrich that sought stronger protections for ANWR's porcupine caribou herd, and one from ranking member Maria Cantwell of Washington that would have struck oil and gas development as a stated purpose within the refuge. Lawmakers voted to table an amendment from Sen. Debbie Stabenow (D-Mich.) that would eliminate tax breaks for major oil companies.

The bill's passage drew quick reactions.

"A clear majority of the people of the North Slope support responsible development in ANWR; they should have the same rights to economic self-determination as people in the rest of the United States," said Rex Rock Sr., president and CEO of the Arctic Slope Regional Corp. "I call on Congress to recognize that Native Alaskans are the best stewards of our lands and open up 1002."

But conservation groups, including the Natural Resources Defense Council and Alaska Wilderness League, rejected arguments that energy development could occur within the coastal plain with minimal environmental impact.

"Look up 'refuge' in the dictionary. Webster's defines it as 'a place that provides shelter or protection,'" said Niel Lawrence, NRDC's Alaska director for the Land and Wildlife Program.

He added: "Subjecting America's last pure wildland — its caribou and musk oxen, the coastal plain, and the Gwich'in way of life — to the destruction of seismic testing and oil extraction is the very opposite of providing shelter and protection."

The League of Conservation Voters today announced a $550,000 multistate television ad campaign urging lawmakers to reject efforts to drill in ANWR. The ads are running in the Washington area as well as parts of Minnesota, Maine and New York.

Sparring over NEPA, revenue

Murkowski and Cantwell engaged in a robust and, at times, tense policy debate over the pros and cons of energy development in the refuge's 1002 area.

Murkowski's legislation "turns the coastal plain into an oil field" and would undermine environmental laws like the National Environmental Policy Act, Cantwell said.

The Alaska Republican reiterated that the 1980 Alaska National Interest Lands Conservation Act set aside the 1002 area as "a small portion of the non-wilderness" for possible future energy development, and said her bill does not contain any language that waives NEPA or other environmental statutes.

"We have not pre-empted the environmental review, nor have we limited the consultation process with Alaska Natives in any way," Murkowski said. "All relevant laws, all regulations and executive orders will apply under this language."

But Cantwell and other Democrats argued that while the legislation might not technically waive NEPA, for instance, it would create a different management structure that would allow the Interior secretary more flexibility to prioritize energy development over wildlife protection in the coastal plain.

The legislation "confuses" the purpose of ANWR as a refuge, Cantwell said. "It makes it impossible for the refuge to win under this language," she said. The Washington Democrat also took the opportunity to jab Interior Secretary Ryan Zinke, referring to him as "no Teddy Roosevelt."

Murkowski's bill would allow up to 2,000 acres of surface land in the coastal plain for production and support facilities. It would direct the Interior Department to conduct two lease sales within ANWR's 1002 area within the 10-year budget window, the first within four years of enactment and the second within seven years.

It would stipulate a 50-50 revenue-sharing split between the state and the federal government, an "agreement that we are willing to make out of necessity, even though our Statehood Act and the Mineral Leasing Act provided for a 90-10 split in Alaska's favor," Murkowski said.

It also would impose a 16 67 percent royalty on oil and gas produced in the refuge's 1002 area. By way of comparison, the government charges royalties of 12.5 percent for onshore oil and gas production and 18.75 percent for energy developed in the outer continental shelf.

The nonpartisan Congressional Budget Office estimated that drilling in ANWR's coastal plain would bring in about $1.1 billion for Uncle Sam over the next decade after the federal government splits the revenue with Alaska.

That assumes a total $2.2 billion coming in between 2018 and 2027 from oil and gas drilling in the 1002 area, a figure that includes estimated proceeds from bonus bids paid by companies in search of leases (***Greenwire***, Nov. 9).

ANWR vs. health care?

Murkowski's ANWR gambit is complicated by its attachment to the budget reconciliation process and the GOP's tax plan.

The fiscal 2018 budget resolution that Congress passed last month tasked Murkowski's panel with finding $1 billion during the next decade to help offset Republicans' $1.5 trillion tax cut; those instructions gave her the opportunity to write legislation paving the way for drilling in the refuge's coastal plain.

Attaching ANWR language to the larger tax package through reconciliation allows it to move by a simple majority vote without the threat of a filibuster. That means it won't need any Democratic support in the Senate.

It's the best shot the Alaska delegation has had in decades to realize its goal of allowing energy development in the refuge's coastal plain.

But those odds were jeopardized yesterday with a revised bill from Senate Finance Chairman Orrin Hatch (R-Utah) that would repeal the individual mandate tax that lies at the heart of the Affordable Care Act (ACA), the Obama-era health care law that Republicans have failed repeatedly to repeal after years of promises to do so.

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The chairwoman said after the markup that she hasn't had a chance to look at the revised tax legislation and was singularly focused on getting her legislation through committee today.

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ABOUT GREENWIRE – THE LEADER IN ENERGY AND ENVIRONMENT NEWS

Greenwire is written and produced by the staff of E&E News. The one-stop source for those who need to stay on top of all of today's major energy and environmental action with an average of more than 20 stories a day, Greenwire covers the complete spectrum, from electricity industry restructuring to Clean Air Act litigation to public lands management. Greenwire publishes daily at 1 p.m.

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Kevin Proescholdt
Conservation Director
Wilderness Watch
2833 43rd Avenue South
Minneapolis, MN 55406
612-201-9266
www.wildernesswatch.org

To read about or order Kevin's new book, Glimpses of Wilderness, go to https://kevinproescholdt.com/

From: Matthew Koehler
To: Kevin Proescholdt
Cc: George Nickas; Dawn Serra; Jeff Smith; Gary Macfarlane; Dana Johnson; George Wuerthner; Fran Mauer; Roger Kaye
Subject: Re: From Greenwire -- ARCTIC: Senate panel approves opening refuge to drilling
Date: Wednesday, November 15, 2017 2:24:12 PM

The League of Conservation Voters today announced a $550,000 multistate television ad campaign urging lawmakers to reject efforts to drill in ANWR. The ads are running in the Washington area as well as parts of Minnesota, Maine and New York.

Let's see $550,000 multi-state ad campaign from LCV

Well, one week after Zinke said he would leave the Missouri Breaks National Monument the way it is, Backcountry Hunters and Angler's launched a $1 4 MILLION MONTANA-ONLY ad campaign to ask Zinke to leave the Breaks alone I said at the time that I bet that $1 4 million MT only ad buy was the largest non-political/election, non-commerical, non-government Ad buy in Montana history

I wouldn't doubt if Trump Jr gave Land Tawney the money just to create some subterfuge

On Wed, Nov 15, 2017 at 2:19 PM, Kevin Proescholdt <kevinp@wildernesswatch org> wrote:

I just saw the ad on Minnesota TV today over lunch The ad targeted Erik Paulsen, a Republican House member from the Twin Cities suburbs His district is pro-environment, but he is not

On 11/15/17 3:16 PM, George Nickas wrote:

> *The League of Conservation Voters today announced a $550,000 multistate television ad campaign urging lawmakers to reject efforts to drill in ANWR. The ads are running in the Washington area as well as parts of Minnesota, Maine and New York.*

Sounds more like a fundraising campaign than a campaign to stop drilling. The delegations in those states are 100 percent with us on the issue.

George Nickas
Executive Director
Wilderness Watch
PO Box 9175
Missoula, MT 59807
p- 406-542-2048
www wildernesswatch org

On Nov 15, 2017, at 12:03 PM, kevinp <email_this@eenews net> wrote:

This Greenwire story was sent to you by: kevinp@wildernesswatch.org

GREENWIRE
AN E&E NEWS PUBLICATION

ARCTIC

Senate panel approves opening refuge to drilling

Kellie Lunney, E&E News reporter
Published: Wednesday, November 15, 2017



The Senate Energy and Natural Resources Committee today approved legislation that would open the Arctic National Wildlife Refuge to drilling. Senate Energy and Natural Resources Committee

Updated at 1:55 p.m. EST.

A Senate panel this morning approved legislation that would allow drilling in a portion of the Arctic National Wildlife Refuge, an important step toward realizing a decadeslong goal for the Alaska delegation and a setback for conservation groups and other opponents of energy development in the region.

The Energy and Natural Resources Committee passed a measure 13-10 that would make the coastal plain of ANWR — a 1.5-million-acre portion of the 19-million-acre refuge — available for oil and gas drilling. The vote was largely along party lines, with all Democrats other than West Virginia's Joe Manchin opposing it and every Republican supporting it. The panel's two independents, Angus King of Maine and Bernie Sanders of Vermont, also voted against the legislation.

Manchin said that while he supported Chairwoman Lisa Murkowski's (R-Alaska) legislation to open drilling in ANWR's so-called 1002 area, he strongly opposed its insertion into the budget reconciliation process as part of Republicans' tax plan.

Sen. Bill Cassidy (R-La.) offered a successful amendment that would increase the share of money that coastal states like Louisiana receive through revenue sharing with the federal government and would direct more funding toward restoring Louisiana's coastlands.

Democrats offered several unsuccessful amendments, some of which Murkowski ruled nongermane, including one from Sanders that sought to increase permits for renewable rather than fossil fuel energy development.

The seven rejected amendments included provisions from New Mexico's Martin Heinrich that sought stronger protections for ANWR's porcupine caribou herd, and one from ranking member Maria Cantwell of Washington that would have struck oil and gas development as a stated purpose within the refuge. Lawmakers voted to table an amendment from Sen. Debbie Stabenow (D-Mich.) that would eliminate tax breaks for major oil companies.

The bill's passage drew quick reactions.

"A clear majority of the people of the North Slope support responsible development in ANWR; they should have the same rights to economic self-determination as people in the rest of the United States," said Rex Rock Sr., president and CEO of the Arctic Slope Regional Corp. "I call on Congress to recognize that Native Alaskans are the best stewards of our lands and open up 1002."

But conservation groups, including the Natural Resources Defense Council and Alaska Wilderness League, rejected arguments that energy development could occur within the coastal plain with minimal environmental impact.

"Look up 'refuge' in the dictionary. Webster's defines it as 'a place that provides shelter or protection,'" said Niel Lawrence, NRDC's Alaska director for the Land and Wildlife Program.

He added: "Subjecting America's last pure wildland — its caribou and musk oxen, the coastal plain, and the Gwich'in way of life — to the destruction of seismic testing and oil extraction is the very opposite of providing shelter and protection."

The League of Conservation Voters today announced a $550,000 multistate television ad campaign urging lawmakers to reject efforts to drill in ANWR. The ads are running in the Washington area as well as parts of Minnesota, Maine and New York.

Sparring over NEPA, revenue

Murkowski and Cantwell engaged in a robust and, at times, tense policy debate over the pros and cons of energy development in the refuge's 1002 area.

Murkowski's legislation "turns the coastal plain into an oil field" and would undermine environmental laws like the National Environmental Policy Act, Cantwell said.

The Alaska Republican reiterated that the 1980 Alaska National Interest Lands Conservation Act set aside the 1002 area as "a small portion of the non-wilderness" for possible future energy development, and said her bill does not contain any language that waives NEPA or other environmental statutes.

"We have not pre-empted the environmental review, nor have we limited the consultation process with Alaska Natives in any way," Murkowski said. "All relevant laws, all regulations and executive orders will apply under this language."

But Cantwell and other Democrats argued that while the legislation might not technically waive NEPA, for instance, it would create a different management structure that would allow the Interior secretary more flexibility to prioritize energy development over wildlife protection in the coastal plain.

The legislation "confuses" the purpose of ANWR as a refuge, Cantwell said. " t makes it impossible for the refuge to win under this language," she said. The Washington Democrat also took the opportunity to jab Interior Secretary Ryan Zinke, referring to him as "no Teddy Roosevelt."

Murkowski's bill would allow up to 2,000 acres of surface land in the coastal plain for production and support facilities. t would direct the Interior Department to conduct two lease sales within ANWR's 1002 area within the 10-year budget window, the first within four years of enactment and the second within seven years.

It would stipulate a 50-50 revenue-sharing split between the state and the federal government, an "agreement that we are willing to make out of necessity, even though our Statehood Act and the Mineral Leasing Act provided for a 90-10 split in Alaska's favor," Murkowski said.

It also would impose a 16.67 percent royalty on oil and gas produced in the refuge's 1002 area. By way of comparison, the government charges royalties of 12 5 percent for onshore oil and gas production and 18.75 percent for energy developed in the outer continental shelf.

The nonpartisan Congressional Budget Office estimated that drilling in ANWR's coastal plain would bring in about $1.1 billion for Uncle Sam over the next decade after the federal government splits the revenue with Alaska.

That assumes a total $2 2 billion coming in between 2018 and 2027 from oil and gas drilling in the 1002 area, a figure that includes estimated proceeds from bonus bids paid by companies in search of leases (***Greenwire***, Nov. 9).

ANWR vs. health care?

Murkowski's ANWR gambit is complicated by its attachment to the budget reconciliation process

and the GOP's tax plan.

The fiscal 2018 budget resolution that Congress passed last month tasked Murkowski's panel with finding $1 billion during the next decade to help offset Republicans' $1 5 trillion tax cut; those instructions gave her the opportunity to write legislation paving the way for drilling in the refuge's coastal plain.

Attaching ANWR language to the larger tax package through reconciliation allows it to move by a simple majority vote without the threat of a filibuster. That means it won't need any Democratic support in the Senate.

It's the best shot the Alaska delegation has had in decades to realize its goal of allowing energy development in the refuge's coastal plain.

But those odds were jeopardized yesterday with a revised bill from Senate Finance Chairman Orrin Hatch (R-Utah) that would repeal the individual mandate tax that lies at the heart of the Affordable Care Act (ACA), the Obama-era health care law that Republicans have failed repeatedly to repeal after years of promises to do so.

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The chairwoman said after the markup that she hasn't had a chance to look at the revised tax legislation and was singularly focused on getting her legislation through committee today.

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Kevin Proescholdt
Conservation Director
Wilderness Watch
2833 43rd Avenue South
Minneapolis, MN 55406
612-201-9266
www.wildernesswatch.org

To read about or order Kevin's new book, Glimpses of Wilderness, go to https://kevinproescholdt.com/

From: Campbell, Douglas
To: Hopper, Katy
Cc: A Alvarez; Janet Bruner; Diana Biesanz
Subject: Re: Murkowski Releases Chairman's Mark to Meet FY2018 Budget Instruction
Date: Wednesday, November 15, 2017 2:40:08 PM

Hi Katy,

No to getting copies and yes please forward what ever you come across.

Thanks

Doug Campbell
Chief Division of Realty
U.S. Fish and Wildlife Service
phone: (907) 786-3907
fax: (907) 786-3901

On Wed, Nov 15, 2017 at 12:37 PM, Hopper, Katy <katy_hopper@fws.gov> wrote:

> Are you already getting this information? Should I forward as I get them?
>
> Thanks,
>
> Katy Hopper
> NWRS, Division of Budget, Performance and Workforce
> Supporting Division of Realty
> U.S. Fish and Wildlife Service
> 703-358-2515
>
> ---------- Forwarded message ----------
> From: **Helfrich, Devin** <devin_helfrich@fws.gov>
> Date: Wed, Nov 8, 2017 at 8:50 PM
> Subject: Fwd: Murkowski Releases Chairman's Mark to Meet FY2018 Budget Instruction
> To: "Katherine (Ketti) Spomer" <katherine_spomer@fws.gov>, Katy Hopper <katy_hopper@fws.gov>
>
> Do you guys want me to include you on these non-request update emails that I send out?
>
> **Devin Helfrich**
> Congressional Legislative Affairs Specialist
> U.S. Fish and Wildlife Service
> Office Direct: (703) 358-2130
> Mobile: (202) 365-5971

---------- Forwarded message ----------
From: **Helfrich, Devin** <devin_helfrich@fws.gov>
Date: Wed, Nov 8, 2017 at 8:48 PM
Subject: Murkowski Releases Chairman's Mark to Meet FY2018 Budget Instruction
To: Amee Howard <amee_howard@fws.gov>, Mitch Ellis <mitch_ellis@fws.gov>, Gregory Siekaniec <gregory_siekaniec@fws.gov>, Karen Clark <karen_clark@fws.gov>, Sara Boario <sara_boario@fws.gov>, Socheata Lor <socheata_lor@fws.gov>, "Damberg, Doug" <doug_damberg@fws.gov>, "Fox, Joanna" <joanna_fox@fws.gov>
Cc: "Martin Kodis (Marty)" <martin_kodis@fws.gov>, Angela Gustavson <angela_gustavson@fws.gov>, Barbara Wainman <barbara_wainman@fws.gov>, Matthew Huggler <matthew_huggler@fws.gov>, Cynthia Martinez <cynthia_martinez@fws.gov>, Shaun Sanchez <shaun_sanchez@fws.gov>

Nov 08 2017

Murkowski Releases Chairman's Mark to Meet FY2018 Budget Instruction

Generates Over $1 Billion in Revenues Over First 10 Years to Reduce Federal Deficit

U.S. Sen. Lisa Murkowski, R-Alaska, today released reconciliation legislation pursuant to the Senate Energy and Natural Resources Committee's instruction to raise $1 billion in federal revenues in H. Con. Res. 71, the Concurrent Resolution on the Budget for Fiscal Year 2018.

"Our instruction is a tremendous opportunity both for our committee and our country," Murkowski said. "The legislation I released tonight will put Alaska and the entire nation on a path toward greater prosperity by creating jobs, keeping energy affordable for families and businesses, generating new wealth, and strengthening our security—while reducing the federal deficit not just by $1 billion over ten years, but tens or even hundreds of billions of dollars over the decades to come."

The reconciliation legislation would authorize limited and responsible energy development in a small part of the non-wilderness portion of the Arctic National Wildlife Refuge in Alaska, known as the "1002 Area" or Coastal Plain.

The Congressional Budget Office estimates the legislation will raise $1.092 billion over the 10-year budget window. Between royalties and federal income taxes, it will raise substantially greater revenues once production from the 1002 Area begins.

View the text of the Chairman's Mark here.

View a summary of the Chairman's Mark here.

View the map referenced in the Chairman's Mark here.

Murkowski is chairman of the Senate Committee on Energy and Natural Resources.

The committee will hold a markup on the legislation a full week from today, on the morning of Wednesday, November 15.

Permalink: https://www.energy.senate.gov/public/index.cfm/2017/11/murkowski-releases-chairman-s-mark-to-meet-fy2018-budget-instruction

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From:	Campbell, Douglas
To:	John Brewer
Subject:	Fwd: Murkowski Releases Chairman's Mark to Meet FY2018 Budget Instruction
Date:	Wednesday, November 15, 2017 2:46:00 PM
Attachments:	Chairman"s Mark FLO17783 11-15-17 Bus Mtg.pdf Summary of Chairman"s Mark 11-15-17 SENR Cmte Business Meeting.pdf ANWR Map Plate 1 and Plate 2 11-15-17 Bus Mtg.pdf

---

Hmm USGS did the maps.

Doug Campbell
Chief Division of Realty
U.S. Fish and Wildlife Service
phone: (907) 786-3907
fax: (907) 786-3901

---------- Forwarded message ----------
From: **Hopper, Katy** <katy_hopper@fws.gov>
Date: Wed, Nov 15, 2017 at 12:37 PM
Subject: Fwd: Murkowski Releases Chairman's Mark to Meet FY2018 Budget Instruction
To: "Campbell, Douglas" <douglas_campbell@fws.gov>, A Alvarez <aeric_alvarez@fws.gov>, Janet Bruner <janet_bruner@fws.gov>, Diana Biesanz <diana_biesanz@fws.gov>

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Katy Hopper
NWRS, Division of Budget, Performance and Workforce
Supporting Division of Realty
U.S. Fish and Wildlife Service
703-358-2515

---------- Forwarded message ----------
From: **Helfrich, Devin** <devin_helfrich@fws.gov>
Date: Wed, Nov 8, 2017 at 8:50 PM
Subject: Fwd: Murkowski Releases Chairman's Mark to Meet FY2018 Budget Instruction
To: "Katherine (Ketti) Spomer" <katherine_spomer@fws.gov>, Katy Hopper <katy_hopper@fws.gov>

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Congressional Legislative Affairs Specialist
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Office Direct: (703) 358-2130

Mobile: (202) 365-5971

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Cc: "Martin Kodis (Marty)" <martin_kodis@fws.gov>, Angela Gustavson <angela_gustavson@fws.gov>, Barbara Wainman <barbara_wainman@fws.gov>, Matthew Huggler <matthew_huggler@fws.gov>, Cynthia Martinez <cynthia_martinez@fws.gov>, Shaun Sanchez <shaun_sanchez@fws.gov>

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Permalink: https://www.energy.senate.gov/public/index.cfm/2017/11/murkowski-releases-chairman-s-mark-to-meet-fy2018-budget-instruction

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SEC. ___. OIL AND GAS PROGRAM.

(a) DEFINITIONS.—In this section:

(1) COASTAL PLAIN.—The term "Coastal Plain" means the area identified as the 1002 Area on the plates prepared by the United States Geological Survey entitled "ANWR Map – Plate 1" and "ANWR Map – Plate 2", dated October 24, 2017, and on file with the United States Geological Survey and the Office of the Solicitor of the Department of the Interior.

(2) SECRETARY.—The term "Secretary" means the Secretary of the Interior, acting through the Bureau of Land Management.

(b) OIL AND GAS PROGRAM.—

(1) IN GENERAL.—Section 1003 of the Alaska National Interest Lands Conservation Act (16 U.S.C. 3143) is repealed.

(2) ESTABLISHMENT.—

(A) IN GENERAL.—The Secretary shall establish and administer a competitive oil and gas program for the leasing, development, production, and transportation of oil and gas in and from the Coastal Plain.

(B) PURPOSES.—Section 303(2)(B) of the Alaska National Interest Lands Conservation Act (Public Law 96–487; 94 Stat. 2390) is amended—

(i) in clause (iii), by striking "and" at the end;

(ii) in clause (iv), by striking the period at the end and inserting "; and"; and

(iii) by adding at the end the following:

"(v) to provide for an oil and gas program on the Coastal Plain.".

(3) MANAGEMENT.—Except as otherwise provided in this section, the Secretary shall manage the oil and gas program on the Coastal Plain in accordance with the Naval Petroleum Reserves Production Act of 1976 (42 U.S.C. 6501 et seq.) (including regulations).

(4) ROYALTIES.—Notwithstanding the Mineral Leasing Act (30 U.S.C. 181 et seq.), the royalty rate for leases issued pursuant to this section shall be 16.67 percent.

(5) RECEIPTS.—Notwithstanding the Mineral Leasing Act (30 U.S.C. 181 et seq.), of the amount of adjusted bonus, rental, and royalty receipts de-

rived from the oil and gas program and operations on Federal land authorized under this section—

(A) 50 percent shall be paid to the State of Alaska; and

(B) the balance shall be deposited into the Treasury as miscellaneous receipts.

(c) 2 LEASE SALES WITHIN 10 YEARS.—

(1) REQUIREMENT.—

(A) IN GENERAL.—Subject to subparagraph (B), the Secretary shall conduct not fewer than 2 lease sales area-wide under the oil and gas program under this section by not later than 10 years after the date of enactment of this Act.

(B) SALE ACREAGES; SCHEDULE.—

(i) ACREAGES.—The Secretary shall offer for lease under the oil and gas program under this section—

(I) not fewer than 400,000 acres area-wide in each lease sale; and

(II) those areas that have the highest potential for the discovery of hydrocarbons.

(ii) SCHEDULE.—The Secretary shall offer—

(I) the initial lease sale under the oil and gas program under this section not later than 4 years after the date of enactment of this Act; and

(II) a second lease sale under the oil and gas program under this section not later than 7 years after the date of enactment of this Act.

(2) RIGHTS-OF-WAY.—The Secretary shall issue any rights-of-way or easements across the Coastal Plain for the exploration, development, production, or transportation necessary to carry out this section.

(3) SURFACE DEVELOPMENT.—In administering this section, the Secretary shall authorize up to 2,000 surface acres of Federal land on the Coastal Plain to be covered by production and support facilities (including airstrips and any area covered by gravel berms or piers for support of pipelines) during the term of the leases under the oil and gas program under this section.



Summary of Chairman's Mark
Reconciliation Legislation

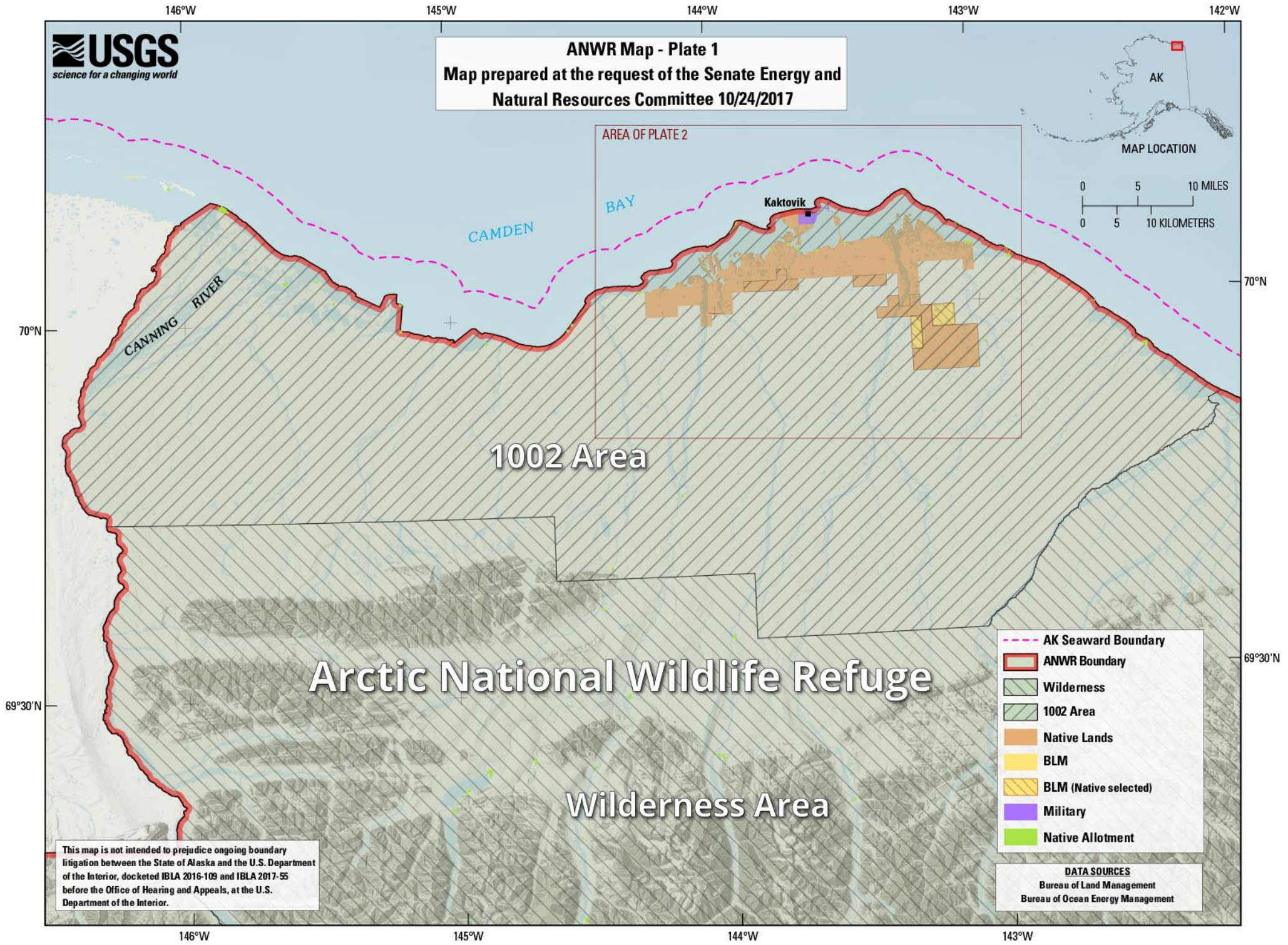
Pursuant to H. Con. Res. 71, the Concurrent Resolution on the Budget for Fiscal Year 2018, the reconciliation legislation contained in the Chairman's Mark directs the Secretary of the Interior to establish and administer a competitive oil and gas program in the non-wilderness portion of the Arctic National Wildlife Refuge, known as the "1002 Area" or Coastal Plain. The legislation defines the term "Coastal Plain" by referencing Plate 1 and Plate 2 of the October 24, 2017 Map prepared by the United States Geological Survey.

The legislation repeals the prohibition on development from the Coastal Plain contained in section 1003 of the Alaska National Interest Lands Conservation Act (16 U.S.C. 3143), and directs the Secretary to manage the oil and gas program on the Coastal Plain in accordance with the Naval Petroleum Reserves Production Act of 1976 (42 U.S.C. 6501 et seq.), except as otherwise provided. The text imposes a royalty rate for leases at 16.67 percent and allocates 50 percent of the revenue derived from the program to the State of Alaska, with the remainder going to the federal Treasury.

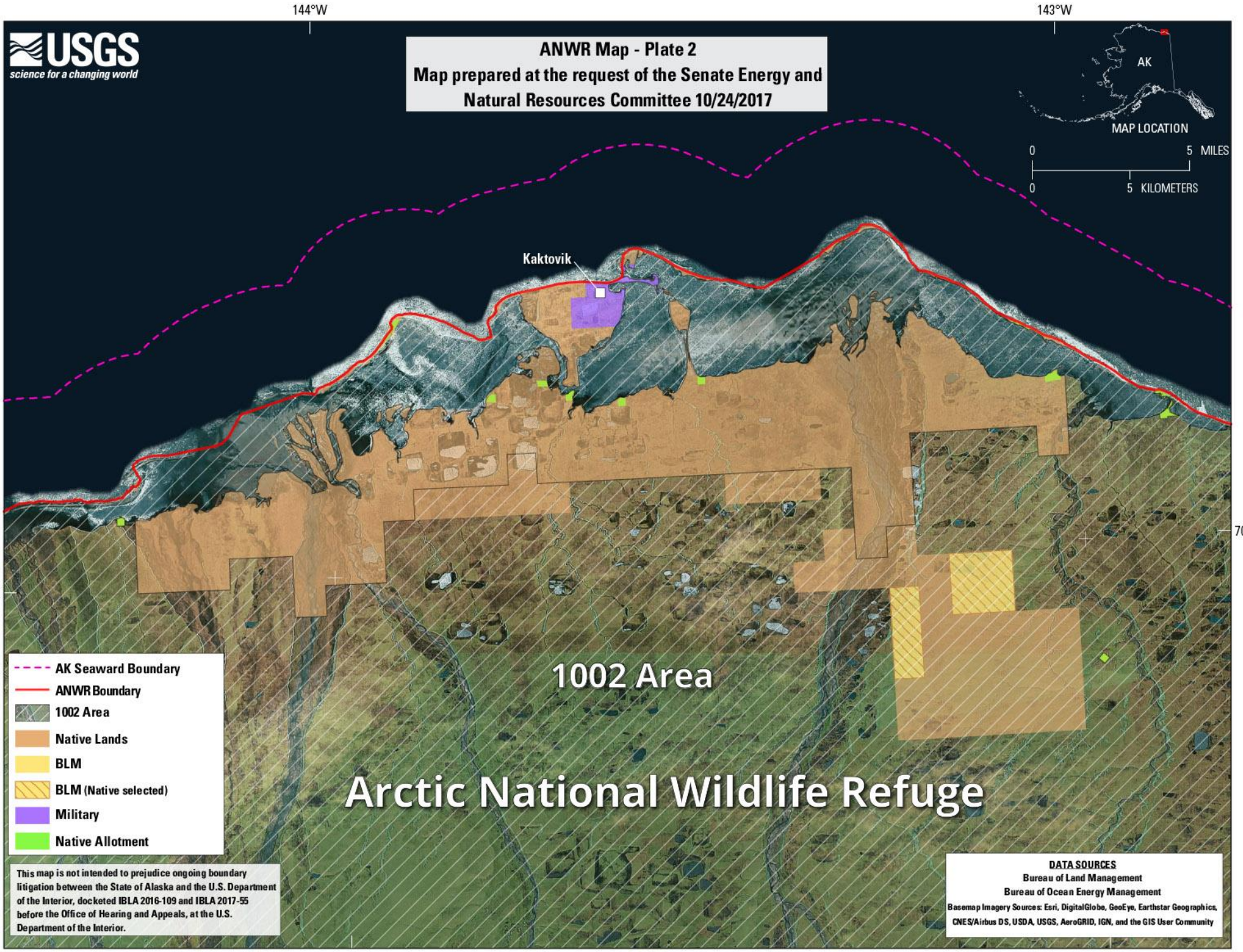
The legislation requires the Secretary to conduct at least two area-wide lease sales within the 10-year budget window. The first lease sale is to be held within four years of the Act's enactment and the second lease sale within seven years of enactment. Each lease sale must contain at least 400,000 acres and be comprised of those areas that have the highest potential for the discovery of hydrocarbons.

The legislation further directs the Secretary to issue any necessary rights-of-way or easements across the Coastal Plain for the exploration, development, production, or transportation associated with the oil and gas program. Additionally, the text limits surface development on federal land on the Coastal Plain to 2,000 acres.

The Congressional Budget Office estimates this reconciliation legislation will raise $1.092 billion over the 10-year budget window.


USGS
science for a changing world
ANWR Map - Plate 1
Map prepared at the request of the Senate Energy and Natural Resources Committee 10/24/2017
AREA OF PLATE 2
AK
MAP LOCATION
0 5 10 MILES
0 5 10 KILOMETERS
Kaktovik
BAY
CAMDEN
CANNING RIVER
1002 Area
Arctic National Wildlife Refuge
Wilderness Area
146°W
145°W
144°W
143°W
142°W
70°N
69°30'N
AK Seaward Boundary
ANWR Boundary
Wilderness
1002 Area
Native Lands
BLM
BLM (Native selected)
Military
Native Allotment
DATA SOURCES
Bureau of Land Management
Bureau of Ocean Energy Management
This map is not intended to prejudice ongoing boundary litigation between the State of Alaska and the U.S. Department of the Interior, docketed IBLA 2016-109 and IBLA 2017-55 before the Office of Hearing and Appeals, at the U.S. Department of the Interior.

0000003103


USGS
science for a changing world
ANWR Map - Plate 2
Map prepared at the request of the Senate Energy and Natural Resources Committee 10/24/2017
144°W
143°W
AK
MAP LOCATION
0
5 MILES
0
5 KILOMETERS
Kaktovik
70°N
70°N
1002 Area
Arctic National Wildlife Refuge
AK Seaward Boundary
ANWR Boundary
1002 Area
Native Lands
BLM
BLM (Native selected)
Military
Native Allotment
This map is not intended to prejudice ongoing boundary litigation between the State of Alaska and the U.S. Department of the Interior, docketed IBLA 2016-109 and IBLA 2017-55 before the Office of Hearing and Appeals, at the U.S. Department of the Interior.
DATA SOURCES
Bureau of Land Management
Bureau of Ocean Energy Management
Basemap Imagery Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
144°W
143°W

0000003104

From: Kohout, Jenifer
To: Putnam, Christopher
Cc: Wilson, Ryan; Mary Colligan; Patrick Lemons; James Wilder
Subject: Re: Help with Arctic 1002 EA
Date: Wednesday, November 15, 2017 3:13:49 PM
Attachments: Polar bears and seismic surveys.jk.docx

Thanks Christopher. A few questions here as well. Please see what you think.

Again, Mary, Patrick and Jim, if you could take a quick look and weigh in on the draft (and my comments), that would be great. This section will be included in the "Environmental Consequences" portion of the EA.

On Wed, Nov 15, 2017 at 12:03 PM, Putnam, Christopher <christopher_putnam@fws.gov> wrote:

> Hi Jenifer,
>
> Here is my summary of the effects of seismic survey activities to polar bears. I've made it a very brief summary, but if more detail is needed I can certainly add it. Let me know what you think.
>
> Christopher Putnam
> Supervisory Fish and Wildlife Biologist
> Marine Mammals Management
> U.S. Fish & Wildlife Service
> 1011 East Tudor Rd, MS 341
> Anchorage, AK 99503-6199
> 907-786-3844 office
> 907-268-0577 mobile
> 907-786-3816 fax
>
> "All that is gold does not glitter, not all those who wander are lost; the old that is strong does not wither, deep roots are not reached by the frost."
> -- J.R.R. Tolkien
>
> On Wed, Nov 15, 2017 at 10:50 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:
>
> > Thanks Ryan. I had a few minor suggestions but think this aligns well with what we discussed yesterday with Refuges (Tracy).
> >
> > Jim, Patrick and Mary, please take a look and see if there are any other items you think should be mentioned about polar bears in the "Affected Environment" portion of the 1002 Area EA.
> >
> > On Tue, Nov 14, 2017 at 4:11 PM, Wilson, Ryan <ryan_r_wilson@fws.gov> wrote:
> >
> > > Hi Jennifer,
> > > Here's my first hack at the 'Affected Environment' section. Please let me know if you think anything should be added/deleted as this is the time I've ever worked on one of these.
> > > Thanks,

Ryan

On Tue, Nov 14, 2017 at 11:37 AM, Wilson, Ryan <ryan_r_wilson@fws.gov> wrote:

> Sounds good.
> Ryan
>
> On Tue, Nov 14, 2017 at 11:28 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:
>
> > Ryan and Christopher,
> >
> > Thanks for your help on this. Hopefully it feels manageable given the short length. If you could get me your drafts as early tomorrow (Wed) as possible, I'll take the lead on coordinating review by Jim, Patrick and Mary before we send to Refuges.
> >
> > Make sense?
> >
> > On Tue, Nov 14, 2017 at 11:23 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:
> >
> > > Hi Tracy,
> > >
> > > Just following up on our conversations this morning.
> > >
> > > Ryan will draft the "Affected Environment" section focusing on status of the Southern Beaufort Sea subpopulation and use of the 1002 Area, particularly in the winter. He'll rely on USGS population surveys, the ESA critical habitat designation, and a recent publication showing more land-based denning, etc.
> > >
> > > Christopher will tackle the "Environmental Consequences" section. Assuming that the nature of the activity is exploratory (seismic) work in the winter, Christopher will pull in information from our SBS incidental take regulations/EA and will incorporate by reference mitigation measures that would reduce potential impacts on polar bears denning in the area. In this section, we will also touch on potential indirect consequences (e.g. impact of increased barge traffic) and cumulative impacts (e.g. climate change - sea ice loss - access to prey -- more nutritionally stressed bears on land, etc).
> > >
> > > We understand that you need our 1-2 page entries by Thurs (Nov 16) at 12 noon.
> > >
> > > --Jenifer
> > >
> > > On Tue, Nov 14, 2017 at 8:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
> > >
> > > > Hi,
> > > >
> > > > As Karen mentioned, we are in a big push to get a beefed up EA done for the regulation change that would open the 1002 for oil & gas exploration.
> > > >
> > > > Would you be able to break someone free to write a relatively short 1-2 page Affected Environment section and environmental consequences section for polar bears?

I'll be in the office at 9, if folks have questions. I'll be working on trying to outline a hypothetical exploration plan based on a state proposal from 2015.

Thank you!
-Tracy

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

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FWS Region 7 Land Mapper (Public version)
Region 7 GeoPDF Map Portal

--
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Ryan Wilson, Ph.D., Certified Wildlife Biologist ®
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> > >
> > > Phone: (907) 786-3830
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> > > --
> > > Ryan Wilson, Ph.D., Certified Wildlife Biologist ®
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> > --
> > Jenifer Kohout
> > Deputy Assistant Regional Director for Ecological Services
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--
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Polar bears present in the Arctic National Wildlife Refuge 1002 area may be affected by oil and gas industry seismic survey activities in various ways. Noise, vibrations, sights, and smells produced by seismic survey activities may elicit a wide range of responses in individual polar bears. Polar bear responses to disturbance are highly variable and are influenced by an individual bear's previous experiences and tolerance level. Polar bears are most likely to respond to the majority of seismic survey activities with short-term behavioral and physiological responses such as avoidance, increased vigilance, increased heart rate, and other stress responses. Disturbance during resting may result in increased energy expenditure or adverse physiological responses, but short-term reactions like these will rarely affect the health or survival of individual animals or the population. Chronic disturbances, extreme reactions, or disruption of key behaviors such as feeding or denning are more likely to affect health or survival. Polar bears directly interacting with seismic survey activities increase the risk of human-bear encounters, conflicts, and injury or lethal take of polar bears.

Seismic survey activities disturbing female polar bears at maternal den sites are of great concern. Female polar bears entering dens and females in dens with cubs are more sensitive to noises than other age and sex groups. Disturbance during the early stages of denning may cause a female polar bear to abandon the den site in search of another one. A female polar bear may locate another suitable den site and continue her reproductive process. However, premature den site abandonment after the birth of cubs and before the cubs are able to survive outside of the den, or if the female abandons the cubs after they emerge from the den, will result in cub mortality. The potential for disturbance increases once the female emerges from the den. She is more vigilant against perceived threats and easier to disturb.

The requirements of incidental take authorizations under the Marine Mammal Protection Act, such as polar bear interaction plans, training, monitoring, and mitigation measures have proven effective at reducing the effects of oil and gas industry activities, including seismic surveys, on polar bears in other areas of northern Alaska. Mitigation measures, including a pre-activity den survey and a 1.6-km (1-mi) operational exclusion zone around known dens help to limit disturbance of denning female polar bears. The current incidental take regulations for oil and gas industry activity in the Beaufort Sea and adjacent areas of northern Alaska, published in the Federal Register on August 5, 2016 (81 FR 52276), include a comprehensive analysis of the effects of oil and gas industry activity to polar bears, as well as mitigation, monitoring, and reporting requirements. A detailed description of mitigation measures that limit the effects of seismic surveys on polar bears is available at title 50 of the Code of Federal Regulations, part 18, subpart J, section 18.128.

Commented [KJ1]: I assume you mean the surveys plus all associated activities, e g barge traffic, helicopter access, ice road construction If that's correct, might be worth stating that explicitly

Commented [KJ2]: Do we want to make the following point (from Ryan's entry) more explicit? (I'm fine either way)

Minimizing disturbance while bears are in dens is important because timing of den emergence is significantly related to cub survival (Rode et al in review)

Commented [KJ3]: Tracy mentioned that we need to raise all of our concerns now, rather than bring them up later in the process Is there a way to raise potential concerns about cumulative impacts caused by sea ice loss?

Maybe by adding a new paragraph with something along the following lines:

The frequency and consequences of disturbance may also be exacerbated over time due to sea ice loss and related stressors such as reduced ability to access prey

From: Burkart, Greta
To: Keogh, Warren
Subject: Re: Hot springs established by PLO 399 on master title plats
Date: Wednesday, November 15, 2017 3:16:34 PM

Thank you Warren!

Greta Burkart, PhD
Aquatic Ecologist
US Fish and Wildlife Service
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www.facebook.com/arcticnationalwildliferefuge

On Thu, Nov 9, 2017 at 1:33 PM, Keogh, Warren <warren_keogh@fws.gov> wrote:

> All,
>
> For future reference, attached find a much cleaner and more legible copy of PLO 399, courtesy of ARLIS.
>
> warren
>
> On Fri, Nov 3, 2017 at 3:53 PM, Burkart, Greta <greta_burkart@fws.gov> wrote:
>
> > Thanks Cathy,
> >
> > I have attached the copy of PLO 399 from Warren. I am not sure if this is the entire PLO or just part of it. I would really hate to see them go anywhere near the springs -- they are the most important habitat for many animals, both aquatic and terrestrial. Very important for subsistence activities as well. I think the springs of the Arctic Refuge might be the most unique and rare of Refuge habitats. Exploration and other activities would really change the ecosystem dynamics, especially if the activity is recurrent.
> >
> > Greta
> >
> > Greta Burkart, PhD
> > Aquatic Ecologist
> > US Fish and Wildlife Service
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On Fri, Nov 3, 2017 at 3:03 PM, Flanagan, Cathleen <cathleen_flanagan@fws.gov> wrote:

> Cool. This is pretty exciting. I am not sure how we withdraw lands with spring under PLO 339 but I will begin to investigate.
>
> It would be worth reaching out to others to ensure that we have captured and mapped all known springs within the refuge system so that we can systematically attempt to withdraw these lands under PLO 339. Of course getting this done for the Arctic Refuge is priority one. Especially if land withdrawn under PLO 339 preclude development within a certain radius.
>
> I will discuss this with John when he returns to the office next week.
>
> On Fri, Nov 3, 2017 at 2:24 PM, Burkart, Greta <greta_burkart@fws.gov> wrote:
>
> > Thanks Cathy!
> >
> > That is great news! Especially if the PLO offers additional protections. I don't think development can occur within a certain distance of springs withdrawn under PLO 399.
> >
> > There are several mineral springs in the 1002 area that are not identified in the LandsMapper. I have a comprehensive list of all springs identified in Aquabase and in a few others sources. I will try to get that to you next week before I head to West Virginia.
> >
> > Thanks again,
> >
> > Greta
> >
> > Greta Burkart, PhD
> > Aquatic Ecologist
> > US Fish and Wildlife Service
> > Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
> > 101 12 th Ave Rm 236
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> > www.facebook.com/arcticnationalwildliferefuge
> >
> > On Fri, Nov 3, 2017 at 9:25 AM, Flanagan, Cathleen <cathleen_flanagan@fws.gov> wrote:
> >
> > > See the message below regarding springs mapped by BLM from the 1917 USGS paper. Note that springs discovered now or in the future can be withdrawn under PLO 339.
> > >
> > > ---------- Forwarded message ----------
> > > From: **Fencl, Renee** <rfencl@blm.gov>

Date: Fri, Nov 3, 2017 at 8:22 AM
Subject: Re: Hot springs established by PLO 399 on master title plats
To: cathleen_flanagan@fws.gov
Cc: Jeff Reed <jreed@blm.gov>, "Meliton, Raymund" <rmeliton@blm.gov>

Cathy,

Sorry it took so long to respond, I had training the last two days. Anyway, Ray forwarded this to me with questions of his own so I am going to answer you both at the same time.

The Mineral springs of Alaska: U.S. Geological Survey Water-Supply Paper 418 was published in 1917, listing any hot/mineral springs found. The BLM noted all the hot/mineral springs to the MTPs. If new hot/mineral springs are found they would automatically be withdrawn by PLO 399, even though it isn't noted to the MTP. If, in your review of lands managed by FWS, you come across hot/mineral springs you can give us the coordinates and we will note them to the MTP.

If you have any other questions please let me know.

Renee Fencl
Land Law Examiner
Branch of Lands and Realty
rfencl@blm.gov
Phone: (907) 271-5067
Fax: (907) 271-3624

On Tue, Oct 31, 2017 at 3:14 PM, Meliton, Raymund <rmeliton@blm.gov> wrote:

> I got this email from a hydrologist from FWS. She asked me to shed some light on "the process involved in withdrawing lands if an unmapped spring is identified". Can you explain the withdrawal process for mineral/hot springs if there is one so I can forward the explanation back to her?
>
> Also, a work request would be generated for title and land status if an unmapped spring is identified as withdrawn by PLO 399. Am I correct? Thanks.
>
> Ray
>
> ---------- Forwarded message ----------
> From: **Flanagan, Cathleen** <cathleen_flanagan@fws.gov>
> Date: Tue, Oct 31, 2017 at 1:16 PM
> Subject: Hot springs established by PLO 399 on master title plats
> To: rmeliton@blm.gov
>
> Hi Raymund. My name is Cathy Flanagan. I am a hydrologist and the Water Rights Coordinator for FWS Refuges in Alaska. Scott McGee provide me with you contact after we began a discussion federal lands withdrawn for hot spring and mineral spring under PLO 339. Scott said you might have more information regarding the extent of the withdraws

in Alaska.

My questions to Scott was whether lands for all the hot springs and mineral spring in Alaska have been withdrawn and included mapped? Here is what Scott replied:

> "I can't say for sure that all hot springs established by PLO 399 are shown in our GIS database. We rely on BLM to draw the hot springs on the Master Title Plats. So far, all hot springs that BLM has on the MTPs are in the GIS. However, if BLM has failed to draw a hot spring on an MTP, then we have no way of knowing about the hot spring, and no way to show it in the GIS. Bottom line - if it's not on the MTP, it's not in our GIS.
>
> By the way, PLO 399 (attached) does not identify specific hot springs. It just basically says that areas in Alaska and the rest of the U.S. can be withdrawn for hot springs."

Can you provide more information on the inclusion of withdrawn mineral and hot springs mapped by BLM and the process involved in withdrawing lands if an unmapped spring is identified?

Thanks for your time.

Regards,
Cathy

--
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Regional Water Rights Coordinator/Hydrologist
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1011 E Tudor Rd.
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907-786-3903

--
Raymund Meliton
Lead Cartographic Technician
AK State Ofc
BLM Alaska
Title and Land Status
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--
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--
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--
Warren Keogh
Paralegal Specialist
Water Resources Branch, Division of Natural Resources
U.S. Fish & Wildlife Service
1011 East Tudor Rd.
Anchorage, Alaska 99503

Phone: (907) 786-3388

From: McCaffery, Brian
To: McIntyre, Carol
Subject: Re: nesting golden eagles on Alaska coastal plain
Date: Wednesday, November 15, 2017 3:18:59 PM

C-Mac,

Quick question. From your Denali work, have you found any evidence for earlier nesting through time? I'm interested in seeing if there is any empirical/inferential basis (as opposed to just a theoretical one) for suggesting that the nest initiation dates you and your congressman found three decades ago might be even earlier today. Any thoughts?

And, while we're on the topic of nesting raptors, did you guys happen to detect/record nesting gyrfalcons back in the day during that study?

Cheers,

B-Mac

On Wed, Nov 15, 2017 at 10:42 AM, McIntyre, Carol <carol_mcintyre@nps.gov> wrote:

> Yep, I seem to remember that we didn't spend any or much time doing surveys in the 1002 area.
>
> I wonder if Steve Arthur might know of any sites, but you may have already contacted him.
>
> Cool about the Black-backed Woodpecker and shrike! Our winter yard list also includes a shrike, and a northern goshawk!
>
> Big hugs, B-Mac!
>
> On Wed, Nov 15, 2017 at 10:27 AM, McCaffery, Brian <brian_mccaffery@fws.gov> wrote:
>
> > Thanks, C-Mac! FYI, all of Don Young et al's sites (except perhaps the one at the west end of the Sadlerochit Mtns) were south of the 1002 area. Ted turned me on to a couple known sites in the 1002, however. Will be curious to see if your colleagues have hints of any others.
> >
> > Cheers,
> >
> > BJM
> >
> > PS -- Added a new bird to my WI state list yesterday--Black-backed Woodpecker. My first since my youth in California! Have also been recording red crossbills, and have gotten cuts of at least 3 different call types. Oh yeah, had our first shrike of the winter in our backyard yesterday. Winter feeder birds--you're on notice!
> >
> > On Wed, Nov 15, 2017 at 10:20 AM, McIntyre, Carol <carol_mcintyre@nps.gov> wrote:
> >
> > > Hi Bryan, Rob and Brian,
> > >
> > > Brian McCaffery, FWS, is looking for information on golden eagle breeding sites in the

1002 area of the Arctic National Wildlife Refuge because of the potential for winter seismic exploration to impact early-nesting eagles in late winter/early spring. The 1002 area is basically the coastal plain, north of the Brooks Range - see link below to see the map of the area.

If you guys have any radio-tagged eagles that show breeding behavior on the coastal plain or relatively close to it, can you let Brian McCaffery know? He is copied on this email.

Thanks!

Carol

https://pubs.usgs.gov/fs/fs-0028-01/fs-0028-01.htm

--
Brian J. McCaffery
U. S. Fish and Wildlife Service
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources
Branch of Conservation Planning and Policy

Phone: (907) 330-7514
e-mail: brian_mccaffery@fws.gov

"Do something that scares the living hell outta your boss!" -- Dan Ashe, former Director, USFWS

--
Brian J. McCaffery
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"Do something that scares the living hell outta your boss!" -- Dan Ashe, former Director, USFWS

From: Burkart, Greta
To: Perdue, Margaret
Subject: Re: Follow-up on request for hydrology input for Arctic
Date: Wednesday, November 15, 2017 3:30:57 PM

Hi Meg,

I think I can pull out snow-melt timing and breakup dates from a recent landsat product (MacCander 2017 for NPS). I don't have information on phenology changes specific to the Arctic Refuge 1002 area, but some of the information in the WildREACH report (Martin et al 2009?) can be used. Other than that we can rely on information from landscape-scale analyses from SNAAP and others. Have to go set up a poster now.

My cell phone is b6 [redacted]

Greta

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On Tue, Nov 14, 2017 at 12:45 PM, Perdue, Margaret <margaret_perdue@fws.gov> wrote:

> Hi Greta ---
>
> In case you are checking your email, It would be helpful if you could provide any information or point me to references on observed trends in hydrology related impacts on the coastal plain including the following :
>
> changes in the timing of freeze up and break up
> changes in the incidence of rain on snow events
> changes in snow pack / cover
>
> Thanks
>
> --
> Meg Perdue, Water Quality Specialist
> Water Resources Branch - National Wildlife Refuge System
> U.S. Fish & Wildlife Service Regional Office MS 235
> 1011 E. Tudor Rd
> Anchorage, AK 99503
> phone: 907-786-3421 fax: 907-786-3976
> email: margaret_perdue@fws.gov

From: Burkart, Greta
To: Fischbach, Tracy
Cc: Perdue, Margaret; John Trawicki; Stephanie Brady
Subject: Re: Help with evaluating water resources in the Arctic 1002 Area - Due Noon on Thursday, Nov 16
Date: Wednesday, November 15, 2017 3:37:44 PM

Sorry -- I just reread the email and can send something by tomorrow at noon.

Greta

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On Wed, Nov 15, 2017 at 1:22 PM, Burkart, Greta <greta_burkart@fws.gov> wrote:

> Hi -- If Meg has not pulled something together, I do have a draft of something and can send it by tomorrow evening.
>
> Thanks,
>
> Greta
>
> Greta Burkart, PhD
> Aquatic Ecologist
> US Fish and Wildlife Service
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> email: greta_burkart@fws.gov
> www.facebook.com/arcticnationalwildliferefuge
>
> On Tue, Nov 14, 2017 at 11:33 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
>
> > Hi Meg,
> >
> > Do you have this website? http://dnr.alaska.gov/mlw/mapguide/wr_intro.cfm
> >
> > Tracyann S Fischbach
> > Natural Resources Planner
> > National Wildlife Refuge System - Region 7
> > Division of Natural Resources & Conservation Planning
> > (907) 786-3369

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Region 7 GeoPDF Map Portal

On Tue, Nov 14, 2017 at 11:15 AM, Perdue, Margaret <margaret_perdue@fws.gov> wrote:

> Hi Tracy ---
>
> I checked in with John, I had forgotten that Greta is at the NAASH meeting at NCTC this week.
>
> I can try to pull language together ... but Greta if you have anything drafted for the WRIA for Arctic or other references that would address the issues that Tracy outlined please send them to me.
>
> Thanks
>
> Meg
>
> On Tue, Nov 14, 2017 at 10:54 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
>
> > Hi Greta,
> >
> > The Refuge program is in a big push to get a beefed up EA done for the regulation change that would open the Arctic's 1002 area for oil & gas exploration. The draft EA is due to HQ by this Friday morning, November 17, so I need draft sections to me by **noon on Thursday, Nov 16** . I was told that you are probably the best person to write the water resources section. If not, please let me know ASAP.
> >
> > I need a relatively short 1-2 page Affected Environment section and a 1-2 pages Environmental Consequences section for water resources.
> >
> > The **Affected Environment** section would include:
> > What water resources have been there historically.
> > What water resources are there now.
> > What is the trend. (Showing this in a chart or graph makes it very easy to understand.)
> >
> > This section is just the facts, and should include all water resources that you think may be affected by exploration in the 1002 area. This could include waters outside the Refuge. Including a map of the area evaluated is super helpful. Also, if we don't know, we can just say that. Please do cite all of your resources.
> >
> > The **Environmental Consequences** section would include:
> > How are the resources listed in the Affected Environment going to be affected by exploration activities. This would include ice roads, ice pads, etc. According to the State's proposal it takes about 1 million gallons of water to make 1 mile of road. Where would/could water be taken to

use for building ice roads? Do other species use those waters? We want to keep it short and sweet. We have very little time for this effort.

Thank you SO much!

-Tracy

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
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--
Meg Perdue, Water Quality Specialist
Water Resources Branch - National Wildlife Refuge System
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1011 E. Tudor Rd
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phone: 907-786-3421 fax: 907-786-3976
email: margaret_perdue@fws.gov

From: Burkart, Greta
To: Christopher Latty; Janet Jorgenson
Subject: Can someone send me Heidi"s snow report from the teams drive?
Date: Wednesday, November 15, 2017 3:41:38 PM

Can someone send me Heidi's snow report from the teams drive? It should be under reports. I just found out that I need to write part of an EA for impacts of seismic by Thursday at noon and I do not have access to the Teams drive.

Thanks,

Greta

Greta Burkart, PhD
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email: greta_burkart@fws.gov
www.facebook.com/arcticnationalwildliferefuge

From: Burkart, Greta
To: Trawicki, John
Cc: Fischbach, Tracy; Perdue, Margaret; Stephanie Brady
Subject: Re: Help with evaluating water resources in the Arctic 1002 Area - Due Noon on Thursday, Nov 16
Date: Wednesday, November 15, 2017 3:51:34 PM

I have to go give a poster presentation in 15 minutes, but will pull everything together after that and send it really late tonight or by the time you guys get into work tomorrow morning. What do you have so far?

Greta

Greta Burkart, PhD
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Fairbanks, AK 99701
ph: (907) 456-0519
fax: (907) 456-0428
email: greta_burkart@fws.gov
www.facebook.com/arcticnationalwildliferefuge

On Wed, Nov 15, 2017 at 1:43 PM, Trawicki, John <john_trawicki@fws.gov> wrote:

> Hi Greta- if you can send Meg and I what you have we can incorporate into what Meg has put together. Can you send it today? This is due tomorrow at by 10 AM.
>
> call me if you need to . 907-786-3474, or 360-1656
>
> On Wed, Nov 15, 2017 at 1:22 PM, Burkart, Greta <greta_burkart@fws.gov> wrote:
>
> > Hi -- If Meg has not pulled something together, I do have a draft of something and can send it by tomorrow evening.
> >
> > Thanks,
> >
> > Greta
> >
> > Greta Burkart, PhD
> > Aquatic Ecologist
> > US Fish and Wildlife Service
> > Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
> > 101 12 th Ave Rm 236
> > Fairbanks, AK 99701
> > ph: (907) 456-0519
> > fax: (907) 456-0428
> > email: greta_burkart@fws.gov
> > www.facebook.com/arcticnationalwildliferefuge
> >
> > On Tue, Nov 14, 2017 at 11:33 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
> >
> > > Hi Meg,

Do you have this website? http://dnr.alaska.gov/mlw/mapguide/wr_intro.cfm

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

Hours: Mon - Thurs 9:15 am to 3:15 pm
"Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie

Need access to Refuge Documents?
Online Document Database (ServCat)
Need Refuge land status info for Alaska?
FWS Region 7 Land Mapper (FWS version)
FWS Region 7 Land Mapper (Public version)
Region 7 GeoPDF Map Portal

On Tue, Nov 14, 2017 at 11:15 AM, Perdue, Margaret <margaret_perdue@fws.gov> wrote:

> Hi Tracy ---
>
> I checked in with John, I had forgotten that Greta is at the NAASH meeting at NCTC this week.
>
> I can try to pull language together ... but Greta if you have anything drafted for the WRIA for Arctic or other references that would address the issues that Tracy outlined please send them to me.
>
> Thanks
>
> Meg
>
> On Tue, Nov 14, 2017 at 10:54 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
>
> > Hi Greta,
> >
> > The Refuge program is in a big push to get a beefed up EA done for the regulation change that would open the Arctic's 1002 area for oil & gas exploration. The draft EA is due to HQ by this Friday morning, November 17, so I need draft sections to me by **noon on Thursday, Nov 16** . I was told that you are probably the best person to write the water resources section. If not, please let me know ASAP.
> >
> > I need a relatively short 1-2 page Affected Environment section and a 1-2 pages Environmental Consequences section for water resources.
> >
> > The **Affected Environment** section would include:
> > What water resources have been there historically.
> > What water resources are there now.
> > What is the trend. (Showing this in a chart or graph makes it very easy to understand.)

This section is just the facts, and should include all water resources that you think may be affected by exploration in the 1002 area. This could include waters outside the Refuge. Including a map of the area evaluated is super helpful. Also, if we don't know, we can just say that. Please do cite all of your resources.

The **Environmental Consequences** section would include:
How are the resources listed in the Affected Environment going to be affected by exploration activities. This would include ice roads, ice pads, etc. According to the State's proposal it takes about 1 million gallons of water to make 1 mile of road. Where would/could water be taken to use for building ice roads? Do other species use those waters? We want to keep it short and sweet. We have very little time for this effort.

Thank you SO much!

-Tracy

Tracyann S Fischbach
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--
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phone: 907-786-3421 fax: 907-786-3976
email: margaret_perdue@fws.gov

--
John Trawicki
Water Resources Branch Chief
National Wildlife Refuge System, Alaska
U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99503
Work: (907) 786-3474
Mobile: (907) 360-1656

"The single biggest problem with communication is the illusion that it has taken place"
George Bernard Shaw

From: Howard, Amee
To: Howe, Marian
Subject: Re: Reminder for CLA Report Items
Date: Wednesday, November 15, 2017 3:56:18 PM
Attachments: 11.9.17 - 11.15.17 R7 Log of Congressional Requests.xlsx

---

Hi Merra,

Attached are the Region 7 inquiries for this week. We do not have any scheduled congressional visits in Region 7 or visits to the Hill.

Thanks so much!
Amee

On Wed, Nov 15, 2017 at 7:10 AM, Howe, Marian <marian_howe@fws.gov> wrote:

> Hi everyone,
>
> If you have not already done so, please send me the following items for our reports:
>
> - Congressional Inquiries by COB today - Any congressional inquiries you've received over the last week (11/9-11/15)
> - Congressional Visits by COB today - any upcoming congressional visits planned in your region
> - Meeting Memo entries by 10am ET tomorrow - any scheduled Hill meetings your region has next week and any last minute meetings from this week that were not previously reported
>
> Thanks!
>
> Cheers,
> Merra
>
> --
> Merra Howe
> Sea Grant Knauss Fellow
> Division of Congressional and Legislative Affairs
> U.S. Fish and Wildlife Service
> Office: 703-358-2225
> Cell:617-680-9848
> marian_howe@fws.gov

--

Amee Howard
Congressional and Legislative Affairs
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Anchorage, Alaska
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https://www.fws.gov/alaska/
"Conservation Begins with Hello"

Incoming Date	Congressional Office	Info Requested	Status (Open/Closed)
9-Nov	Senator Sullivan	Information regarding investigation into Anchorage, Alaska retailer where whale vertebrae and a walrus skull were taken into evidence	Closed
14-Nov	Senator Murkowski	Confirming acreage measurements for the Arctic Refuge coastal plain ("1002 area")	Closed

From:	Wilson, Ryan
To:	Kohout, Jenifer
Cc:	Putnam, Christopher; Mary Colligan; Patrick Lemons; James Wilder
Subject:	Re: Help with Arctic 1002 EA
Date:	Wednesday, November 15, 2017 4:00:52 PM
Attachments:	Affected_Environment_PB_15NovRRW.docx

Hi Jennifer,
I've attached the edits you requested with the addition of information on den entrance/emergence. I also agree that the sentence citing the earlier den emergence relationship with cub survival fits well with where you mentioned it in Christopher's document.
Ryan

On Wed, Nov 15, 2017 at 1:13 PM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:

> Thanks Christopher. A few questions here as well. Please see what you think.
>
> Again, Mary, Patrick and Jim, if you could take a quick look and weigh in on the draft (and my comments), that would be great. This section will be included in the "Environmental Consequences" portion of the EA.
>
> On Wed, Nov 15, 2017 at 12:03 PM, Putnam, Christopher <christopher_putnam@fws.gov> wrote:
>
> > Hi Jenifer,
> >
> > Here is my summary of the effects of seismic survey activities to polar bears. I've made it a very brief summary, but if more detail is needed I can certainly add it. Let me know what you think.
> >
> > Christopher Putnam
> > Supervisory Fish and Wildlife Biologist
> > Marine Mammals Management
> > U.S. Fish & Wildlife Service
> > 1011 East Tudor Rd, MS 341
> > Anchorage, AK 99503-6199
> > 907-786-3844 office
> > 907-268-0577 mobile
> > 907-786-3816 fax
> >
> > "All that is gold does not glitter, not all those who wander are lost; the old that is strong does not wither, deep roots are not reached by the frost."
> > -- J.R.R. Tolkien
> >
> > On Wed, Nov 15, 2017 at 10:50 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:
> >
> > > Thanks Ryan. I had a few minor suggestions but think this aligns well with what we discussed yesterday with Refuges (Tracy).
> > >
> > > Jim, Patrick and Mary, please take a look and see if there are any other items you think should be mentioned about polar bears in the "Affected Environment" portion of the

1002 Area EA.

On Tue, Nov 14, 2017 at 4:11 PM, Wilson, Ryan <ryan_r_wilson@fws.gov> wrote:

Hi Jennifer,
Here's my first hack at the 'Affected Environment' section. Please let me know if you think anything should be added/deleted as this is the time I've ever worked on one of these.
Thanks,
Ryan

On Tue, Nov 14, 2017 at 11:37 AM, Wilson, Ryan <ryan_r_wilson@fws.gov> wrote:

Sounds good.
Ryan

On Tue, Nov 14, 2017 at 11:28 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:

Ryan and Christopher,

Thanks for your help on this. Hopefully it feels manageable given the short length. If you could get me your drafts as early tomorrow (Wed) as possible, I'll take the lead on coordinating review by Jim, Patrick and Mary before we send to Refuges.

Make sense?

On Tue, Nov 14, 2017 at 11:23 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:

Hi Tracy,

Just following up on our conversations this morning.

Ryan will draft the "Affected Environment" section focusing on status of the Southern Beaufort Sea subpopulation and use of the 1002 Area, particularly in the winter. He'll rely on USGS population surveys, the ESA critical habitat designation, and a recent publication showing more land-based denning, etc.

Christopher will tackle the "Environmental Consequences" section. Assuming that the nature of the activity is exploratory (seismic) work in the winter, Christopher will pull in information from our SBS incidental take regulations/EA and will incorporate by reference mitigation measures that would reduce potential impacts on polar bears denning in the area. In this section, we will also touch on potential indirect consequences (e.g. impact of increased barge traffic) and cumulative impacts (e.g. climate change - sea ice loss - access to prey -- more nutritionally stressed bears on land, etc).

We understand that you need our 1-2 page entries by Thurs (Nov 16) at 12 noon.

--Jenifer

On Tue, Nov 14, 2017 at 8:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Hi,
>
> As Karen mentioned, we are in a big push to get a beefed up EA done for the regulation change that would open the 1002 for oil & gas exploration.
>
> Would you be able to break someone free to write a relatively short 1-2 page Affected Environment section and environmental consequences section for polar bears?
>
> I'll be in the office at 9, if folks have questions. I'll be working on trying to outline a hypothetical exploration plan based on a state proposal from 2015.
>
> Thank you!
> -Tracy
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
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>
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--
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--
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--
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Fax: (907) 786-3816

Of the two polar bear subpopulations (or stocks) found in the United States, polar bears in the Southern Beaufort Sea (SBS) subpopulation are the most likely to occur in the 1002 area of the Arctic National Wildlife Refuge. The subpopulation is shared by the U.S. and Canada. The boundary of the SBS subpopulation, as recognized by the Polar Bear Specialists Group, is Icy Cape, Alaska to the west and south of Banks Island and east of the Baillie Islands, Canada to the east (Obbard et al. 2010). The SBS subpopulation had an estimated population size of approximately 900 bears in 2010 (Bromaghin et al. 2015). This estimate represents a significant reduction from previous estimates of approximately 1,800 in 1986 (Amstrup et al. 1986), and 1,526 in 2006 (Regehr et al. 2006). Although there was some evidence in the 2010 estimate that the population might be showing signs of the subpopulation beginning to increase (Bromaghin et al. 2015). Analyses of over 20 years of data on the size and body condition of bears in this subpopulation demonstrated declines for most sex and age classes (Rode et al. 2010, 2014).

Population declines and the size and body condition of bears in the SBS subpopulation have been linked to declining sea ice conditions in the Beaufort Sea (Regehr et al. 2006; Rode et al. 2010, 2014, in press; Bromaghin et al. 2015). Declining sea ice conditions in the Beaufort Sea have also led to an increase in the proportion of the subpopulation coming onshore in summer and autumn (from 5.8% during 1986-1999 to 20% during 2000-2014) and a 30 day increase in time spent on land (Atwood et al. 2016). While on land, polar bears typically do not feed (Rode et al. 2015), although bears in the SBS subpopulation are drawn to bowhead whale remains from subsistence harvest, particularly adjacent to the community of Kaktovik, Alaska (Wilson et al. 2017). These whale remains may be helping offset lost hunting opportunities for bears in the SBS subpopulation due to sea ice loss (Herreman and Peacock 2013, Atwood et al. 2016).

In addition to a higher proportion of the SBS subpopulation occurring on shore during summer and autumn, there is also an increasing trend towards more bears denning on land (Olson et al. 2017). Denning substrate (i.e., sea ice or mainland) is significantly related to where bears occur in autumn. Pregnant polar bears in the SBS subpopulation that spent >25 days on land in autumn all subsequently denned on land (Olson et al. 2017). Between 1985-2013, the percent of bears denning on land in the SBS subpopulation increased from 34 to 55%, linked to sea ice declines. Designated Critical Denning Habitat overlaps with 77% of the 1002 area of the Arctic National Wildlife Refuge (U.S. Fish and Wildlife Service 2010). There is also 38% more denning habitat available in the coastal plain of the Arctic National Wildlife than in the region immediately west of the refuge (Durner et al. 2006). Polar bears have been shown to den in the 1002 area with greater frequency than expected based on available habitat (Amstrup 1993). Based on known den locations from 2000-2010, 22% of dens for bears in the SBS subpopulation occurred within the 1002 area (Durner et al. 2010). Thus, the 1002 area has been documented to be an important area for denning by polar bears and will likely increase in importance as the percent of bears denning on land increases with sea ice loss (Olson et al. 2017).

The mean dates of den entrance and emergence for polar bears that den on land in the SBS subpopulation is 11 November and 3 March, respectively (Rode et al. in review). Females observed with cubs in spring emerged 15 days later than females observed without cubs (Rode et al. in review). Land-based denning also appears to be important for polar bears, as bears that den on land have significantly higher reproductive success (Rode et al. in review).

References

Amstrup, S.C. 1993. Human disturbances of denning polar bears in Alaska. Arctic 46:246-250.

Amstrup, S.C., I. Stirling, and J.W. Lentfer. 1986. Past and present status of polar bears in Alaska. Wildlife Society Bulletin 14:241-254.

Atwood, T.C., E. Peacock, M.A. McKinney, K. Lillie, R.R. Wilson, D.C. Douglas, S. Miller, and P. Terletzky. 2016. Rapid environmental change drives increased land use by an Arctic marine predator. PLoS One 11:e0155932.

Bromaghin, J.F., T.L. McDonald, I. Stirling, A.E. Derocher, E.S. Richardson, E.V. Regehr, D.C. Douglas, G.M. Durner, T.C. Atwood, and S.C. Amstrup. 2015. Polar bear population dynamics in the southern Beaufort Sea during a period of sea ice decline. Ecological Applications 25:634-651.

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Herreman, J. and E. Peacock. 2013. Polar bear use of a persistent food subsidy: Insights from non-invasive genetic sampling in Alaska. Ursus 24:148-163.

Obbard, M.E., G.W. Thiemann, E. Peacock, and T.D. DeBruyn. 2010. Polar Bears: Proceedings of the 15th Working Meeting of the IUCN/SSC Polar Bear Specialist Group, Copenhagen, Denmark, 29 June–3 July 2009. Gland, Switzerland and Cambridge, UK: IUCN.

Olson, J.W., K.D. Rode, D.L. Eggett, T.S. Smith, R.R. Wilson, G.M. Durner, A.S. Fischbach, T.C. Atwood, and D.C. Douglas. 2017. Collar temperature sensor data reveal long-term patterns in southern Beaufort Sea polar bear den distribution on pack ice and land. Marine Ecology Progress Series 564:211-224.

Regehr, E.V., S.C. Amstrup, and I. Stirling. 2006. Polar Bear Population Status in the Southern Beaufort Sea. U. S. Geological Survey, Alaska Science Center, Anchorage. Open-File Report 1337.

Rode, K.D., S.C. Amstrup, and E.V. Regehr. 2010. Reduced body size and cub recruitment in polar bears associated with sea ice decline. Ecological Applications. 20:768-782.

Rode, K.D., J. Olson, D. Eggett, D.C. Douglas, G.M. Durner, T.C. Atwood, E.V. Regehr, R.R. Wilson, T. Smith, and M. St. Martin. In review. Denning phenology and polar bear reproductive success in a changing climate. Journal of Mammalogy.

Rode, K.D., E.V. Regehr, D.C. Douglas, G.M. Durner, A.E. Derocher, G.W. Thiemann, and S.M. Budge. 2014. Variation in the response of an Arctic top predator experiencing habitat loss: feeding and reproductive ecology of two polar bear populations. Global Change Biology 20:76-88.

Rode, K.D., C.T. Robbins, L. Nelson, and S.C. Amstrup. 2015. Can polar bears use terrestrial foods to offset lost ice-based hunting opportunities?. Frontiers in Ecology and the Environment 13:138-145.

Rode, K.D., R.R. Wilson, D.C. Douglas, V. Muhlenbruch, T.C. Atwood, E.V. Regehr, E. Richardson, N. Pilfold, A. Derocher, G. Durner, I. Stirling, S. Amstrup, M. St. Martin, A. Pagano, E. Peacock, and K. Simac. In press. Spring fasting behavior among polar bears provides and index of ecosystem productivity. Global Change Biology. DOI:10.1111/gcb.13933

United States Fish and Wildlife Service. 2010. Designation of critical habitat for the polar bear (*Ursus maritimus*) in the United States. Federal Register 75:76086-76137.
Wilson, R.R., E.V. Regehr, M. St. Martin, T.C. Atwood, L. Peacock, S. Miller, and G. Divoky. 2017. Onshore ecology of polar bears in relation to sea-ice loss with implications for the management of conflict with humans. Biological Conservation 214:288-294.

From: Fox, Joanna
To: Brady, Stephanie
Cc: Dufford, Sheila; Steve Berendzen
Subject: Re: Arctic NWR map
Date: Wednesday, November 15, 2017 4:19:58 PM

OK - sounds good. Thanks Stephanie

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"Do what you can, with what you have, where you are." -- Theodore Roosevelt

On Wed, Nov 15, 2017 at 1:55 PM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:

> yes I can pull the map from the CCP - figure 1-1 - but Tracy wants to manipulate it -so she does not want a pdf - everyone in cartographer in the RO is out - that is why I asked Sheila - but if it does not exist outside of a pdf - then we will have to work with what we have. thanks.
>
>
> stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |
> U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska |
> 907.306.7448
>
>
> On Wed, Nov 15, 2017 at 1:51 PM, Fox, Joanna <joanna_fox@fws.gov> wrote:
>
> > Is there not one in the CCP? I believe Realty would have all of those.
> >
> >
> > Joanna L. Fox
> > Deputy Refuge Manager
> > Arctic National Wildlife Refuge
> > 101 12th Avenue, Room 236
> > Fairbanks, AK 99701
> > (907) 456-0549
> >
> > Follow us on Facebook!
> > www.facebook.com/arcticnationalwildliferefuge
> >
> >
> > *"Do what you can, with what you have, where you are." -- Theodore Roosevelt*
> >
> > On Wed, Nov 15, 2017 at 1:43 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:
> >
> > > I will check.

Sheila

Sheila J. Dufford
Biologist / GIS Specialist
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sheila_dufford@fws.gov
http://www.fws.gov/refuge/Yukon_Flats/

***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**

On Wed, Nov 15, 2017 at 1:32 PM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:

> Hi there Sheila - do you happen to have a map of Arctic refuge with the surrounding communities? We need this for the EA that Tracy is writing for the proposed rule for exploration - unfortunately, we need the map by 10am tomorrow morning - do you have anything that would work? thanks much - Stephanie
>
> stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448

From: Kohout, Jenifer
To: Wilson, Ryan
Subject: Re: Help with Arctic 1002 EA
Date: Wednesday, November 15, 2017 4:32:17 PM

Thanks Ryan!

On Wed, Nov 15, 2017 at 2:00 PM, Wilson, Ryan <ryan_r_wilson@fws.gov> wrote:

> Hi Jennifer,
> I've attached the edits you requested with the addition of information on den entrance/emergence. I also agree that the sentence citing the earlier den emergence relationship with cub survival fits well with where you mentioned it in Christopher's document.
> Ryan
>
> On Wed, Nov 15, 2017 at 1:13 PM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:
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> > Thanks Christopher. A few questions here as well. Please see what you think.
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> > Again, Mary, Patrick and Jim, if you could take a quick look and weigh in on the draft (and my comments), that would be great. This section will be included in the "Environmental Consequences" portion of the EA.
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> > On Wed, Nov 15, 2017 at 12:03 PM, Putnam, Christopher <christopher_putnam@fws.gov> wrote:
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> > > Here is my summary of the effects of seismic survey activities to polar bears. I've made it a very brief summary, but if more detail is needed I can certainly add it. Let me know what you think.
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> > > Christopher Putnam
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> > > "All that is gold does not glitter, not all those who wander are lost; the old that is strong does not wither, deep roots are not reached by the frost."
> > > -- J.R.R. Tolkien
> > >
> > > On Wed, Nov 15, 2017 at 10:50 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:
> > >
> > > > Thanks Ryan. I had a few minor suggestions but think this aligns well with what we discussed yesterday with Refuges (Tracy).

Jim, Patrick and Mary, please take a look and see if there are any other items you think should be mentioned about polar bears in the "Affected Environment" portion of the 1002 Area EA.

On Tue, Nov 14, 2017 at 4:11 PM, Wilson, Ryan <ryan_r_wilson@fws.gov> wrote:

> Hi Jennifer,
> Here's my first hack at the 'Affected Environment' section. Please let me know if you think anything should be added/deleted as this is the time I've ever worked on one of these.
> Thanks,
> Ryan
>
> On Tue, Nov 14, 2017 at 11:37 AM, Wilson, Ryan <ryan_r_wilson@fws.gov> wrote:
>
> > Sounds good.
> > Ryan
> >
> > On Tue, Nov 14, 2017 at 11:28 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:
> >
> > > Ryan and Christopher,
> > >
> > > Thanks for your help on this. Hopefully it feels manageable given the short length. If you could get me your drafts as early tomorrow (Wed) as possible, I'll take the lead on coordinating review by Jim, Patrick and Mary before we send to Refuges.
> > >
> > > Make sense?
> > >
> > > On Tue, Nov 14, 2017 at 11:23 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:
> > >
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> > > >
> > > > Just following up on our conversations this morning.
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> > > > Ryan will draft the "Affected Environment" section focusing on status of the Southern Beaufort Sea subpopulation and use of the 1002 Area, particularly in the winter. He'll rely on USGS population surveys, the ESA critical habitat designation, and a recent publication showing more land-based denning, etc.
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> > > > Christopher will tackle the "Environmental Consequences" section. Assuming that the nature of the activity is exploratory (seismic) work in the winter, Christopher will pull in information from our SBS incidental take regulations/EA and will incorporate by reference mitigation measures that would reduce potential impacts on polar bears denning in the area. In this section, we will also touch on potential indirect consequences (e.g. impact of increased barge traffic) and cumulative impacts (e.g. climate change - sea ice loss - access to prey -- more nutritionally stressed bears on land, etc).
> > > >
> > > > We understand that you need our 1-2 page entries by Thurs (Nov 16) at 12 noon.

--Jenifer

On Tue, Nov 14, 2017 at 8:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Hi,
>
> As Karen mentioned, we are in a big push to get a beefed up EA done for the regulation change that would open the 1002 for oil & gas exploration.
>
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>
> I'll be in the office at 9, if folks have questions. I'll be working on trying to outline a hypothetical exploration plan based on a state proposal from 2015.
>
> Thank you!
> -Tracy
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
>
> Hours: Mon - Thurs 9:15 am to 3:15 pm
> "Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie
>
> **Need access to Refuge Documents?**
> Online Document Database (ServCat)
> ***Need Refuge land status info for Alaska?***
> FWS Region 7 Land Mapper (FWS version)
> FWS Region 7 Land Mapper (Public version)
> Region 7 GeoPDF Map Portal

--
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e. Jenifer_Kohout@fws.gov

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e. Jenifer_Kohout@fws.gov

From: Greg Siekaniec
To: Tauline Davis
Subject: Re: 1002 Check-in (if needed)
Date: Wednesday, November 15, 2017 4:38 58 PM

Okay, thanks

Sent from my iPhone

On Nov 15, 2017, at 5:30 PM, Tauline Davis <tauline_davis@fws gov> wrote:

> This event has been canceled and removed from your calendar
>
> Title: 1002 Check-in (if needed)
> When: Wed Nov 15, 2017 2:30pm – 3pm Alaska Time
> Where: Karen's Office/b5 - CIP Passcode:b5 - CIP
> Video call:b5 - CIP
> [redacted]>
> Calendar: greg_siekaniec@fws gov
> Who:
> * karen_clark@fws gov - creator
> * greg_siekaniec@fws gov
> * tracy_fischbach@fws gov
> * stephanie_brady@fws gov
> * doug_damberg@fws gov
>
> Invitation from Google Calendar: https://www google com/calendar/
>
> You are receiving this email at the account greg_siekaniec@fws gov because you are subscribed for cancellations on calendar greg_siekaniec@fws gov
>
> To stop receiving these emails, please log in to https://www google com/calendar/ and change your notification settings for this calendar
>
> Forwarding this invitation could allow any recipient to modify your RSVP response Learn more at https://support google com/calendar/answer/37135#forwarding
>
> <meeting ics>

From: Putnam, Christopher
To: Wilson, Ryan
Cc: Kohout, Jenifer; Mary Colligan; Patrick Lemons; James Wilder
Subject: Re: Help with Arctic 1002 EA
Date: Wednesday, November 15, 2017 4:39:44 PM
Attachments: Polar bears and seismic surveys v2.docx

I've made some edits to address the comments. I still need to add the citations, but I need to leave for an appointment. I'll add them when I return.

Christopher Putnam
Supervisory Fish and Wildlife Biologist
Marine Mammals Management
U.S. Fish & Wildlife Service
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Anchorage, AK 99503-6199
907-786-3844 office
907-268-0577 mobile
907-786-3816 fax

"All that is gold does not glitter, not all those who wander are lost; the old that is strong does not wither, deep roots are not reached by the frost."
-- J.R.R. Tolkien

On Wed, Nov 15, 2017 at 2:00 PM, Wilson, Ryan <ryan_r_wilson@fws.gov> wrote:

> Hi Jennifer,
> I've attached the edits you requested with the addition of information on den entrance/emergence. I also agree that the sentence citing the earlier den emergence relationship with cub survival fits well with where you mentioned it in Christopher's document.
> Ryan
>
> On Wed, Nov 15, 2017 at 1:13 PM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:
>
> > Thanks Christopher. A few questions here as well. Please see what you think.
> >
> > Again, Mary, Patrick and Jim, if you could take a quick look and weigh in on the draft (and my comments), that would be great. This section will be included in the "Environmental Consequences" portion of the EA.
> >
> > On Wed, Nov 15, 2017 at 12:03 PM, Putnam, Christopher <christopher_putnam@fws.gov> wrote:
> >
> > > Hi Jenifer,
> > >
> > > Here is my summary of the effects of seismic survey activities to polar bears. I've made it a very brief summary, but if more detail is needed I can certainly add it. Let me know what you think.

Christopher Putnam
Supervisory Fish and Wildlife Biologist
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"All that is gold does not glitter, not all those who wander are lost; the old that is strong does not wither, deep roots are not reached by the frost."
-- J.R.R. Tolkien

On Wed, Nov 15, 2017 at 10:50 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:

> Thanks Ryan. I had a few minor suggestions but think this aligns well with what we discussed yesterday with Refuges (Tracy).
>
> Jim, Patrick and Mary, please take a look and see if there are any other items you think should be mentioned about polar bears in the "Affected Environment" portion of the 1002 Area EA.
>
> On Tue, Nov 14, 2017 at 4:11 PM, Wilson, Ryan <ryan_r_wilson@fws.gov> wrote:
>
> > Hi Jennifer,
> > Here's my first hack at the 'Affected Environment' section. Please let me know if you think anything should be added/deleted as this is the time I've ever worked on one of these.
> > Thanks,
> > Ryan
> >
> > On Tue, Nov 14, 2017 at 11:37 AM, Wilson, Ryan <ryan_r_wilson@fws.gov> wrote:
> >
> > > Sounds good.
> > > Ryan
> > >
> > > On Tue, Nov 14, 2017 at 11:28 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:
> > >
> > > > Ryan and Christopher,
> > > >
> > > > Thanks for your help on this. Hopefully it feels manageable given the short length. If you could get me your drafts as early tomorrow (Wed) as possible, I'll take the lead on coordinating review by Jim, Patrick and Mary before we send to Refuges.
> > > >
> > > > Make sense?
> > > >
> > > > On Tue, Nov 14, 2017 at 11:23 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:
> > > >
> > > > > Hi Tracy,

Just following up on our conversations this morning.

Ryan will draft the "Affected Environment" section focusing on status of the Southern Beaufort Sea subpopulation and use of the 1002 Area, particularly in the winter. He'll rely on USGS population surveys, the ESA critical habitat designation, and a recent publication showing more land-based denning, etc.

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We understand that you need our 1-2 page entries by Thurs (Nov 16) at 12 noon.

--Jenifer

On Tue, Nov 14, 2017 at 8:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

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>
> As Karen mentioned, we are in a big push to get a beefed up EA done for the regulation change that would open the 1002 for oil & gas exploration.
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Terrestrial oil and gas industry seismic survey activities on the North Slope of Alaska typically require between 80 and 160 personnel. Substantial logistical support is required for a seismic survey operation, and also to support the personnel camps, vehicles, security, aircraft operations, restocking of the explosive magazine (if explosives are used), medical support, scientists, marine mammal observers, ice road construction, barge traffic, and many other logistical and support functions.

Polar bears present in the Arctic National Wildlife Refuge 1002 area may be affected by ~~oil and gas industry~~ seismic survey activities in various ways. Noise, vibrations, sights, and smells produced by seismic survey activities may elicit a wide range of responses ~~in individual~~from polar bears. Polar bears respond to the sights and sound of snowmachines, vehicles, vessels, and aircraft; especially helicopters (Watts and Ratson 1989; Dyck 2001; Dyck and Baydack 2004; Andersen and Aars 2005). Polar bear responses to disturbance are highly variable and are influenced by an individual bear's previous experiences and tolerance level. Polar bears are most likely to respond to the majority of seismic survey activities with short-term behavioral and physiological responses such as avoidance, increased vigilance, increased heart rate, and other stress responses. Disturbance during resting may result in increased energy expenditure or adverse physiological responses (Watts et al. 1991), but short-term reactions like these will rarely affect the health or survival of individual animals or the population. The effects of fleeing from aircraft may be minimal if the event is short and the animal is otherwise healthy and unstressed. However, on a warmer day, a short run may be enough to overheat a well-insulated polar bear. The effect of fleeing an aircraft or ground vehicle on polar bear cubs, particularly cubs of the year, would likely be the use of energy that otherwise would be needed for survival during a critical time in a polar bear's life, and potentially separation from the female. If the exposure and separation, or both, were brief and singular then the effect would most likely be minimal. ~~-~~Chronic disturbances, extreme reactions, ~~or~~ disruption of key behaviors such as feeding or denning, or separation of dependent cubs from the female are more likely to affect health or survival. Polar bears directly interacting with seismic survey activities increase the risk of human-bear encounters, conflicts, and injury or ~~lethal take~~death of polar bears.

Seismic survey activities disturbing female polar bears at maternal den sites are of great concern. Minimizing disturbance while bears are in dens is important because timing of den emergence is significantly related to cub survival (Rode et al. in review). Female polar bears entering dens and females in dens with cubs are more sensitive to noises than other age and sex groups. Disturbance during the early stages of denning may cause a female polar bear to abandon the den site in search of another one. A female polar bear may locate another suitable den site and continue her reproductive process. Denning female bears may abandon their dens early in response to stress (Amstrup 1993; Ramsay and Stirling 1986). Amstrup (1993) reported most polar bears in dens continue to occupy the dens after close approaches by aircraft. Although the snow attenuates some aircraft noise (Blix and Lentfer 1992), repeated overflights may cause polar bears to abandon or depart their dens. ~~However, P~~premature den site abandonment after the birth of cubs ~~and before the cubs are able to survive outside of the den~~, or if the female abandons the cubs after they emerge from the den, will result in cub mortality. The potential for disturbance increases once the female emerges from the den. She is more vigilant against perceived threats and easier to disturb.

Commented [KJ1]: I assume you mean the surveys plus all associated activities, e g barge traffic, helicopter access, ice road construction If that's correct, might be worth stating that explicitly

Commented [KJ2]: Do we want to make the following point (from Ryan's entry) more explicit? (I'm fine either way)

Minimizing disturbance while bears are in dens is important because timing of den emergence is significantly related to cub survival (Rode et al in review)

Commented [KJ3]: Tracy mentioned that we need to raise all of our concerns now, rather than bring them up later in the process Is there a way to raise potential concerns about cumulative impacts caused by sea ice loss?

Maybe by adding a new paragraph with something along the following lines:

The frequency and consequences of disturbance may also be exacerbated over time due to sea ice loss and related stressors such as reduced ability to access prey

~~The requirements of incidental take authorizations under the Marine Mammal Protection Act, such as polar bear interaction plans, training, monitoring, and mitigation measures have proven effective at reducing the effects of oil and gas industry activities, including seismic surveys, on polar bears in other areas of northern Alaska. Mitigation measures, including a pre-activity den survey and a 1.6-km (1-mi) operational exclusion zone around known dens help to limit disturbance of denning female polar bears. The current incidental take regulations for oil and gas industry activity in the Beaufort Sea and adjacent areas of northern Alaska, published in the Federal Register on August 5, 2016 (81 FR 52276), include a comprehensive analysis of the effects of oil and gas industry activity to polar bears, as well as mitigation, monitoring, and reporting requirements. A detailed description of mitigation measures that limit the effects of seismic surveys on polar bears is available at title 50 of the Code of Federal Regulations, part 18, subpart J, section 18.128.~~

Though human activities (e.g. industrial, subsistence) are expected to exert a smaller influence on polar bear populations than the loss of sea ice habitat (Atwood et al. 2015; Regehr et al. 2015), the cumulative effects of seismic survey activity and climate change are not well understood. Habitat loss due to changes in Arctic sea ice is the primary cause of decline in polar bear populations, and the decline of sea ice is expected to continue throughout the polar bear's range for the foreseeable future (73 FR 28212, May 15 2008). Under both stabilized and unabated greenhouse gas emissions models, polar bears are expected to have greatly decreased persistence throughout the region (Atwood et al. 2015). The effects of seismic survey activity in the Arctic National Wildlife Refuge 1002 area combined with the effects of climate change could have unknown effects on the Southern Beaufort Sea population of polar bears.

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The requirements of incidental take authorizations under the Marine Mammal Protection Act, such as polar bear interaction plans, training, monitoring, and mitigation measures have proven effective at reducing the effects of oil and gas industry activities, including seismic surveys, on polar bears in other areas of northern Alaska. Mitigation measures, including a pre-activity den survey and a 1.6-km (1-mi) operational exclusion zone around known dens help to limit disturbance of denning female polar bears. The current incidental take regulations for oil and gas industry activity in the Beaufort Sea and adjacent areas of northern Alaska, published in the Federal Register on August 5, 2016 (81 FR 52276), include a comprehensive analysis of the effects of oil and gas industry activity to polar bears, as well as mitigation, monitoring, and reporting requirements. A detailed description of mitigation measures that limit the effects of seismic surveys on polar bears is available at title 50 of the Code of Federal Regulations, part 18, subpart J, section 18.128.

From: Davis, Tauline
To: Greg Siekaniec
Subject: Re: 1002 Check-in (if needed)
Date: Wednesday, November 15, 2017 4:48:58 PM

---

ok sounds good :)

On Wed, Nov 15, 2017 at 2:48 PM, Greg Siekaniec <greg_siekaniec@fws.gov> wrote:

> Tomorrow we can bring it all together. I spoke with Kurth and he is comfortable we are on the right track.
>
> Sent from my iPhone
>
> On Nov 15, 2017, at 5:42 PM, Davis, Tauline <tauline_davis@fws.gov> wrote:
>
> > your welcome they are happy to brief you Greg - we cancelled thinking you were not available and Karen is tied up. If you want a briefing they will do one for you.
> >
> > On Wed, Nov 15, 2017 at 2:38 PM, Greg Siekaniec <greg_siekaniec@fws.gov> wrote:
> >
> > > Okay, thanks
> > >
> > > Sent from my iPhone
> > >
> > > On Nov 15, 2017, at 5:30 PM, Tauline Davis <tauline_davis@fws.gov> wrote:
> > >
> > > > This event has been canceled and removed from your calendar.
> > > >
> > > > Title: 1002 Check-in (if needed)
> > > > When: Wed Nov 15, 2017 2:30pm – 3pm Alaska Time
> > > > Where: Karen's Office/ b5 - CIP Passcode: b5 - CIP
> > > > Video call: b5 - CIP [redacted]
> > > > Calendar: greg_siekaniec@fws.gov
> > > > Who:
> > > > * karen_clark@fws.gov - creator
> > > > * greg_siekaniec@fws.gov
> > > > * tracy_fischbach@fws.gov
> > > > * stephanie_brady@fws.gov

* doug_damberg@fws.gov

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<meeting.ics>

--
Tauline Davis
907-786-3542
Executive Assistant
Regional Director's Office

--
Tauline Davis
907-786-3542
Executive Assistant
Regional Director's Office

From: Google Calendar on behalf of tracy_fischbach@fws.gov
To: b6 [redacted].com
Subject: New event: 1002 EA Review @ Thu 2017-11-16 11:00 - 12:00 (christopher_putnam@fws.gov)
Date: Wednesday, November 15, 2017 5:00:38 PM

1002 EA Review

more details »

Hi all,

For those outside Refuges, you're attendance is not required, but if you are still able and willing to help, you are very welcome. We will go through the document relatively quickly in order to determine where significant gaps remain and what to do about them. We do know we are allowed to say, "Additional literature review is needed to fully consider the consequences and cumulative effects of exploration activities on XXXXX resource." I will have the Vidyo on. If you need a conference call line, please let me know.

Thanks!

When Thu 2017-11-16 11:00 – 12:00 Alaska Time

Where FWS-FW7 NWRS Conference Room/Regional Office (map)

Video call b6 - CIP [redacted]

Calendar christopher_putnam@fws.gov

Who
- tracy_fischbach@fws.gov - organizer
- christopher_putnam@fws.gov
- edward_decleva@fws.gov
- socheata_lor@fws.gov
- nicole_gustine@fws.gov
- margaret_perdue@fws.gov
- peter_wikoff@fws.gov
- jenifer_kohout@fws.gov
- stephanie_brady@fws.gov
- brian_mccaffery@fws.gov
- ryan_r_wilson@fws.gov
- john_w_martin@fws.gov
- john_trawicki@fws.gov
- wendy_loya@fws.gov
- doug_damberg@fws.gov

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From: Fox, Joanna
To: Tracy Fischbach
Subject: Re: Invitation: 1002 EA Review @ Thu Nov 16, 2017 11am - 12pm (joanna_fox@fws.gov)
Date: Wednesday, November 15, 2017 5:20:03 PM

Tracy - I'll be out on leave tomorrow and Friday (traveling to lower 48), and unable to attend this meeting. Steve B. will likely be unavailable as well, as he is attending LE for Supervisors at NCTC this week. If you need participation from the Refuge, Roger Kaye will be Acting in my absence, and Steve Arthur may well be available as well (with an hour or two advance notice).

Thanks for all your help on this!

Joanna

_____
Joanna L. Fox
Deputy Refuge Manager
Arctic National Wildlife Refuge
101 12th Avenue, Room 236
Fairbanks, AK 99701
(907) 456-0549

Follow us on Facebook!
www.facebook.com/arcticnationalwildliferefuge

"Do what you can, with what you have, where you are." -- Theodore Roosevelt

On Wed, Nov 15, 2017 at 3:13 PM, Tracy Fischbach <tracy_fischbach@fws.gov> wrote:

> **1002 EA Review** **more details »**
>
> Hi all,
>
> For those outside Refuges, you're attendance is not required, but if you are still able and willing to help, you are very welcome. We will go through the document relatively quickly in order to determine where significant gaps remain and what to do about them. We do know we are allowed to say, "Additional literature review is needed to fully consider the consequences and cumulative effects of exploration activities on XXXXX resource." I will have the Vidyo on. If you need a conference call line, please let me know.
>
> Thanks!
>
> When Thu Nov 16, 2017 11am – 12pm Alaska Time
> Where FWS-FW7 NWRS Conference Room/Regional Office (map)
> Video call b5 - CIP [redacted]
> Calendar joanna_fox@fws.gov
>
> - organizer

Who

- tracy_fischbach@fws.gov
- margaret_perdue@fws.gov
- nicole_gustine@fws.gov
- peter_wikoff@fws.gov
- john_w_martin@fws.gov
- steve_berendzen@fws.gov
- joanna_fox@fws.gov
- socheata_lor@fws.gov
- doug_damberg@fws.gov
- brian_mccaffery@fws.gov
- jenifer_kohout@fws.gov
- wendy_loya@fws.gov
- john_trawicki@fws.gov
- stephanie_brady@fws.gov
- christopher_putnam@fws.gov
- edward_decleva@fws.gov
- ryan_r_wilson@fws.gov

Going? **Yes** - **Maybe** - **No** more options »

Invitation from Google Calendar

You are receiving this email at the account joanna_fox@fws.gov because you are subscribed for invitations on calendar joanna_fox@fws.gov.

To stop receiving these emails, please log in to https://www.google.com/calendar/ and change your notification settings for this calendar.

Forwarding this invitation could allow any recipient to modify your RSVP response. Learn More.

From: Kohout, Jenifer
To: Putnam, Christopher
Cc: Wilson, Ryan; Mary Colligan; Patrick Lemons; James Wilder
Subject: Re: Help with Arctic 1002 EA
Date: Wednesday, November 15, 2017 6:01:39 PM

Yup. Looks good. Thanks Christopher. I'll wait for the citations before I send this to Tracy.

On Wed, Nov 15, 2017 at 2:39 PM, Putnam, Christopher <christopher_putnam@fws.gov> wrote:

> I've made some edits to address the comments. I still need to add the citations, but I need to leave for an appointment. I'll add them when I return.
>
> Christopher Putnam
> Supervisory Fish and Wildlife Biologist
> Marine Mammals Management
> U.S. Fish & Wildlife Service
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>
> "All that is gold does not glitter, not all those who wander are lost; the old that is strong does not wither, deep roots are not reached by the frost."
> -- J.R.R. Tolkien
>
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>
> > Hi Jennifer,
> > I've attached the edits you requested with the addition of information on den entrance/emergence. I also agree that the sentence citing the earlier den emergence relationship with cub survival fits well with where you mentioned it in Christopher's document.
> > Ryan
> >
> > On Wed, Nov 15, 2017 at 1:13 PM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:
> >
> > > Thanks Christopher. A few questions here as well. Please see what you think.
> > >
> > > Again, Mary, Patrick and Jim, if you could take a quick look and weigh in on the draft (and my comments), that would be great. This section will be included in the "Environmental Consequences" portion of the EA.
> > >
> > > On Wed, Nov 15, 2017 at 12:03 PM, Putnam, Christopher <christopher_putnam@fws.gov> wrote:
> > >
> > > > Hi Jenifer,
> > > >
> > > > Here is my summary of the effects of seismic survey activities to polar bears. I've made it a very brief summary, but if more detail is needed I can certainly add it. Let me know what you think.

Christopher Putnam
Supervisory Fish and Wildlife Biologist
Marine Mammals Management
U.S. Fish & Wildlife Service
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"All that is gold does not glitter, not all those who wander are lost; the old that is strong does not wither, deep roots are not reached by the frost."
-- J.R.R. Tolkien

On Wed, Nov 15, 2017 at 10:50 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:

> Thanks Ryan. I had a few minor suggestions but think this aligns well with what we discussed yesterday with Refuges (Tracy).
>
> Jim, Patrick and Mary, please take a look and see if there are any other items you think should be mentioned about polar bears in the "Affected Environment" portion of the 1002 Area EA.
>
> On Tue, Nov 14, 2017 at 4:11 PM, Wilson, Ryan <ryan_r_wilson@fws.gov> wrote:
>
> > Hi Jennifer,
> > Here's my first hack at the 'Affected Environment' section. Please let me know if you think anything should be added/deleted as this is the time I've ever worked on one of these.
> > Thanks,
> > Ryan
> >
> > On Tue, Nov 14, 2017 at 11:37 AM, Wilson, Ryan <ryan_r_wilson@fws.gov> wrote:
> >
> > > Sounds good.
> > > Ryan
> > >
> > > On Tue, Nov 14, 2017 at 11:28 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:
> > >
> > > > Ryan and Christopher,
> > > >
> > > > Thanks for your help on this. Hopefully it feels manageable given the short length. If you could get me your drafts as early tomorrow (Wed) as possible, I'll take the lead on coordinating review by Jim, Patrick and Mary before we send to Refuges.
> > > >
> > > > Make sense?

On Tue, Nov 14, 2017 at 11:23 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:

> Hi Tracy,
>
> Just following up on our conversations this morning.
>
> Ryan will draft the "Affected Environment" section focusing on status of the Southern Beaufort Sea subpopulation and use of the 1002 Area, particularly in the winter. He'll rely on USGS population surveys, the ESA critical habitat designation, and a recent publication showing more land-based denning, etc.
>
> Christopher will tackle the "Environmental Consequences" section. Assuming that the nature of the activity is exploratory (seismic) work in the winter, Christopher will pull in information from our SBS incidental take regulations/EA and will incorporate by reference mitigation measures that would reduce potential impacts on polar bears denning in the area. In this section, we will also touch on potential indirect consequences (e.g. impact of increased barge traffic) and cumulative impacts (e.g. climate change - sea ice loss - access to prey -- more nutritionally stressed bears on land, etc).
>
> We understand that you need our 1-2 page entries by Thurs (Nov 16) at 12 noon.
>
> --Jenifer
>
> On Tue, Nov 14, 2017 at 8:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
>
> > Hi,
> >
> > As Karen mentioned, we are in a big push to get a beefed up EA done for the regulation change that would open the 1002 for oil & gas exploration.
> >
> > Would you be able to break someone free to write a relatively short 1-2 page Affected Environment section and environmental consequences section for polar bears?
> >
> > I'll be in the office at 9, if folks have questions. I'll be working on trying to outline a hypothetical exploration plan based on a state proposal from 2015.
> >
> > Thank you!
> > -Tracy
> >
> > Tracyann S Fischbach
> > Natural Resources Planner
> > National Wildlife Refuge System - Region 7
> > Division of Natural Resources & Conservation Planning
> > (907) 786-3369
> >
> > Hours: Mon - Thurs 9:15 am to 3:15 pm

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Region 7 GeoPDF Map Portal

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From:	Kohout, Jenifer
To:	Fischbach, Tracy
Cc:	Mary Colligan; Doug Damberg; Stephanie Brady; Patrick Lemons; James Wilder; Ryan Wilson; Christopher Putnam
Subject:	Polar Bear entry for the Arctic 1002 EA
Date:	Wednesday, November 15, 2017 6:06:14 PM
Attachments:	Affected_Environment_PB_15NovRRW.final.docx

Hi Tracy,

Attached in our (Ryan's) polar bear entry for the Affected Environment.

The Environmental Consequences section is almost complete; Christopher is just finishing up some of the citations.

--Jenifer

On Tue, Nov 14, 2017 at 11:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Yes. Thank you!
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
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On Tue, Nov 14, 2017 at 8:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

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Of the two polar bear subpopulations (or stocks) found in the United States, polar bears in the Southern Beaufort Sea (SBS) subpopulation are the most likely to occur in the 1002 area of the Arctic National Wildlife Refuge. The subpopulation is shared by the U.S. and Canada. The boundary of the SBS subpopulation, as recognized by the Polar Bear Specialists Group, is Icy Cape, Alaska to the west and south of Banks Island and east of the Baillie Islands, Canada to the east (Obbard et al. 2010). The SBS subpopulation had an estimated population size of approximately 900 bears in 2010 (Bromaghin et al. 2015). This estimate represents a significant reduction from previous estimates of approximately 1,800 in 1986 (Amstrup et al. 1986), and 1,526 in 2006 (Regehr et al. 2006). Although there was some evidence in the 2010 estimate that the population might be showing signs of the subpopulation beginning to increase (Bromaghin et al. 2015). Analyses of over 20 years of data on the size and body condition of bears in this subpopulation demonstrated declines for most sex and age classes (Rode et al. 2010, 2014).

Population declines and the size and body condition of bears in the SBS subpopulation have been linked to declining sea ice conditions in the Beaufort Sea (Regehr et al. 2006; Rode et al. 2010, 2014, in press; Bromaghin et al. 2015). Declining sea ice conditions in the Beaufort Sea have also led to an increase in the proportion of the subpopulation coming onshore in summer and autumn (from 5.8% during 1986-1999 to 20% during 2000-2014) and a 30 day increase in time spent on land (Atwood et al. 2016). While on land, polar bears typically do not feed (Rode et al. 2015), although bears in the SBS subpopulation are drawn to bowhead whale remains from subsistence harvest, particularly adjacent to the community of Kaktovik, Alaska (Wilson et al. 2017). These whale remains may be helping offset lost hunting opportunities for bears in the SBS subpopulation due to sea ice loss (Herreman and Peacock 2013, Atwood et al. 2016).

In addition to a higher proportion of the SBS subpopulation occurring on shore during summer and autumn, there is also an increasing trend towards more bears denning on land (Olson et al. 2017). Denning substrate (i.e., sea ice or mainland) is significantly related to where bears occur in autumn. Pregnant polar bears in the SBS subpopulation that spent >25 days on land in autumn all subsequently denned on land (Olson et al. 2017). Between 1985-2013, the percent of bears denning on land in the SBS subpopulation increased from 34 to 55%, linked to sea ice declines. Designated Critical Denning Habitat overlaps with 77% of the 1002 area of the Arctic National Wildlife Refuge (U.S. Fish and Wildlife Service 2010). There is also 38% more denning habitat available in the coastal plain of the Arctic National Wildlife than in the region immediately west of the refuge (Durner et al. 2006). Polar bears have been shown to den in the 1002 area with greater frequency than expected based on available habitat (Amstrup 1993). Based on known den locations from 2000-2010, 22% of dens for bears in the SBS subpopulation occurred within the 1002 area (Durner et al. 2010). Thus, the 1002 area has been documented to be an important area for denning by polar bears and will likely increase in importance as the percent of bears denning on land increases with sea ice loss (Olson et al. 2017).

The mean dates of den entrance and emergence for polar bears that den on land in the SBS subpopulation is 11 November and 3 March, respectively (Rode et al. in review). Females observed with cubs in spring emerged 15 days later than females observed without cubs (Rode et al. in review). Land-based denning also appears to be important for polar bears, as bears that den on land have significantly higher reproductive success (Rode et al. in review).

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From: Perdue, Margaret
To: Burkart, Greta
Subject: Draft for review
Date: Wednesday, November 15, 2017 6:32:01 PM
Attachments: WR_1002_AffectedEnv.docx

Hi Greta ---

Here's what we've got at this point for affected environment.

--
Meg Perdue, Water Quality Specialist
Water Resources Branch - National Wildlife Refuge System
U.S. Fish & Wildlife Service Regional Office MS 235
1011 E. Tudor Rd
Anchorage, AK 99503
phone: 907-786-3421 fax: 907-786-3976
email: margaret_perdue@fws.gov

Affected Environment

Water resources on the coastal plain of the Arctic National Wildlife Refuge consist of streams, lakes, and springs. Streams of the Arctic coastal plain flow north, several forming large alluvial fans as they flow into the Beaufort Sea where they contribute substantial volumes of water and sediment to coastal ecosystems (CCP). Like other areas of the Arctic, the coastal plain is underlain by continuous permafrost limiting infiltration of surface water and limiting groundwater resources. Groundwater that may exist below permafrost is thought to be saline or brackish (Williams 1970). While ninety-nine percent of the 1002 Area is classified as wetlands fresh water is limited and confined to the shallow zone above permafrost (Clough et al. 1987). Lakes are not evenly distributed across the coastal plain with concentrations occurring near the mouth of the Canning River in the west and the Sadlerochit and Jago River regions to the east with very few lakes occupying the central Katakturuk River region (Trawicki et al. 1991). Total annual precipitation averages 6.2 inches per year (snow vs rain) (Arctic Environmental Information Center 1986- May 91 report, update) leading to climate and permafrost as dominant factors that limit water availability. The non-frozen water found on the coastal plain during the winter months is located in small isolated pools beneath ice hummocks associated with stream drainages , lakes with depths greater than 7 feet, and flowing surface waters associated with springs (Lyons and Trawicki 1994).

Streams

The 1002 Area has a relatively high density of streams compared to other areas of the North Slope (Brackney 2008- CCP). The hydrography of these systems is strongly influenced by the climate which is characterized by extremely low winter temperatures and short, cool summers. Streamflow rapidly declines in most systems shortly after freeze up in September and ceases in most streams by December when they are generally frozen to the stream bed resulting in no flow or flow so low as to not be measureable(Lyons and Trawicki 1994). A few exceptions to this occur where springs result in open reaches and aufeis areas that develop providing important fish over-wintering habitat (Arcone 1989 – Apr 90 report). Break up on the Arctic coastal plain occurs during a brief period in late May or early June. Snowmelt begins in the mountains and foothills progressing towards the coastal plain. Rapidly melting water runs over the ground as sheetflow with infiltration limited by permafrost. Water in drainages rises rapidly, often flowing over ice covered stream channels. More than half of the annual discharge for these streams can occur during a period of several days to a few weeks (Clough et al. 1987, Sloan 1987). Based on origin, hydrologic regime, and chemical and biological characteristics, Craig and McCart (1975) classified North Slope streams into three categories: mountain, spring-fed, and tundra. Mountain streams are typically fast flowing and fed by varying proportions of snowmelt, glacier meltwater, and spring-fed tributaries. Waters are cold (usually less than 50 °F), occasionally turbid, moderately hard, and support low invertebrate densities. The most common species of fish in mountain streams is Dolly Varden. Mountain streams that receive glacial inputs are unique to the eastern North Slope, in the Jago, Hulahula, and Okpilak watersheds, discharge from glacial sources is the dominant source of flow when precipitation is low and air temperatures are high and transport large volumes of water, sediment and

nutrients to downstream ecosystems. Spring-fed streams are often tributaries of mountain streams and have relatively stable flows and temperatures throughout the year. Spring-fed waters are characterized by low levels of dissolved solids and very high densities of macroinvertebrates. Many spring-fed streams provide critical spawning and overwintering habitat for Dolly Varden. Tundra streams originate in the Brooks Range Foothills and coastal plain ecoregions, are fed by surface runoff, tend to be meandering systems, and have low to moderate invertebrate densities. Waters are typically warmer and exhibit lower pH and conductivity relative to mountain and spring-fed streams. Huryn et al. (2004) found that gradients in freezing probability, nutrient concentrations, and substratum instability control invertebrate communities in these systems. Some projections indicate that glacial inputs could disappear within the next 50 years altering hydrology by reducing instream connectivity and negatively impacting fish migrating to critical overwintering habitat (Nolan et al. 2011). Surface water availability and instream connectivity will potentially be adversely impacted by deepening of the active layer on the coastal plain, increasing duration of the summer season, and increased evapotranspiration rates (CCP).

Springs and Aufeis Areas

Six springs are located on the Arctic coastal plain identified through reconnaissance investigation by Childers et al. (1977): Sadlerochit Spring, Red Hill Spring, Katakturuk River tributary Spring, Hulahula River Spring, Okerokovik River Spring, and Aichilik River Spring. During the winter months pressurized water discharges from a spring pushing up through the ice to the surface where it spreads out and freezes forming aufeis areas that can become extensive. These formations melt more slowly than snow, generally persist into the summer and may provide a temporary source of freshwater (Kane and Slaughter 1973). Open water associated with springs provides important winter habitat particularly once surface water runoff ceases due to freezing (Lyons and Trawicki 1994). Most springs in Arctic Refuge have survived since the last glacial maximum (Yoshikawa et al. 2007), suggesting that they will continue to flow and be refugia for aquatic biota in a changing climate.

Lakes

The density of lakes in the Arctic coastal plain is low compared to the rest of the North Slope and as noted earlier their distribution is not uniform, nor is their size and depth (CCP). Jorgenson and Shur (2007) classified the coastal plain into regions based on lake origin: thaw, depression, riverine, and delta. Depression lake basins are formed in undulating sandy, alluvial marine or eolian deposits, and are the majority found on the coastal plain concentrated in the depression lakes region between the Hulahula and Niguanak rivers. Riverine lakes include oxbow and floodplain lakes along sinuous channels and thaw lakes formed in ice-rich abandoned channels. Riverine lakes are most concentrated along the Jago and Niguanak rivers. Delta lakes include thaw, riverine, and tidal lakes and most are found in deltas of the Hulahula, Jago, Aichilik, and Canning rivers (CCP). The majority of lakes on the coastal plain are shallow lakes with surface areas ranging from 1,500 acres to less than 10 acres (Trawicki et al. 1991). Recharge of these systems is generally limited to snow melt and direct precipitation in the immediate vicinity of

the lake (Lyons and Trawicki 1994). When not connected to larger drainage networks, evaporation has a strong influence on water chemistry and plays an important role in regulating lake water balance (CCP). Maximum winter ice thickness on lakes in the Arctic is between 6-7 feet (Bilello and Bates 1969, 1971, 1972, and 1975). Clough et al. (1987) reported that most lakes have basins less than 7 feet deep and thus freeze to the substrate. These shallow lakes generally melt from the surface downward in spring. Deeper lakes that do not freeze to substrate may have ice present on the surface well into July. Due to the level of winter freezing, the depth of lakes restricts the presence of fish, Hobbie (1984) found fish present only in lakes with depths greater than 5.6 feet. Shallow lakes generally lack fish because they usually freeze solid but they provide important habitat to emergent vegetation, invertebrates, and migratory birds due to the earlier availability of ice-free areas. Trawicki et al. (1991) identified fish presence in lakes on the coastal plain to be more frequent and widespread than previously suspected. Ninespine stickleback (Pungitius puingitus) were found in 34 of 52 lakes surveyed (65%) in 1989. In the past half a century, the duration of ice cover, thermal regimes, and rates of primary productivity have likely changed. In the future, changes in temperature, active layer depth, fire frequency and severity, and erosion rates could affect lake distribution, water quality, water levels, size, and connectivity to other habitats (CCP).

Winter Specific Hydrologic Data

Hydrologic data for the 1002 area are limited, short-term (less than five years) data were collected over two decades ago at 11 stream gage sites on five drainage systems across the coastal plain and an inventory of 119 lake basins was conducted to create lake contour maps water volume calculations and estimates of winter water volume beneath ice cover. These data were collected in large part to address questions regarding winter water availability in the 1002 area in the event of development activities. In the case of the river studies winter water was found to occur over a wide area in most of the major river drainages but it was restricted to small isolated pools beneath ice hummocks scattered throughout the braided portions of these rivers. The volume of water available was estimated to be small, 9 million gallons over the 237 miles of inventoried area. Total estimated volume of the study lakes ranged from 55,382 acre-feet (18 billion gallons) when free of ice to 3,366 acre-feet (1.1 billion gallons) beneath a maximum ice thickness of seven feet. Ninety percent of the available water was contained in just nine of the 119 surveyed lakes, the majority were found in the Canning River delta area (up to eighty percent of the total volume), and only two lakes were located in the region between the Katakturuk and Sadlerochit rivers.

From: Audubon Alaska
To: ryan_r_wilson@fws.gov
Subject: Audubon Alaska November eNews
Date: Wednesday, November 15, 2017 6:44:29 PM

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In This Issue

- Next Steps in Defending the Arctic Refuge
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- National Petroleum Reserve-Alaska Featured in NY Times
- Tongass Threatened by Congressional Review Act
- Audubon Alaska Print Newsletters
- 'Name that Bird' Photo Quiz
- TONIGHT: Campbell Creek Science Center Fireside Chat
- Bird Trivia Night!
- Christmas Bird Count for Kids

Next Steps in Defending the Arctic Refuge

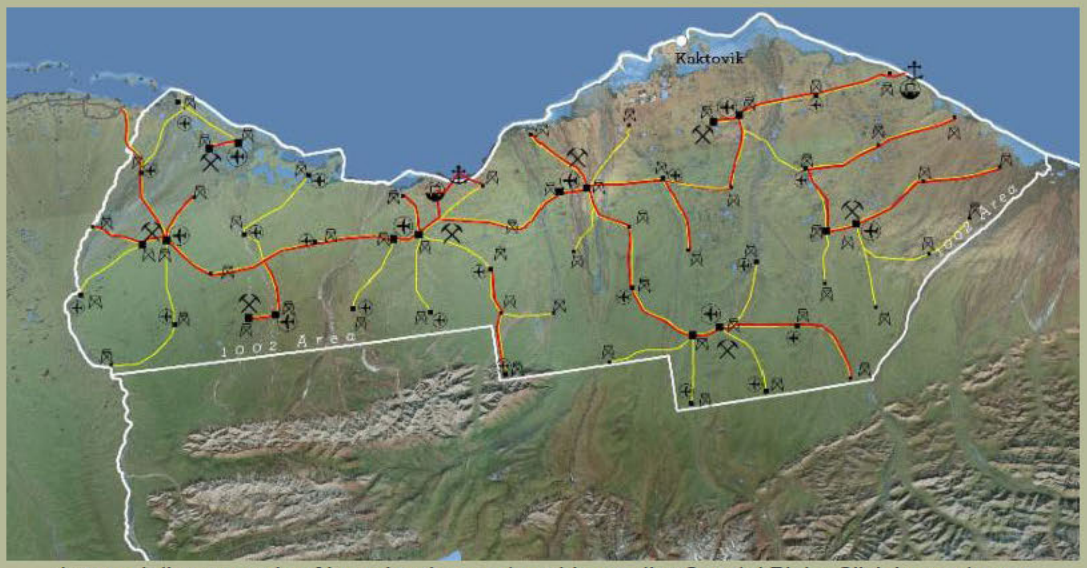


Photo by Milo Burcham

Today the Senate Energy and Natural Resources Committee approved Senator Lisa Murkowski's legislation to open the Coastal Plain of the Arctic National Wildlife Refuge to oil and gas development.

The drilling bill will now be folded into the larger tax proposal currently working its way through Congress, with a full Senate vote possible in the next few weeks. **Learn more here**, and keep the pressure on your representatives to oppose drilling in the Arctic Refuge. **Take action here!**

The 2,000-Acre Footprint Myth



A speculative scenario of how development could span the Coastal Plain. Click image to see enlarged map with key.

The Arctic National Wildlife Refuge drilling legislation that passed out of the Senate Energy and Natural Resources Committee today states that surface development in the Coastal Plain would be limited to 2,000 acres.

This 2,000-acre figure is often cited by proponents of drilling in the Refuge when they want to downplay the impact drilling would have on the Arctic ecosystem. The reality is that the entire 1.5-million-acre Coastal Plain would be subject to leasing and exploration. **Learn the truth behind this deceptive figure.**

National Petroleum Reserve-Alaska Featured in NY Times



Photo by Bob Wick / BLM

The "National Petroleum Reserve is more than an untapped oil drum waiting for a straw. The western Arctic contains a world, wild and rich and like no place else. It must not be sacrificed," writes Christopher Solomon in a commentary piece in the New York Times. **Read the article and view the amazing accompanying graphics here.**

Tongass Threatened by Congressional Review Act

Last December, the US Forest Service finalized an amendment to the Tongass Land Management Plan (TLMP). While the plan has some flaws, it still sets strong boundaries around ecologically important watersheds in the Tongass National Forest, and it affirms the need for a transition away from tax-payer subsidized, environmentally destructive, old-growth clearcut logging.

Unfortunately, this TLMP amendment

may be repealed by way of the Congressional Review Act (CRA), a law that empowers Congress to review new federal regulations and vote to overrule them by simple majority vote.

Learn more here.

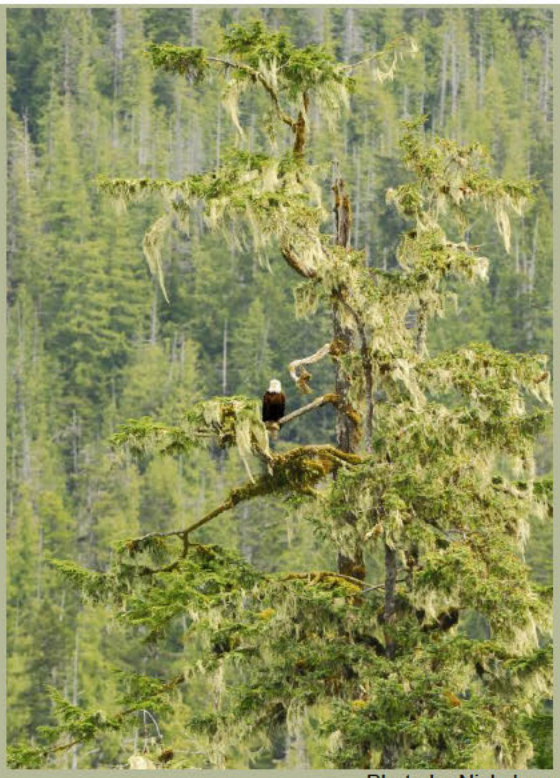


Photo by Nick Jans



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'Name that Bird' Photo Quiz



Photo by Mark Peck



Photo by Matthew Hansen

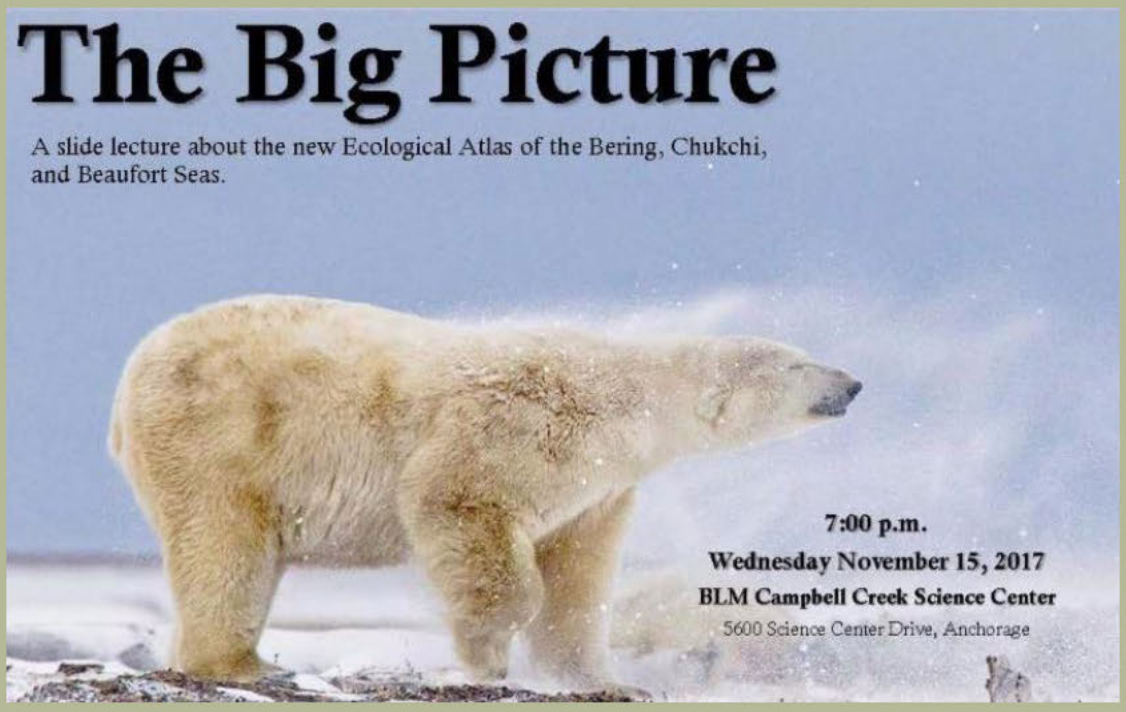
Last Month's Quiz Bird

Last month's quiz bird was the Pine Grosbeak. The grayish bodies of Pine Grosbeaks are decked out in pinkish reds on males and yellows on females. They are often absurdly tame, allowing very close approach.

This Month's Quiz Bird

This month's quiz bird breeds mostly on northern Great Plains, but localized populations also nest on tundra at James Bay, Ontario and on the Alaska Peninsula.

Upcoming Events



The Big Picture: An Ecological Atlas of the Bering, Chukchi, and Beaufort Seas
TONIGHT: Wednesday, November 15th, 7 pm
BLM Campbell Creek Science Center

5600 Science Center Drive

Join Max Goldman, Audubon Alaska's Arctic Marine Ecologist, for a fireside chat about the *Ecological Atlas of the Bering, Chukchi, and Beaufort Seas.* Max will explain the process of making the Atlas, the importance of scientific synthesis and data sharing, and the state of the Arctic and Arctic science today.
The talk is free and open to the public!



Bird Trivia Night!
Cynosure Brewing
Wednesday, December 6th
5:30 - 7:00 PM

Dust off those bird guides you set aside at the end of summer and start studying up! Audubon Alaska is hosting an evening of Alaska bird trivia at Cynosure Brewing. Enjoy some friendly competition and tasty craft beers.

Trivia will start at 6pm. Free event, beer available for purchase.
We hope to see you there!

Christmas Bird Count for Kids
The Alaska Zoo
Saturday, December 9th
9:00 AM - 1:00 PM

Kids 6 and over are invited to come explore the outdoors with experienced birders and discover how local birds tough out the Alaska winter. Only a small number of birding spots are available so please contact Stephanie Hartman at the Alaska Zoo at 907-341-6463 to make your reservations today! The fee is $3 per person.

Learn More

Return to top

Audubon Alaska, 431 West 7th Avenue, Suite 101, Anchorage, AK 99501

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From: Dufford, Sheila
To: Fischbach, Tracy
Subject: Re: Arctic NWR map
Date: Wednesday, November 15, 2017 6:55:43 PM
Attachments: Refuge & Villages.png

1st Draft

Sheila J. Dufford
Biologist / GIS Specialist
Yukon Flats National Wildlife Refuge
101 12th Avenue, Room 264
Fairbanks, AK 99701
907-456-0307
sheila_dufford@fws.gov
http://www.fws.gov/refuge/Yukon_Flats/

***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**

On Wed, Nov 15, 2017 at 3:15 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> I'm on my way out, but I will call you first thing tomorrow when I get in. Thanks for being willing to help out!
>
> My big need is a map of the Refuge with villages noted. I'm sure there will be more in the near future. Thanks - Tracy
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
>
> Hours: Mon - Thurs 9:15 am to 3:15 pm
> "Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie
>
> **Need access to Refuge Documents?**
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> FWS Region 7 Land Mapper (Public version)
> Region 7 GeoPDF Map Portal
>
> On Wed, Nov 15, 2017 at 2:37 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:
>
> > Tracy,
> > Please call me this is easier to talk about than sending emails back & forth.
> >
> > Sheila
> >
> > **Sheila J. Dufford**
> > **Biologist / GIS Specialist**

Yukon Flats National Wildlife Refuge
101 12th Avenue, Room 264
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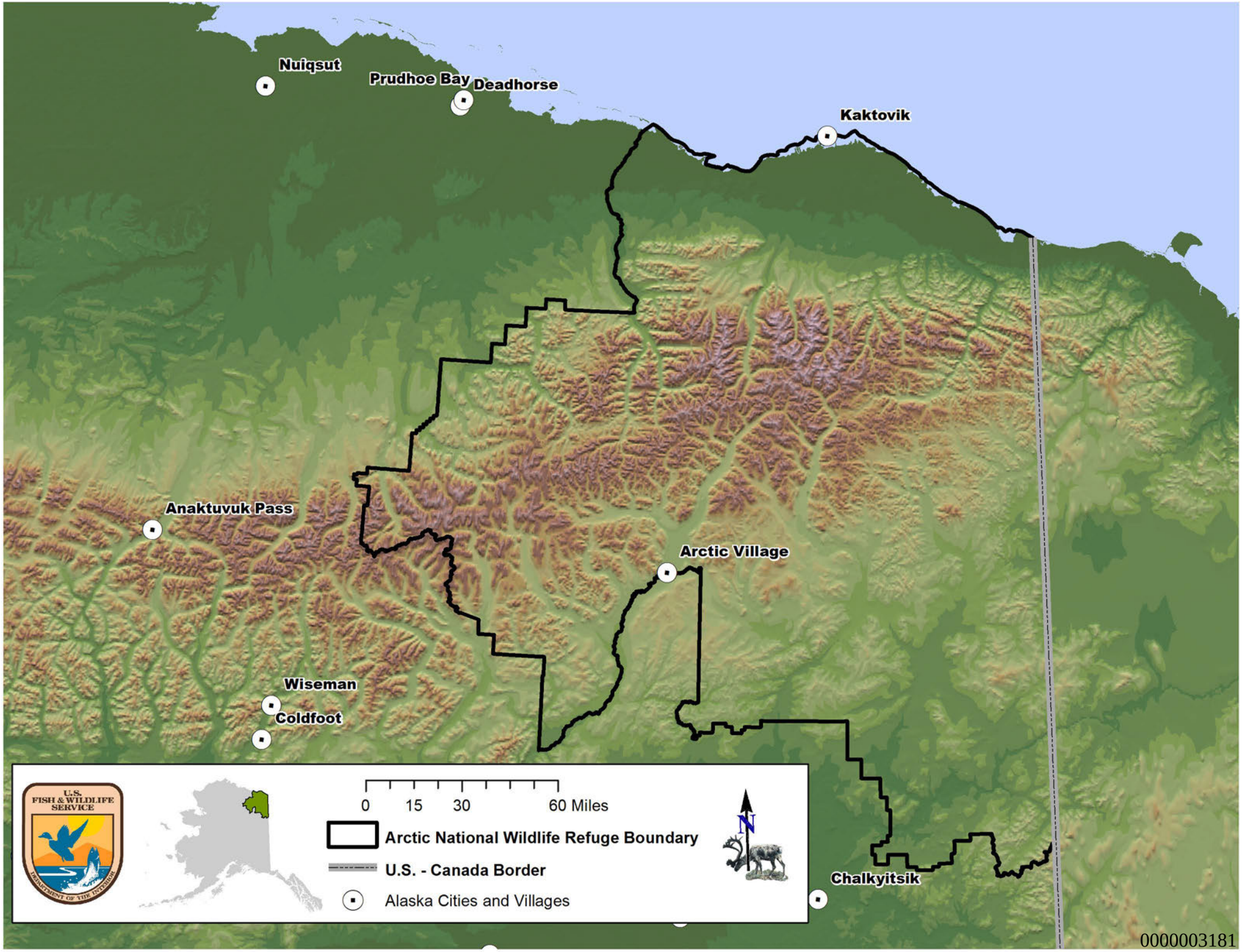
On Wed, Nov 15, 2017 at 2:20 PM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:

> I am looping in Tracy so she can answer your questions - I sent her and uploaded the map from the CCP to her google drive -so she has that in pdf. Thanks Sheila. Stephanie
>
> stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |
> U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska |
> 907.306.7448
>
> On Wed, Nov 15, 2017 at 2:13 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:
>
> > I pulled a copy of the CCP. Does Tracy have a map in the CCP or Otherwise that she likes that I could try and copy? I need to know what she wants on it. Just NWR boundaries and communities? Land Status? Shaded Relief? Major Rivers?
> >
> > Does she want an ArcGIS Project to manipulate? Or what format is she looking for?
> >
> > Sheila
> >
> > **Sheila J. Dufford**
> > **Biologist / GIS Specialist**
> > **Yukon Flats National Wildlife Refuge**
> > **101 12th Avenue, Room 264**
> > **Fairbanks, AK 99701**
> > **907-456-0307**
> > **sheila_dufford@fws.gov**
> > **http://www.fws.gov/refuge/Yukon_Flats/**
> >
> > ***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**
> >
> > On Wed, Nov 15, 2017 at 1:55 PM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:
> >
> > > yes I can pull the map from the CCP - figure 1-1 - but Tracy wants to manipulate it -so she does not want a pdf - everyone in cartographer in the RO is out - that is why I asked Sheila - but if it does not exist outside of a pdf - then we will have to work with what we have. thanks.
> > >
> > > stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |

U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448

On Wed, Nov 15, 2017 at 1:51 PM, Fox, Joanna <joanna_fox@fws.gov> wrote:

> Is there not one in the CCP? I believe Realty would have all of those.
>
> _____
> Joanna L. Fox
> Deputy Refuge Manager
> Arctic National Wildlife Refuge
> 101 12th Avenue, Room 236
> Fairbanks, AK 99701
> (907) 456-0549
>
> Follow us on Facebook!
> www.facebook.com/arcticnationalwildliferefuge
>
> *"Do what you can, with what you have, where you are." -- Theodore Roosevelt*
>
> On Wed, Nov 15, 2017 at 1:43 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:
>
> > I will check.
> > Sheila
> >
> > **Sheila J. Dufford**
> > **Biologist / GIS Specialist**
> > **Yukon Flats National Wildlife Refuge**
> > **101 12th Avenue, Room 264**
> > **Fairbanks, AK 99701**
> > **907-456-0307**
> > **sheila_dufford@fws.gov**
> > **http://www.fws.gov/refuge/Yukon_Flats/**
> >
> > ***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**
> >
> > On Wed, Nov 15, 2017 at 1:32 PM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:
> >
> > > Hi there Sheila - do you happen to have a map of Arctic refuge with the surrounding communities? We need this for the EA that Tracy is writing for the proposed rule for exploration - unfortunately, we need the map by 10am tomorrow morning - do you have anything that would work? thanks much - Stephanie
> > >
> > > stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448


Nuiqsut
Prudhoe Bay
Deadhorse
Kaktovik
Anaktuvuk Pass
Arctic Village
Wiseman
Coldfoot
Chalkyitsik
U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR
0 15 30 60 Miles
Arctic National Wildlife Refuge Boundary
U.S. - Canada Border
Alaska Cities and Villages
N
0000003181

From: McCaffery, Brian
To: Fischbach, Tracy
Subject: Re: Hail to the Early Risers
Date: Wednesday, November 15, 2017 6:58:19 PM
Attachments: Affected Environment by taxa.docx

Hey, Tracy,

Here's a draft of the affected environment section for eagles, resident birds, and terrestrial non-caribou wildlife. I still can't access the document via the drive, so I hope you can just cut and paste these in to the appropriate sections. I think I was able to get a portion of the eagle section inputted before it locked up. If so, just delete what's there, and paste in the entirety of what I'm sending you now.

Cheers,

BJM

PS -- Hope you get some sleep!

On Wed, Nov 15, 2017 at 3:12 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Hi all,
>
> I know that you are up and moving earlier than I will be in the morning, so here's my request.
>
> Nicole, can you start at the top of the document and start cleaning up fragmented sentences. Accept big changes that are obvious replacements of placeholder language and start looking for consistency issues. For instance, it should probably be "North Slope" not north slope or northslope. Also, keep an eye out for still remaining Kodiak language from my cut/paste. No deer in Arctic as far as I know.
>
> Brian and John, please look through the document and note glaring holes and think about strategies for plugging them. Think boiler plate language that gives us wiggle to fill it out later. For instance, "Additional literature review is needed to fully consider the consequences and cumulative effects of exploration activities on XXXXX resource."
>
> Also, everyone consider what maps we may need/want. Sheila Dufford at Arctic will be able to help us get some of those put together.
>
> Thanks everyone for all that you are doing. I REALLY appreciate it and I know the Refuge does as well.
>
> I'll be one my email later this evening and early in the morning.
>
> Cheers, Tracy
>
> 20171113_EA_ARC 1002 Reg Change_DRAFT
>
> Tracyann S Fischbach
> Natural Resources Planner

National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
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--
Brian J. McCaffery
U. S. Fish and Wildlife Service
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources
Branch of Conservation Planning and Policy

Phone: (907) 330-7514
e-mail: brian_mccaffery@fws.gov

"Do something that scares the living hell outta your boss!" -- Dan Ashe, former Director, USFWS

Bald eagles are considered a casual visitor on the coastal plain (Arctic NWR CCP) but recent observations suggest that they may be more accurately considered a very rare possible breeder in the 1002 area (T. Swem, pers. comm.). Golden eagles, on the other hand are fairly common visitors on the coastal plain, and rare breeders on the inland coastal plain (Arctic NWR CCP). Across the entire Arctic Coastal Plain, overall golden eagle numbers in spring increased significantly between 1986 and 2012 at an annual rate of 7%; over the last decade of that period the increase was significant at an annual rate of 37% (Stehn et al. 2013). The mean annual index for golden eagles over the entire period was 118 birds, but in 2012, the index reached an all-time high of 522 (Stehn et al. 2013).

The 1002 area is very important for non-breeding golden eagles, particularly subadults, which both scavenge and prey upon caribou during the calving and post-calving period of the Porcupine herd (Mauer 1985). Although none of the nest sites visited by Mauer (1985) and his colleagues were within the 1002 area, subsequent observations have confirmed them as a breeding species there, including at nest sites within core calving areas (T. Swem, pers.comm.).

Within the refuge, golden eagles breeding north of the crest of the Brooks Range begin nesting very early in spring. Based on a three-year study (1988-1990), nest initiation dates in those golden eagles ranged from 23 March to 11 May, with annual mean nest initiation dates of 22 April, 14 April, and 5 April in 1988, 1989, and 1990, respectively (Young et al. 1995). Those dates would include the last third of the operations phase and the entirety of the demobilization phase of a recently-proposed winter seismic exploration project farther west on the North Slope (BLM CPAI-NPR-A Final Seismic Environmental Assessment, 2016). Elsewhere, disturbance and development correlated with reduction in golden eagle nest success (Kochert et al. 2002); winter seismic activity could have similar result.

Four species of birds are considered permanent residents of the coastal plain: Willow Ptarmigan, Rock Ptarmigan, Gyrfalcon, and Common Raven (Arctic NWR CCP). Gyrfalcons are an uncommon resident of the inland coastal plain (Arctic NWR CCP); eyries are known in the 1002 area (T. Swem, pers. comm.). Even in the middle of winter, gyrfalcons may be present on their nesting territories; in the coastal Northwest Territories of Canada (at latitudes comparable to, or greater than, those of the 1002 area), gyrfalcons have been found on territory as early as February (Booms et al. 2008). Both species of ptarmigan are important components of the gyrfalcon diet, particularly in winter and early spring when other prey types are either absent or scarce (Watson et al. 2012). Nest initiation dates range from early April to early June and, as with the Golden Eagle, early-nesting birds could be disturbed by winter seismic exploration during both the late operation and demobilization phases. Gyrfalcons are known to be disturbed by both fixed-wing aircraft and helicopter overflights; disturbed birds are less likely to use the same site in subsequent year (Booms et al. 2008)

Terrestrial Mammals, Not Including Caribou

As established by ANILCA, the first purpose of the Arctic National Wildlife Refuge is to "conserve fish and wildlife populations and habitats in their natural diversity." Among the wildlife species specifically listed in ANILCA under this purpose are several species of large terrestrial mammals including caribou, Dall sheep, muskox, moose, brown bear, wolf, and wolverine. Caribou will be considered in the next section; Dall sheep do not occur on the coastal plain. Among the five species which do occur in that region, both muskox and moose have experienced marked population declines over the last few decades. After muskox were reintroduced to the North Slope in the Arctic Refuge in 1969 and 1970, the population grew steadily and rapidly from 1978 to 1985 and then remained relatively stable until nearly the end of the century. Beginning in 1998, however, numbers dropped dramatically for the next half decade and have remained very low ever since. The overall muskox population in northeast Alaska and northwest Canada peaked in 1993 and has declined since then, but most of that decline is due to losses from the Arctic Refuge. Today, most of the muskox in the area are either west or east of the Arctic Refuge (Arctic NWR CCP).

Moose populations in northeast Alaska, including the Arctic Refuge, increased rapidly in the third quarter of the 20th century. From 1989-1994, however, moose in this region declined by at least 50%, leading to harvest closures on state lands. By the early 21st century, moose populations west of the refuge had started to increase, but the same pattern did not hold on the Arctic Refuge. Relatively few moose occur east of the Canning River on the coastal plain or in the foothills of the refuge. Because of concerns about the small population size, harvest restrictions have been implemented (Arctic NWR CCP).

Of the two species, muskox is probably more vulnerable to potential disturbance on the coastal plain. Female muskox don't breed until they are four or five years old, most only breed every other year (or less frequently), and produce just a single calf. They subsist on generally poor quality forage in the winter time, and to compensate, they conserve energy by reducing their winter activity. In addition, calves are born between mid-April and mid-May, 4-6 weeks before snowmelt and subsequent green-up produce nutritious forage. As a result, late winter is a time of high vulnerability, and if any muskox were in the vicinity of seismic exploration camps and activity, disturbance could dangerously impact their energy balance (Arctic NWR CCP).

Grizzly bears, wolves, and wolverines all occur on the coastal plain, but are more common inland in the foothills and mountains of the Brooks Range. Among the three, bears may be the most vulnerable to disturbance. Throughout the Arctic, brown bears have low rates of reproduction. They exhibit a delayed age at first reproduction (nine years of age in the Arctic refuge), mean litter size of two, high first-year mortality, and an interval between successful litters of greater than three years. In addition, they emerge from their dens from late March through May; females with cubs usually emerge before adult males (Arctic NWR CCP). The den emergence period overlaps the late operation and entire demobilization phases of hypothetical winter seismic exploration. Human-bear conflicts would be possible at this time as recently-emerged and hungry bears are ranging widely in search of early spring food.

From:	Putnam, Christopher
To:	Kohout, Jenifer
Cc:	Fischbach, Tracy; Mary Colligan; Doug Damberg; Stephanie Brady; Patrick Lemons; James Wilder; Ryan Wilson
Subject:	Re: Polar Bear entry for the Arctic 1002 EA
Date:	Wednesday, November 15, 2017 7:44:17 PM
Attachments:	Polar bears and seismic surveys v2.docx

Hi Tracy,

Attached is the text for the Environmental Consequences section. Let me know if you have any questions.

Christopher Putnam
Supervisory Fish and Wildlife Biologist
Marine Mammals Management
U.S. Fish & Wildlife Service
1011 East Tudor Rd, MS 341
Anchorage, AK 99503-6199
907-786-3844 office
907-268-0577 mobile
907-786-3816 fax

"All that is gold does not glitter, not all those who wander are lost; the old that is strong does not wither, deep roots are not reached by the frost."
-- J.R.R. Tolkien

On Wed, Nov 15, 2017 at 4:05 PM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:

> Hi Tracy,
>
> Attached in our (Ryan's) polar bear entry for the Affected Environment.
>
> The Environmental Consequences section is almost complete; Christopher is just finishing up some of the citations.
>
> --Jenifer
>
> On Tue, Nov 14, 2017 at 11:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
>
> > Yes. Thank you!
> >
> > Tracyann S Fischbach
> > Natural Resources Planner
> > National Wildlife Refuge System - Region 7
> > Division of Natural Resources & Conservation Planning
> > (907) 786-3369
> >
> > Hours: Mon - Thurs 9:15 am to 3:15 pm
> > "Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie
> >
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FWS Region 7 Land Mapper (Public version)
Region 7 GeoPDF Map Portal

On Tue, Nov 14, 2017 at 11:23 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:

> Hi Tracy,
>
> Just following up on our conversations this morning.
>
> Ryan will draft the "Affected Environment" section focusing on status of the Southern Beaufort Sea subpopulation and use of the 1002 Area, particularly in the winter. He'll rely on USGS population surveys, the ESA critical habitat designation, and a recent publication showing more land-based denning, etc.
>
> Christopher will tackle the "Environmental Consequences" section. Assuming that the nature of the activity is exploratory (seismic) work in the winter, Christopher will pull in information from our SBS incidental take regulations/EA and will incorporate by reference mitigation measures that would reduce potential impacts on polar bears denning in the area. In this section, we will also touch on potential indirect consequences (e.g. impact of increased barge traffic) and cumulative impacts (e.g. climate change - sea ice loss - access to prey -- more nutritionally stressed bears on land, etc).
>
> We understand that you need our 1-2 page entries by Thurs (Nov 16) at 12 noon.
>
> --Jenifer

On Tue, Nov 14, 2017 at 8:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Hi,
>
> As Karen mentioned, we are in a big push to get a beefed up EA done for the regulation change that would open the 1002 for oil & gas exploration.
>
> Would you be able to break someone free to write a relatively short 1-2 page Affected Environment section and environmental consequences section for polar bears?
>
> I'll be in the office at 9, if folks have questions. I'll be working on trying to outline a hypothetical exploration plan based on a state proposal from 2015.
>
> Thank you!
> -Tracy
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
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--
Jenifer Kohout
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Alaska Region
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--
Jenifer Kohout
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Terrestrial oil and gas industry seismic survey activities on the North Slope of Alaska typically require between 80 and 160 personnel. Substantial logistical support is required for a seismic survey operation, and also to support the personnel camps, vehicles, security, aircraft operations, restocking of the explosive magazine (if explosives are used), medical support, scientists, marine mammal observers, ice road construction, barge traffic, and many other logistical and support functions.

Polar bears present in the Arctic National Wildlife Refuge 1002 area may be affected by seismic survey activities in various ways. Noise, vibrations, sights, and smells produced by seismic survey activities may elicit a wide range of responses from polar bears. Polar bears respond to the sights and sound of snowmachines, vehicles, vessels, and aircraft; especially helicopters (Watts and Ratson 1989; Dyck 2001; Dyck and Baydack 2004; Andersen and Aars 2005). Polar bear responses to disturbance are highly variable and are influenced by an individual bear's previous experiences and tolerance level. Polar bears are most likely to respond to the majority of seismic survey activities with short-term behavioral and physiological responses such as avoidance, increased vigilance, increased heart rate, and other stress responses. Disturbance during resting may result in increased energy expenditure or adverse physiological responses (Watts et al. 1991), but short-term reactions like these will rarely affect the health or survival of individual animals or the population. The effects of fleeing from aircraft may be minimal if the event is short and the animal is otherwise healthy and unstressed. However, on a warmer day, a short run may be enough to overheat a well-insulated polar bear. The effect of fleeing an aircraft or ground vehicle on polar bear cubs, particularly cubs of the year, would likely be the use of energy that otherwise would be needed for survival during a critical time in a polar bear's life, and potentially separation from the female. If the exposure and separation, or both, were brief and singular then the effect would most likely be minimal. Chronic disturbances, extreme reactions, disruption of key behaviors such as feeding or denning, or separation of dependent cubs from the female are more likely to affect health or survival. Polar bears directly interacting with seismic survey activities increase the risk of human-bear encounters, conflicts, and injury or death of polar bears.

Seismic survey activities disturbing female polar bears at maternal den sites are of great concern. Minimizing disturbance while bears are in dens is important because timing of den emergence is significantly related to cub survival (Rode et al. in review). Female polar bears entering dens and females in dens with cubs are more sensitive to noises than other age and sex groups. Disturbance during the early stages of denning may cause a female polar bear to abandon the den site in search of another one. A female polar bear may locate another suitable den site and continue her reproductive process Denning female bears may abandon their dens early in response to stress (Amstrup 1993). Amstrup (1993) reported most polar bears in dens continue to occupy the dens after close approaches by aircraft. Although the snow attenuates some aircraft noise (Blix and Lentfer 1992), repeated overflights may cause polar bears to abandon or depart their dens. Premature den site abandonment after the birth of cubs, or if the female abandons the cubs after they emerge from the den, will result in cub mortality. The potential for disturbance increases once the female emerges from the den. She is more vigilant against perceived threats and easier to disturb.

Though human activities (e.g. industrial, subsistence) are expected to exert a smaller influence on polar bear populations than the loss of sea ice habitat (Atwood et al. 2015; Regehr et al. 2015), the cumulative effects of seismic survey activity and climate change are not well understood. Habitat loss due to changes in Arctic sea ice is the primary cause of decline in polar bear populations, and the decline of sea ice is expected to continue throughout the polar bear's range for the foreseeable future (73 FR 28212, May 15 2008). Under both stabilized and unabated greenhouse gas emissions models, polar bears are expected to have greatly decreased persistence throughout the region (Atwood et al. 2015). The effects of seismic survey activity in the Arctic National Wildlife Refuge 1002 area combined with the effects of climate change could have unknown effects on the Southern Beaufort Sea population of polar bears.

The requirements of incidental take authorizations under the Marine Mammal Protection Act, such as polar bear interaction plans, training, monitoring, and mitigation measures have proven effective at reducing the effects of oil and gas industry activities, including seismic surveys, on polar bears in other areas of northern Alaska. Mitigation measures, including a pre-activity den survey and a 1.6-km (1-mi) operational exclusion zone around known dens help to limit disturbance of denning female polar bears. The current incidental take regulations for oil and gas industry activity in the Beaufort Sea and adjacent areas of northern Alaska, published in the Federal Register on August 5, 2016 (81 FR 52276), include a comprehensive analysis of the effects of oil and gas industry activity to polar bears, as well as mitigation, monitoring, and reporting requirements. A detailed description of mitigation measures that limit the effects of seismic surveys on polar bears is available at title 50 of the Code of Federal Regulations, part 18, subpart J, section 18.128.

References

Amstrup, S.C. 1993. Human disturbances of denning polar bears in Alaska. Arctic 46: 246-250.

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From: Tracy Fischbach
To: McCaffery, Brian
Cc: Gustine, Nicole; John Martin; Stephanie Brady
Subject: Re: Hail to the Early Risers
Date: Wednesday, November 15, 2017 7:47:53 PM

No worries. I really appreciate the extra time you've been putting in.

Sent from my iPad

On Nov 15, 2017, at 4:19 PM, McCaffery, Brian <brian_mccaffery@fws.gov> wrote:

> Yep, that task will have to wait until the morning, because I've still got to finish writing my AE sections tonight. FYI, I won't be able to attend the pre-submission conference tomorrow. I've got sick leave starting at the same time as the conference. Have got to drive to another town for a doctor's appt. Sorry about that!
>
> Brian
>
> On Wed, Nov 15, 2017 at 3:12 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
>
> Hi all,
>
> I know that you are up and moving earlier than I will be in the morning, so here's my request.
>
> Nicole, can you start at the top of the document and start cleaning up fragmented sentences. Accept big changes that are obvious replacements of placeholder language and start looking for consistency issues. For instance, it should probably be "North Slope" not north slope or northslope. Also, keep an eye out for still remaining Kodiak language from my cut/paste. No deer in Arctic as far as I know.
>
> Brian and John, please look through the document and note glaring holes and think about strategies for plugging them. Think boiler plate language that gives us wiggle to fill it out later. For instance, "Additional literature review is needed to fully consider the consequences and cumulative effects of exploration activities on XXXXX resource."
>
> Also, everyone consider what maps we may need/want. Sheila Dufford at Arctic will be able to help us get some of those put together.
>
> Thanks everyone for all that you are doing. I REALLY appreciate it and I know the Refuge does as well.
>
> I'll be one my email later this evening and early in the morning.
>
> Cheers, Tracy
>
> 20171113_EA_ARC 1002 Reg Change_DRAFT

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

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--
Brian J. McCaffery
U. S. Fish and Wildlife Service
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources
Branch of Conservation Planning and Policy

Phone: (907) 330-7514
e-mail: brian_mccaffery@fws.gov

"Do something that scares the living hell outta your boss!" -- Dan Ashe, former Director, USFWS

From: Tracy Fischbach
To: Putnam, Christopher
Cc: Kohout, Jenifer; Mary Colligan; Doug Damberg; Stephanie Brady; Patrick Lemons; James Wilder; Ryan Wilson
Subject: Re: Polar Bear entry for the Arctic 1002 EA
Date: Wednesday, November 15, 2017 7:49:18 PM

Excellent. Thank you!

Sent from my iPad

On Nov 15, 2017, at 5:44 PM, Putnam, Christopher <christopher_putnam@fws.gov> wrote:

> Hi Tracy,
>
> Attached is the text for the Environmental Consequences section. Let me know if you have any questions.
>
> Christopher Putnam
> Supervisory Fish and Wildlife Biologist
> Marine Mammals Management
> U.S. Fish & Wildlife Service
> 1011 East Tudor Rd, MS 341
> Anchorage, AK 99503-6199
> 907-786-3844 office
> 907-268-0577 mobile
> 907-786-3816 fax
>
> "All that is gold does not glitter, not all those who wander are lost; the old that is strong does not wither, deep roots are not reached by the frost."
> -- J.R.R. Tolkien
>
> On Wed, Nov 15, 2017 at 4:05 PM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:
>> Hi Tracy,
>>
>> Attached in our (Ryan's) polar bear entry for the Affected Environment.
>>
>> The Environmental Consequences section is almost complete; Christopher is just finishing up some of the citations.
>>
>> --Jenifer
>>
>> On Tue, Nov 14, 2017 at 11:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
>>> Yes. Thank you!
>>>
>>> Tracyann S Fischbach
>>> Natural Resources Planner

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On Tue, Nov 14, 2017 at 11:23 AM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:

> Hi Tracy,
>
> Just following up on our conversations this morning.
>
> Ryan will draft the "Affected Environment" section focusing on status of the Southern Beaufort Sea subpopulation and use of the 1002 Area, particularly in the winter. He'll rely on USGS population surveys, the ESA critical habitat designation, and a recent publication showing more land-based denning, etc.
>
> Christopher will tackle the "Environmental Consequences" section. Assuming that the nature of the activity is exploratory (seismic) work in the winter, Christopher will pull in information from our SBS incidental take regulations/EA and will incorporate by reference mitigation measures that would reduce potential impacts on polar bears denning in the area. In this section, we will also touch on potential indirect consequences (e.g. impact of increased barge traffic) and cumulative impacts (e.g. climate change - sea ice loss - access to prey -- more nutritionally stressed bears on land, etc).
>
> We understand that you need our 1-2 page entries by Thurs (Nov 16) at 12 noon.
>
> --Jenifer

On Tue, Nov 14, 2017 at 8:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Hi,
>
> As Karen mentioned, we are in a big push to get a beefed up EA done for the regulation change that would open the 1002 for oil & gas exploration.
>
> Would you be able to break someone free to write a relatively short 1-2 page

Affected Environment section and environmental consequences section for polar bears?

I'll be in the office at 9, if folks have questions. I'll be working on trying to outline a hypothetical exploration plan based on a state proposal from 2015.

Thank you!
-Tracy

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
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--
Jenifer Kohout
Deputy Assistant Regional Director for Ecological Services
Alaska Region
U.S. Fish & Wildlife Service
p. (907) 786-3687
e. Jenifer_Kohout@fws.gov

--
Jenifer Kohout
Deputy Assistant Regional Director for Ecological Services
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U.S. Fish & Wildlife Service
p. (907) 786-3687
e. Jenifer_Kohout@fws.gov

<Polar bears and seismic surveys v2.docx>

From:	Alaska Online Public Notices
To:	john_trawicki@fws.gov
Subject:	Alaska Online Public Notices for 11/15/2017
Date:	Wednesday, November 15, 2017 7:54:34 PM

Thank you for your interest in Alaska Online Public Notices

New Notices Published on 11/15/2017:

- **Boards and Commissions (Health and Social Services)** Alaska Commission on Aging - Executive Committee Meeting - November 20, 2017
- **Procurement (Natural Resources)** RFP 180000026, Dry Sonic Drilling Services for TLO at Icy Cape, Alaska
- **Procurement (Public Safety)** ITB 2018-1200-3853 -PROVIDE MAINTENANCE SERVICES FOR THE DEPARTMENT OF PUBLIC SAFETY PATROL VESSEL STIMSON.
- **Procurement (Transportation and Public Facilities)** RFP No. 25-18-1-014, Parks Hwy MP 183-192 Reconstruction
- **Public Notices (Administration)** Alaska Oil and Gas Conservation Commission
- **Public Notices (Commerce, Community and Economic Development)** NOTICE OF FILING PETITION TO REMOVE THE RESTRICTION ON AWU PAYING DIVIDENDS
- **Public Notices (Commerce, Community and Economic Development)** Public Meeting of the Regulatory Commission of Alaska
- **Public Notices (Commerce, Community and Economic Development)** Regulatory Commission of Alaska: Notice of Utility Tariff Filing (HEA)
- **Regulations (Commerce, Community and Economic Development)** Notice of Proposed Changes to Types of Licenses and Endorsements for a Deputy Marine Pilot License in the Regulations of The Board of Marine Pilots
- **Regulations (Corrections)** Pre-release Furlough
- **Regulations (Health and Social Services)** RESPONSE TO QUESTIONS REGARDING SUPPLEMENTAL NOTICE of Proposed Changes - Durable Medical Equipment, Prosthetics & Orthotics, & Supplies- Medicaid Coverage & Payment Regulations

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From: Burkart, Greta
To: Jorgenson, Janet
Cc: Christopher Latty
Subject: Re: Can someone send me Heidi"s snow report from the teams drive?
Date: Wednesday, November 15, 2017 8:10:35 PM

Thanks Janet,

The regional office is writing an EA for effects of seismic work in the 1002 area and Tracy Fischbach asked me to write something up for water resources and it has to get to them by tomorrow morning. This is just the first draft, so I am assumng they would contact you about additional drafts.

Greta

Greta Burkart, PhD
Aquatic Ecologist
US Fish and Wildlife Service
Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
101 12 th Ave Rm 236
Fairbanks, AK 99701
ph: (907) 456-0519
fax: (907) 456-0428
email: greta_burkart@fws.gov
www.facebook.com/arcticnationalwildliferefuge

On Wed, Nov 15, 2017 at 2:20 PM, Jorgenson, Janet <janet_jorgenson@fws.gov> wrote:

> Is this what you wanted? What is the EA for?
>
> On Wed, Nov 15, 2017 at 1:41 PM, Burkart, Greta <greta_burkart@fws.gov> wrote:
>
> > Can someone send me Heidi's snow report from the teams drive? It should be under reports. I just found out that I need to write part of an EA for impacts of seismic by Thursday at noon and I do not have access to the Teams drive.
> >
> > Thanks,
> >
> > Greta
> >
> > Greta Burkart, PhD
> > Aquatic Ecologist
> > US Fish and Wildlife Service
> > Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
> > 101 12 th Ave Rm 236
> > Fairbanks, AK 99701
> > ph: (907) 456-0519
> > fax: (907) 456-0428
> > email: greta_burkart@fws.gov
> > www.facebook.com/arcticnationalwildliferefuge

--
Janet C. Jorgenson
Botanist
Arctic National Wildlife Refuge
101 12th Ave, Rm 236
Fairbanks, Alaska 99701

907-456-0216

From: Frontier Energy
To: richard_lanctot@fws.gov
Subject: News from Frontier Energy Magazine
Date: Wednesday, November 15, 2017 9:04:46 PM

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Norway lawsuit says Arctic plan violates constitution

Norway's plan for Arctic oil exploration is unconstitutional because it violates the right to a healthy environment, a lawyer for Greenpeace and the Nature and Youth environmental group told an Oslo court on Tuesday, said Reuters. The case is the first of its kind in Norway and says a 2015 oil licensing round in the Arctic that gave awards to Statoil,

Thursday, November 16, 2017
Issue 284

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CALENDAR

Arctic Circle Forum
Scotland, UK
November 19 - 21
The Arctic Circle Forums are a series of specialised spin-off events from the main Arctic Circle Assembly, held annually in Iceland
Click here for more.

Arctic Futures Symposium
Brussels, Belgium
November 20
Arctic Futures is an annual event organised in Brussels to provide members of European Institutions and the wider Brussels international community

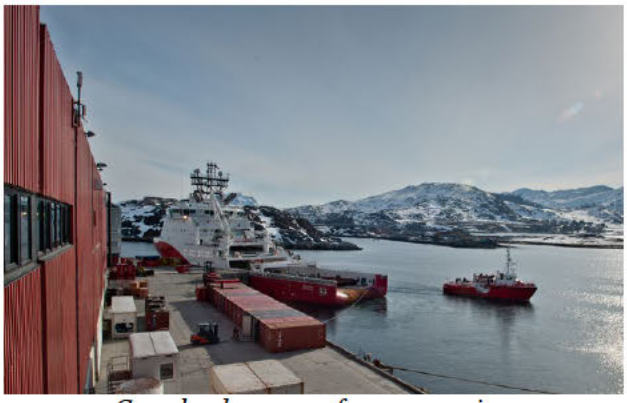


Explorers face legal uncertainty in Norway

Chevron and others violates the constitution.
Norway signed the 2016 Paris accord, which aims to end the fossil fuel era this century.
The country is Western Europe's largest oil producer and oil and gas are its most important exports.
Government lawyers say the case is a publicity stunt that would cost jobs if it is successful.



Offshore oil-gas assessment meetings in Iqaluit, Greenland



Greenland prepares for green review

Iqaluit residents will get a chance to participate in public sessions this week for a big environmental review of oil and gas resources in Baffin Bay and Davis Strait.
The Nunavut Impact Review Board will hold public meetings this week to discuss the issues raised.
It's part of the first phase of a process that started earlier this year called a strategic environmental assessment, or SEA.
The Iqaluit meetings are part of an early "scoping" process aimed at creating a master list of priorities for the strategic assessment.
The final version of the scoping document is supposed to be completed by February 2018, and the SEA is supposed to be completed by March 2019, when the NIRB will submit a final report.
The Liberal government asked the NIRB to do the SEA this past February, following an earlier commitment by the previous Conservative government that was stalled for nearly three years.
Ottawa wants the NIRB to look at oil and gas resources in Baffin Bay and Davis Strait and the potential environmental and socio-economic impacts of developing them.
The NIRB's assessment will inform Ottawa's review of its five-year ban on Arctic offshore oil and gas licences, announced in late 2016.

Arctic wildlife refuge drilling faces Washington vote

Oil drilling in a vast Alaskan wildlife refuge could move a step closer to reality this week as the US

with the opportunity to engage with Arctic stakeholders and specialists on the various challenges and issues facing the Arctic today.
For further information click here.

11th Arctic Shipping Summit
London
November 29 - 30
ACI's 11th Arctic Shipping Summit will gather leading experts and stakeholders from across the sector of to discuss the development of viable and profitable business ventures in the Arctic whilst overcoming the challenges posed by regulations, environmental considerations, logistical complexity and the need for reliable data and communications, skilled and well-trained crews and safe procedures.
Click here for more details.

Arctic Change 2017
December 11 - 15
Québec, Canada
Building on the success of its previous Annual Scientific Meetings, the ArcticNet Network of Centres of Excellence and its partners are hosting this event bringing together the global Arctic research community.
Arctic Change 2017 will bring together leading Arctic researchers, graduate students, Northern community representatives, and government and industry partners and stakeholders from all fields. During the week, the world's foremost Arctic scientists will

government's Senate panel votes to open part of the reserve coveted by conservationists, say local news reports. Republicans, who control Congress and the White House, have long wanted to prise open a portion of the Arctic National Wildlife Refuge on the north coast known as the 1002 area.Republicans, who control Congress and the White House, have long wanted to prise open a portion of the Arctic National Wildlife Refuge on the north coast known as the 1002 area.



Alaska face uncertainty in upstream developments



Russia expects steady growth of Arctic oil over next decades

The share of Russian oil, produced in the Arctic zone, would grow by 2035 from 17 to 26%, Russia's First Deputy Minister of Energy Alexei Teksler said. "By 2035, the share of oil, produced in the Arctic, would grow to 26%," he said.
This means, that the Arctic production would grow to more than 90 million tonnes against the current level of 60 million tonnes. According to the deputy minister, the oil deposits in the Arctic take about 22% of the oil reserves in Russia.
The gas production in the Arctic would also grow. In 20 years, the growth would be 200 bcm. The share of the "Arctic" gas in the Russian production would remain about the same - slightly over 80%, where the Arctic deposits take the share of 65%, first of all the fields in Yamal.

Arctic scientists, geologists prepare for UN meeting in 2018

Expert involving Canadian, Danish, US and Norwegian scientists will start in 2018 to discuss the issues of the allegiance of underwater tectonic structures in the Arctic Ocean to various sections of the Arctic shelf, Leopold Lobkovsky, member of the team that prepared the Russian Academy of Sciences' submission and Deputy Director of Geology at Shirshov Oceanology Institute of the Russian Academy of Sciences, told RIA Novosti.
During the 45th session of the UN Commission on the Limits of the Continental Shelf, which will take place in New York on November 13-17, the last two geographical points in Russia's Arctic shelf expansion bid will be considered. Russian Minister of Natural Resources and Environment Sergei Donskoi will take part in the meeting.
"Norway and Denmark have also submitted bids to set the outer limits of the Arctic continental shelf to the UN Commission, Canada is expected to do so in the near future, and the US later. We will have to consult with all these countries, agree upon our submission, taking into account our common problems related to the Lomonosov and Alfa-Mendelyev ridges, which are parts of various continental edges of the Arctic Ocean. We are planning to begin these consultations next year," Lobkovsky said.

Russia to submit new Arctic basins to UN in November

Russian natural resources and environment minister Sergei Donskoi will update the United Nations sub-commission on the tectonic model of the Amundsen and Nansen basins in the central Arctic Ocean as part of the review of Russia's request to expand its Arctic shelf boundaries, the Natural Resources and Environment Ministry reported.
The UN sub-commission has studied data to determine and analyse the foot of the continental slope in the Amundsen, Nansen and Makarov basins. Russia provided evidence relating to 44 points ascertaining the foot of the continental slope and 42 of these

discuss the emerging global challenges and opportunities arising from climate change and modernization in the circum-Arctic. With over 1500 participants expected to attend, Arctic Change 2017 will be one of the largest trans-sectoral international Arctic research conferences ever held in Canada.
www.arcticnet.ulaval.ca

2018

Arctic Frontiers: Connecting the Arctic
January 21 - 26
Tromso, Norway
Arctic Frontiers is an international arena on sustainable development in the Arctic. The conference addresses the management of opportunities and challenges to achieve viable economic growth with societal and environmental sustainability.
Arctic Frontiers brings academia, government and business together to create a firmer foundation for decision-making and sustainable economic development in the Arctic. Join the Arctic Frontiers conference preparing the new Arctic future.
For more information, please click here.

48th International Arctic Workshop
April 5 - 6
Boulder, Colorado
The Arctic Workshop is open to all interested in high latitude environments, including those of the past, present, and future. Talks and posters on all aspects of Arctic science, social science, and engineering are invited, including Arctic and Antarctic climate, anthropology, atmospheric chemistry, engineering and

were recognised as appropriate. The sub-commission requested clarification on the remaining two points, which concerned the Amundsen and Nansen basins. The required updated data is to be presented in New York in mid-November.
A concurrent meeting of a separate sub-commission will review Canada's request to expand its continental shelf boundaries.

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SCAR/IASC Open Science Conference
2018 Arctic Observing Summit

TIMELINE

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19 - 23 June
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POLAR2018 is a joint event from the Scientific Committee on Antarctic Research SCAR and the

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www.polar2018.org

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From: Fischbach, Tracy
To: Steve Berendzen
Subject: Re: 1002 EA Review
Date: Wednesday, November 15, 2017 9:48:02 PM

Sound great! I'll send you an email with the phone number and you can just call in directly to the conference room.

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
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On Wed, Nov 15, 2017 at 6:01 PM, Steve Berendzen <steve_berendzen@fws.gov> wrote:

> Tracy, I'm at NCTC this week, but would like to join the call if u
> would have a conference line available
>
> Sent from my iPhone
>
> > On Nov 15, 2017, at 7:13 PM, Tracy Fischbach <tracy_fischbach@fws.gov> wrote:
> >
> > You have been invited to the following event.
> >
> > Title: 1002 EA Review
> > Hi all,
> >
> > For those outside Refuges, you're attendance is not required, but if you
> > are still able and willing to help, you are very welcome. We will go
> > through the document relatively quickly in order to determine where
> > significant gaps remain and what to do about them. We do know we are
> > allowed to say, "Additional literature review is needed to fully consider
> > the consequences and cumulative effects of exploration activities on XXXXX
> > resource." I will have the Vidyo on. If you need a conference call line,
> > please let me know.
> >
> > Thanks!
> > When: Thu Nov 16, 2017 11am – 12pm Alaska Time
> > Where: FWS-FW7 NWRS Conference Room/Regional Office

> Video call: b5 - CIP [redacted]
> Calendar: steve_berendzen@fws.gov
> Who:
> * tracy_fischbach@fws.gov - organizer
> * wendy_loya@fws.gov
> * edward_decleva@fws.gov
> * margaret_perdue@fws.gov
> * john_trawicki@fws.gov
> * stephanie_brady@fws.gov
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From: Fischbach, Tracy
To: Dufford, Sheila
Subject: Re: Arctic NWR map
Date: Wednesday, November 15, 2017 11:28:09 PM

We'll need the outline of the 1002 area and the label at the bottom covers Venetie and Fort Yukon which the CCP mentions. We haven't talked in the document about Nuiqsut. Do we need to?

Thanks so much for jumping in. -Tracy

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

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On Wed, Nov 15, 2017 at 4:55 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:

> 1st Draft
>
> **Sheila J. Dufford**
> **Biologist / GIS Specialist**
> **Yukon Flats National Wildlife Refuge**
> **101 12th Avenue, Room 264**
> **Fairbanks, AK 99701**
> **907-456-0307**
> **sheila_dufford@fws.gov**
> **http://www.fws.gov/refuge/Yukon_Flats/**
>
> ***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**
>
> On Wed, Nov 15, 2017 at 3:15 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
>
> > I'm on my way out, but I will call you first thing tomorrow when I get in. Thanks for being willing to help out!
> >
> > My big need is a map of the Refuge with villages noted. I'm sure there will be more in the near future. Thanks - Tracy
> >
> > Tracyann S Fischbach
> > Natural Resources Planner

National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

Hours: Mon - Thurs 9:15 am to 3:15 pm
"Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie

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On Wed, Nov 15, 2017 at 2:37 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:

> Tracy,
> Please call me this is easier to talk about than sending emails back & forth.
>
> Sheila
>
> **Sheila J. Dufford**
> **Biologist / GIS Specialist**
> **Yukon Flats National Wildlife Refuge**
> **101 12th Avenue, Room 264**
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>
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>
> On Wed, Nov 15, 2017 at 2:20 PM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:
>
> > I am looping in Tracy so she can answer your questions - I sent her and uploaded the map from the CCP to her google drive -so she has that in pdf. Thanks Sheila. Stephanie
> >
> > stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448
> >
> > On Wed, Nov 15, 2017 at 2:13 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:
> >
> > > I pulled a copy of the CCP. Does Tracy have a map in the CCP or Otherwise that she likes that I could try and copy? I need to know what she wants on it. Just NWR boundaries and communities? Land Status? Shaded Relief? Major Rivers?

Does she want an ArcGIS Project to manipulate? Or what format is she looking for?

Sheila

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***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**

On Wed, Nov 15, 2017 at 1:55 PM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:

> yes I can pull the map from the CCP - figure 1-1 - but Tracy wants to manipulate it -so she does not want a pdf - everyone in cartographer in the RO is out - that is why I asked Sheila - but if it does not exist outside of a pdf - then we will have to work with what we have.
> thanks.
>
> stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448
>
> On Wed, Nov 15, 2017 at 1:51 PM, Fox, Joanna <joanna_fox@fws.gov> wrote:
>
> > Is there not one in the CCP? I believe Realty would have all of those.
> >
> > _____
> > Joanna L. Fox
> > Deputy Refuge Manager
> > Arctic National Wildlife Refuge
> > 101 12th Avenue, Room 236
> > Fairbanks, AK 99701
> > (907) 456-0549
> >
> > Follow us on Facebook!
> > www.facebook.com/arcticnationalwildliferefuge
> >
> > *"Do what you can, with what you have, where you are." -- Theodore Roosevelt*
> >
> > On Wed, Nov 15, 2017 at 1:43 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:
> >
> > > I will check.
> > > Sheila

Sheila J. Dufford
Biologist / GIS Specialist
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***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**

On Wed, Nov 15, 2017 at 1:32 PM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:

> Hi there Sheila - do you happen to have a map of Arctic refuge with the surrounding communities? We need this for the EA that Tracy is writing for the proposed rule for exploration - unfortunately, we need the map by 10am tomorrow morning - do you have anything that would work? thanks much - Stephanie
>
> stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448

From: Fischbach, Tracy
To: Gustine, Nicole; John Martin; Brian McCaffery
Cc: Stephanie Brady
Subject: Re: Hail to the Early Risers
Date: Wednesday, November 15, 2017 11:30:52 PM

Ok. I've added Brian's sections. I think a big fix is going to be straightening out the headings in Chapter 4. This is also where we need significant work. Chapter 3 looks ok. Not great, but ok. We also need to start moving the citations to the reference section. Because we have so few clearly laid out effects, we may want to consider just removing those tables from Chapter 2 for now.

-T

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
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On Wed, Nov 15, 2017 at 3:12 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Hi all,
>
> I know that you are up and moving earlier than I will be in the morning, so here's my request.
>
> Nicole, can you start at the top of the document and start cleaning up fragmented sentences. Accept big changes that are obvious replacements of placeholder language and start looking for consistency issues. For instance, it should probably be "North Slope" not north slope or northslope. Also, keep an eye out for still remaining Kodiak language from my cut/paste. No deer in Arctic as far as I know.
>
> Brian and John, please look through the document and note glaring holes and think about strategies for plugging them. Think boiler plate language that gives us wiggle to fill it out later. For instance, "Additional literature review is needed to fully consider the consequences and cumulative effects of exploration activities on XXXXX resource."
>
> Also, everyone consider what maps we may need/want. Sheila Dufford at Arctic will be able to help us get some of those put together.
>
> Thanks everyone for all that you are doing. I REALLY appreciate it and I know the Refuge does as well.
>
> I'll be one my email later this evening and early in the morning.
>
> Cheers, Tracy

20171113_EA_ARC 1002 Reg Change_DRAFT

Tracyann S Fischbach
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From: Fischbach, Tracy
To: Greg Siekaniec; Karen Clark; Mitch Ellis; Socheata Lor; Doug Damberg; Steve Berendzen; Stephanie Brady
Subject: Update on a Wednesday Evening
Date: Wednesday, November 15, 2017 11:40:03 PM

So, we have most of Chapter 1 (intro), 2 (summary), and 3 (affected environment) done. At least as good as we'll probably get it. We have lots of holes in Chapt 4 (environmental consequences) that we'll figure out tomorrow. The big things like Polar Bears are done. Many of the other resources are harder to nail down because there hasn't been as much done with them in conjunction with oil & gas development. The writing team is meeting tomorrow at 11 am to go through the document generally to discuss the glaring holes and strategize about what to do with them. We may remove some of the sections entirely. We may put something really general in others. Stay tuned. The document has changed considerably. Because we have team members in time zones to our east, they will be doing some heavy editing in the morning before the rest of us get going.

Do let us know if you have additional guidance for us to consider at our discussion tomorrow or if you would like to dial in. I will have Vidyo on, and can get a conference call line opened if necessary.

Cheers, T

P.S. The November chapter of a Sand County Almanac includes the well-known section about being an axe-man... taking responsibility for the actions we take on the land. Thoughtful reading indeed.

20171113_EA_ARC 1002 Reg Change_DRAFT

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From: Burkart, Greta
To: Perdue, Margaret
Subject: Re: Draft for review
Date: Thursday, November 16, 2017 5:29:38 AM
Attachments: 1002 Area EA AffectedEnvironment_GretaVersion1.docx

---

Thanks! For some reason your message did not come in until this morning, so I went ahead and wrote an Affected Environment Section and was about to start on environmental consequences. I will work what I have done into what you have so far. In case you are interested, I have attached what I wrote. I still need to add the references.

Thanks again!

Greta

Greta Burkart, PhD
Aquatic Ecologist
US Fish and Wildlife Service
Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
101 12 th Ave Rm 236
Fairbanks, AK 99701
ph: (907) 456-0519
fax: (907) 456-0428
email: greta_burkart@fws.gov
www.facebook.com/arcticnationalwildliferefuge

On Wed, Nov 15, 2017 at 4:31 PM, Perdue, Margaret <margaret_perdue@fws.gov> wrote:

> Hi Greta ---
>
> Here's what we've got at this point for affected environment.
> --
> Meg Perdue, Water Quality Specialist
> Water Resources Branch - National Wildlife Refuge System
> U.S. Fish & Wildlife Service Regional Office MS 235
> 1011 E. Tudor Rd
> Anchorage, AK 99503
> phone: 907-786-3421 fax: 907-786-3976
> email: margaret_perdue@fws.gov

The Canning River forms the western boundary of the 1002 area of the Arctic NWR. Nearly 100 miles to the east the Aichilik River forms the eastern boundary. There are over 3,000 lakes, ten large rivers and fourteen named smaller rivers and streams in the 1002 area. Mountain streams and rivers flow north from the Brooks Range to the Beaufort Sea. Tundra streams and rivers flow north from the foothills and the coastal plain to the Beaufort Sea. There are six documented spring-fed reaches in the 1002 area.

The entire 1002 area is underlain by continuous permafrost, which limits infiltration and retention of surface water. The distribution of permafrost and depth of the active layer have a strong influence on surface water balance. The Arctic climate and permafrost are the controlling physical forces of the hydrologic cycle across the coastal plain.

Most major rivers originate in the Brooks Range, flow almost directly north into the Arctic Ocean, and have relatively few tributaries, while smaller streams and rivers contribute substantial volumes of water and sediment to coastal ecosystems. Based on origin, hydrologic regimes, and chemical and biological characteristics, Craig and McCart (1975) classified North Slope streams and rivers into three categories: mountain, spring-fed, and tundra. Mountain streams are typically fast flowing and fed by varying proportions of snowmelt, glacier meltwater, and spring-fed tributaries. Waters are cold (usually less than 50 °F), occasionally turbid, moderately hard, and support low invertebrate densities. The most common species of fish in mountain streams is Dolly Varden. Spring-fed streams are often tributaries of mountain streams and have relatively stable flows and temperatures throughout the year. Spring-fed waters are characterized by low levels of dissolved solids and very high densities of macroinvertebrates. Many spring-fed streams provide critical spawning and overwintering habitat for Dolly Varden. Tundra streams originate in the Brooks Range Foothills and coastal plain ecoregions, are fed by surface runoff, tend to be meandering systems, and have low to moderate invertebrate densities. Waters are typically warmer and exhibit lower pH and conductivity relative to mountain and spring-fed streams. Huryn et al. (2004) found that gradients in freezing probability, nutrient concentrations, and substratum instability control invertebrate communities in these systems.

Six of the 18 springs studied by Childers et al. 1977 are located in the 1002 area: Sadlerochit Spring, Red Hill Spring, Katakturuk River tributary spring, Hulahula River spring at fish hole #1, Okerokovik River spring, and Aichilik River spring. Sadlerochit is the largest of these springs. During winter when surface runoff has ceased due to freezing, ice-free water associated with discharge from groundwater springs provides important wintering habitat for thousands of fish and unique macroinvertebrate communities (Craig 1984?). Downstream from spring-fed areas, overflow water freezes and forms aufeis which melts later than snow and can be a large source of discharge later in the summer season. Many aufeis formations are extensive. They melt slower than snow and often persists throughout the summer. Some are used by caribou for insect relief during the summer. Childers et al. (1977) reported that nearly contiguous fields of aufeis covered over one hundred miles from the upper reaches of the Canning River down to its delta.

Approximately 75% of the Refuge's North Slope lakes are in the 1002 area and are typically shallow thaw and depression lakes with surface areas ranging from 1,500 acres to less than 10 acres. The density of lakes in the 1002 area is much lower than in the nearby National Petroleum Reserve-Alaska. Most lakes in the 1002 area are shallow and freeze to the bottom during winter (Trawicki et al. 1991). The distribution of lakes is uneven. The topographic relief on the western portion of the Arctic NWR prohibits

the formation of thaw lakes, thus, there are very few lakes between the Canning and Sadlerochit rivers. Most lakes form in relatively flat terrain and in general are isolated from river drainage systems by permafrost. The majority of lake surface area is at the mouth of the Canning River and in the vicinity of the Jago River. Recharge of lakes has not been studied, but is thought to occur by during snowmelt, overbank flooding, and precipitation. When not connected to larger drainage networks, evaporation has a strong influence on water chemistry and plays an important role in regulating lake water balance. Jorgenson and Shur (2007) classified coastal plain lakes based on origin: thaw, depression, riverine, and delta. Thaw lakes are formed by the degradation of ice-rich sediments and are found on river deltas. Depression lake basins are formed in undulating sandy, alluvial marine or eolian deposits. Most lakes in the 1002 area are small ponds in the depression lakes region between the Hulahula and Niguanak rivers. Riverine lakes include oxbow and floodplain lakes along sinuous channels and thaw lakes formed in ice-rich abandoned channels. Riverine lakes are most concentrated along the Jago and Niguanak rivers. Delta lakes include thaw, riverine, and tidal lakes and most are found in deltas of the Hulahula, Jago, Aichilik, and Canning rivers. Up to 80 percent of the winter water volume is in lakes in the Canning River delta (Trawicki et al. 1991). Lakes in the foothills tend to be deeper, have larger surface areas, and store much greater volumes of water than coastal plain lakes. Limnology of lakes in the Refuge has not been well studied. In the past half a century, the duration of ice cover, thermal regimes, and rates of primary productivity have likely changed. In the future, changes in temperature, active layer depth, fire frequency and severity, and erosion rates could affect lake distribution, water quality, water levels, size, and connectivity to other habitats.

The extreme cold temperatures and short days during the winter cause the streams and lakes to freeze to substrate. Lake ice thickness is dependent on snow cover or water-depth, but in general ice thickness is two feet by mid-November and by mid-January the ice thickness is four feet. The maximum ice thickness on lakes along the coastal plain is six to seven feet (Bilello and Bates 1969, 1971, 1972, and 1975). Shallow lakes that freeze to the bottom in the winter melt from the surface down. Ice on the deeper lakes that do not freeze to substrate may be present well into July. Most streams and rivers freeze in October or November and remain frozen until temperatures warm and break-up occurs in late May or early June (Lyons and Trawicki 1994).

During late winter, unfrozen water provides critical habitat for fish in the Refuge (Craig 1989) and only exists in small isolated areas downstream from flowing surface water associated with springs (Childers et al. 1977, Craig 1989a), in lakes deeper than seven feet (Trawicki et al. 1991, Lyons and Trawicki 1994), and below ice hummocks (Elliot and Lyons 1990, Lyons and Trawicki 1994). A total of 8,839,200 gallons of water is estimated to occur beneath 604 ice hummocks along rivers during winter (Elliott and Lyons 1990). Breakup on the North Slope occurs in a brief period in late-May or early-June. Snowmelt begins earliest in the mountains and foothills and progresses towards the coastal plain. The rapidly melting water from the foothills runs over the frozen ground as sheetflow. Infiltration is prohibited because of the presence of permafrost. Water in the stream channels rises rapidly, flowing over ice-covered stream channels. As much as 50 percent of the annual flow of North Slope rivers may take place during breakup (Clough et al. 1987, and Sloan 1987). After break-up, streams and rivers are fed by a variety of sources, including precipitation, springs, and meltwater from aufeis and glaciers (Lyons and Trawicki 1994, Childers et al. 1997). Later in the summer season, infrequent precipitation events can lead to loss of instream connectivity, which can have negative impacts on fish migrating to critical overwintering habitat (Lyons and Trawicki 1994).

Information for Environmental Consequences…

Because unfrozen water is limited in winter, conflicts between overwintering fish populations and industrial water withdrawals seem likely (West et al. 1992). Water withdrawal and its direct influence on reducing available habitat (wetted space) probably impacts stream fish populations more than any other winter alteration of streams (Cunjak 1996). Since the distribution of Arctic grayling adults (as well as juveniles) is extremely restricted during the long arctic winter when most of the drainage is frozen solid (Craig and Poulin 1975), water removal , causing reduced groundwater flow or altered baseflow and ice and temperature regimes has the potential to affect all

From: Burkart, Greta
To: Perdue, Margaret
Subject: Re: Draft for review
Date: Thursday, November 16, 2017 5:31:30 AM
Attachments: NAASH Greta one slide.pptx

I am also attaching a poster I made of some of threats to water quality in the 1002 area.

Greta Burkart, PhD
Aquatic Ecologist
US Fish and Wildlife Service
Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
101 12 th Ave Rm 236
Fairbanks, AK 99701
ph: (907) 456-0519
fax: (907) 456-0428
email: greta_burkart@fws.gov
www.facebook.com/arcticnationalwildliferefuge

On Thu, Nov 16, 2017 at 3:29 AM, Burkart, Greta <greta_burkart@fws.gov> wrote:

> Thanks! For some reason your message did not come in until this morning, so I went ahead and wrote an Affected Environment Section and was about to start on environmental consequences. I will work what I have done into what you have so far. In case you are interested, I have attached what I wrote. I still need to add the references.
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> Thanks again!
>
> Greta
>
> Greta Burkart, PhD
> Aquatic Ecologist
> US Fish and Wildlife Service
> Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
> 101 12 th Ave Rm 236
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> > Hi Greta ---
> >
> > Here's what we've got at this point for affected environment.
> > --
> > Meg Perdue, Water Quality Specialist
> > Water Resources Branch - National Wildlife Refuge System
> > U.S. Fish & Wildlife Service Regional Office MS 235
> > 1011 E. Tudor Rd
> > Anchorage, AK 99503

phone: 907-786-3421 fax: 907-786-3976
email: margaret_perdue@fws.gov

Immediate Needs for Water Quantity & Quality Studies in the 1002 Area of the Arctic National Wildlife Refuge



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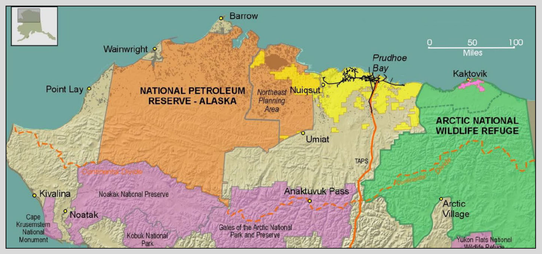
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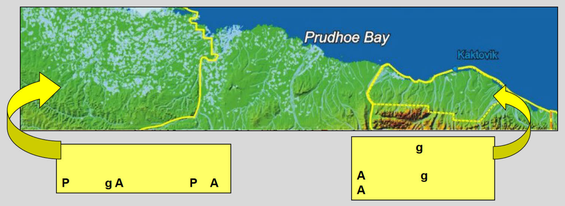
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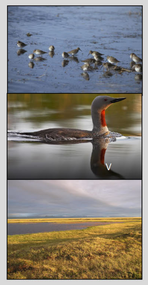
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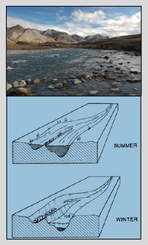


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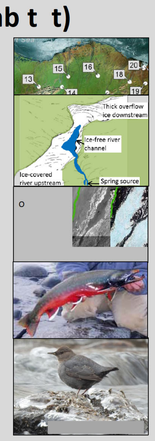


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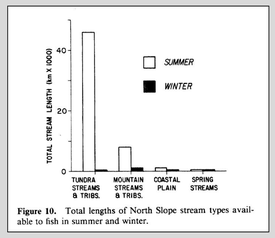
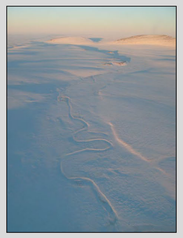


Figure 10. Total lengths of North Slope stream types available to fish in summer and winter.





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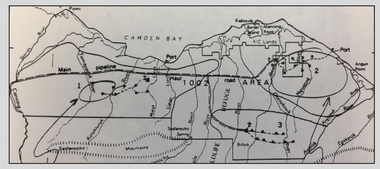
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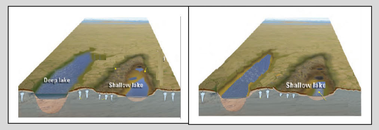
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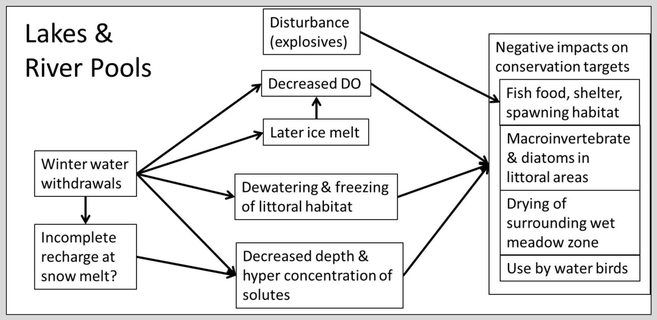
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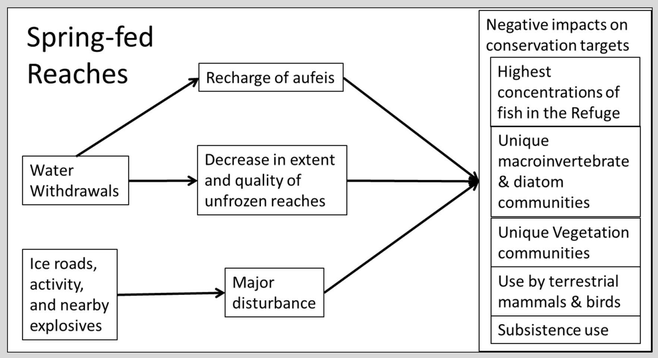
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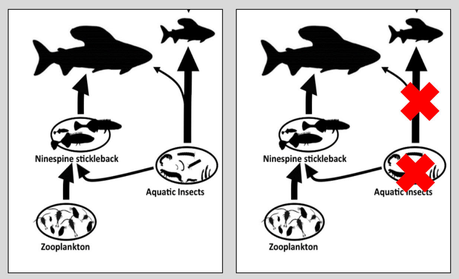








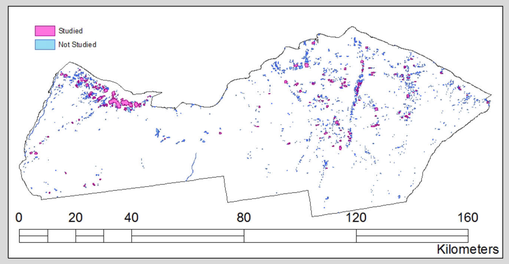
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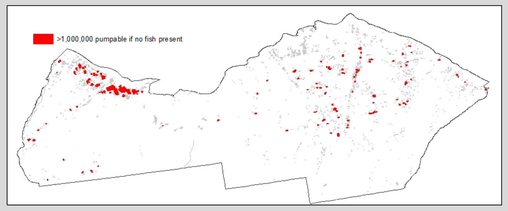
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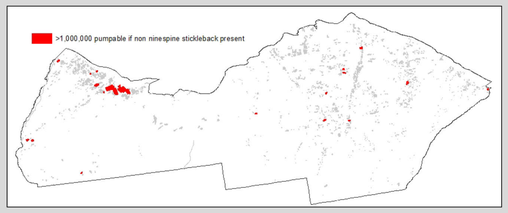
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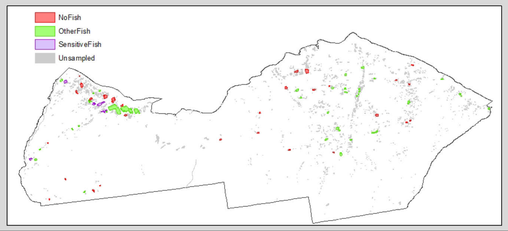
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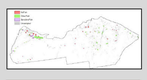
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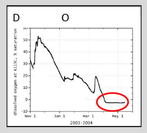
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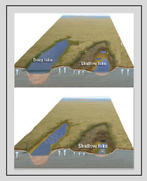
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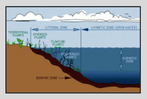




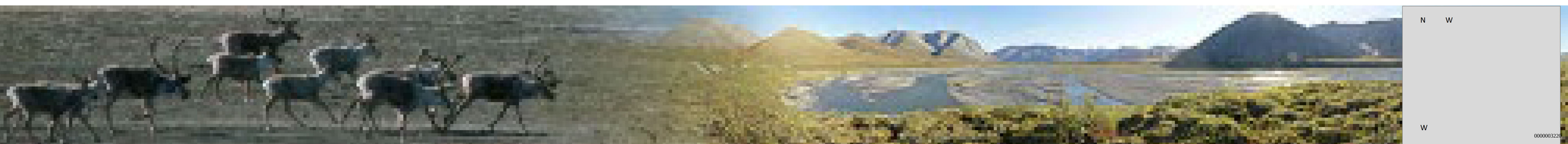












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From: kevinp
To: gnickas@wildernesswatch.org; dserra@wildernesswatch.org; jsmith@wildernesswatch.org; gary@wildrockies.org; danajohnson@wildernesswatch.org; b6 @gmail.com; b6 @gmail.com; b6 r@mosquitonet.com; roger_kaye@fws.gov
Subject: From E&E Daily -- ARCTIC: Murkowski faces new GOP threat to ANWR drilling
Date: Thursday, November 16, 2017 6:38:09 AM

This E&E Daily story was sent to you by: kevinp@wildernesswatch.org

E&E DAILY

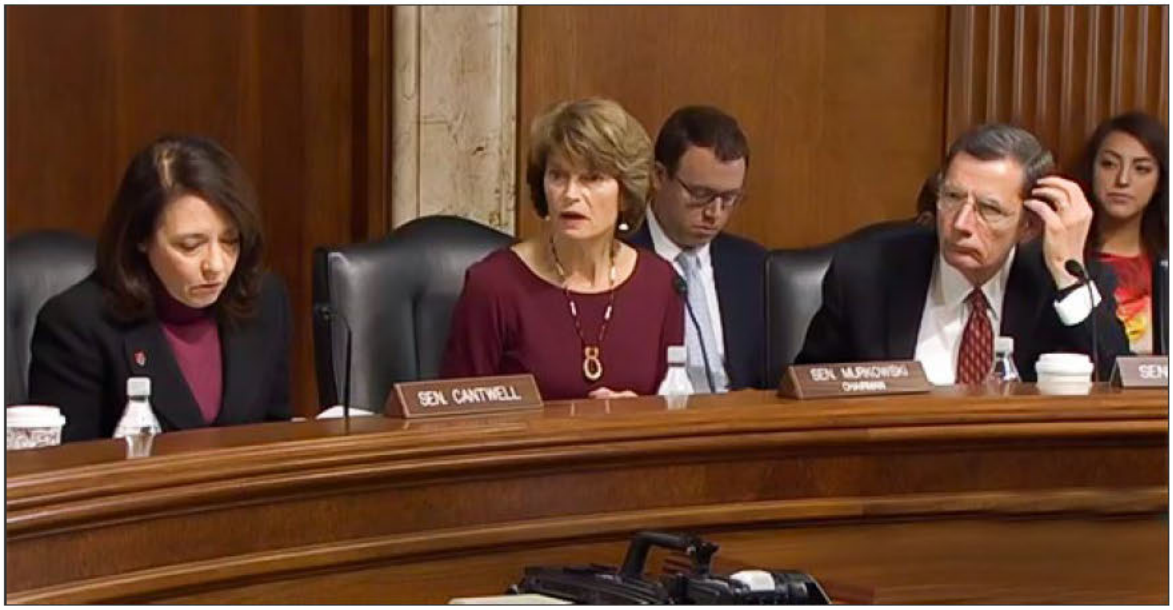
AN E&E NEWS PUBLICATION

ARCTIC

Murkowski faces new GOP threat to ANWR drilling

Kellie Lunney, E&E News reporter

Published: Thursday, November 16, 2017



(Left to right) Energy and Natural Resources Committee ranking member Maria Cantwell (D-Wash.), Chairwoman Lisa Murkowski (R-Alaska) and Sen. John Barrasso (R-Wyo.) during a markup yesterday on Arctic National Wildlife Refuge drilling. C-SPAN

Republican Sen. Lisa Murkowski crossed a significant hurdle yesterday when the Energy and Natural Resources Committee she leads advanced her legislation allowing drilling in the coastal plain of the Arctic National Wildlife Refuge.

Now, the Alaskan must deal with a new threat to her decadeslong quest to bring energy development to the region — and this one isn't from Democrats or conservation groups. It leaves her with a Sophie's choice of sorts, pitting drilling against health care.

A revised tax bill unveiled Tuesday, less than 24 hours before the ENR Committee markup, included provisions that would repeal the Affordable Care Act's individual mandate tax, the heart of Obama's signature health care law ***E&E Daily***, Nov. 15).

Murkowski opposed the Senate GOP's efforts to repeal much of the ACA earlier this year over concerns about the potential impact on health coverage in her state, which has expanded under the law.

Murkowski's ANWR language is attached to the larger GOP tax package, a thread in an intricate web of offsets. The fiscal 2018 budget resolution that Congress passed last month tasked the ENR Committee with finding $1 billion during the next decade to help offset Republicans' $1.5 trillion tax cut.

Those instructions gave her the opportunity to write legislation paving the way for drilling in the refuge's coastal plain.

Inserting ANWR language into the larger tax package through reconciliation allows it to move by a simple majority vote without the threat of a filibuster. That means it won't need any Democratic support in the Senate.

But the opening the reconciliation process has provided for ANWR drilling could end up being a double-edged sword. It could force her to choose between an energy policy she believes will bring much-needed jobs and revenue to her state and changes to a health care law that could adversely affect many of her constituents.

After yesterday's markup, reporters asked the senator, known on Capitol Hill for her equanimity, for her thoughts on the new development.

"To be very honest with you, my focus has been entirely on this hearing this morning," she said, adding that she "read the news as I was walking in that it has been included" referring to a repeal of the individual mandate in the tax plan.

"Now that this [markup] is behind me, I will have a chance to give a little more focus to what the overall package will be," Murkowski told reporters. "Now we will have a chance to look at that broader bill."

The 2017 ANWR language is the best shot the Alaska delegation has had in decades to realize its goal of allowing energy development in the refuge's coastal plain.

Sen. Maria Cantwell (D-Wash.), the ranking member of the ENR Committee, successfully defeated the last major push in 2005 to open drilling in the refuge.

Cantwell yesterday expressed her disappointment after the panel's vote.

"It is a tragedy that Republicans will run over something so precious as the Arctic National Wildlife Refuge, land that has that stood undisturbed for thousands of years, all for a giveaway to oil corporations that allows them to ignore important environmental protections," she said.

In 1995, ANWR drilling legislation made it through both the House and Senate, only to have President Clinton veto it.

The Senate Finance Committee this week has been marking up the mammoth tax bill and has yet to start debate on hundreds of amendments ***E&E News PM***, Nov. 15).

Senate Majority Whip John Cornyn (R-Texas) has said the goal is a vote on the legislation after the Thanksgiving break. That doesn't give Murkowski much time to savor her latest victory.

She did provide a quick update on her win in a phone call yesterday to the Resource Development Council of Alaska conference in Anchorage, where a crowd of 700 industry executives gave her rousing applause.

"We have made it through two of the most significant hurdles," she said.

Reporter Margie Hobson contributed.

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From: Google Alerts
To: sara_boario@fws.gov
Subject: Google Alert - U.S. Fish and Wildlife Service Alaska
Date: Thursday, November 16, 2017 6:40:11 AM

Google Alerts

U.S. Fish and Wildlife Service Alaska

As-it-happens update · November 16, 2017

NEWS

Arctic refuge drilling closer as Senate panel backs bill

Middletown Press

Lisa Murkowski, R-**Alaska**, right, speaks as committee's ranking member .... The **wildlife** refuge has been the focus of a political fight for nearly four ... She and other Democrats said the GOP bill is especially unwise at a time when **U.S.** oil production is booming, ... Customer **Service** · Newsroom Contacts ...

Flag as irrelevant

Importing Elephant Trophies From Zimbabwe Is Legal Again. And Conservationists Are Horrified



Fortune

A few years ago, under the Obama administration, the **U.S. Fish** & **Wildlife Service** (FWS) banned the import into the **U.S.** of elephant trophies from ...

Flag as irrelevant

State reminder: lights out for the seabirds

Thegardenisland.com

... lights on Kauai's protected and endangered seabirds, and works with the **U.S. Fish and Wildlife Service** and DLNR's Division of Forestry and Wildlife ...

Flag as irrelevant

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Send Feedback

From: Google Calendar
To: Christopher Putnam
Subject: Daily Agenda for Christopher Putnam as of 5am
Date: Thursday, November 16, 2017 7:41:51 AM

Google Calendar

christopher_putnam@fws.gov, here is your schedule for:

Thu 2017-11-16

11:00 – 12:00	1002 EA Review (FWS-FW7 NWRS Conference Room/Regional Office)	christopher_putnam@fws.gov
13:00 – 14:30	Winter 2017-2018 Polar Bear Den Detect... (US Fish & Wildlife Department Services, 1011 E Tudor Rd # 200, Anchorage, AK 99503, USA)	christopher_putnam@fws.gov

Google Calendar

You are receiving this email at the account christopher_putnam@fws.gov because you are subscribed to receive daily agendas for the following calendars: :TripCase, christopher_putnam@fws.gov, b6 [redacted]@gmail.com.

To change which calendars you receive daily agendas for, please log in to https://www.google.com/calendar/ and change your notification settings for each calendar.

From: Google Calendar on behalf of Edward Decleva
To: tracy_fischbach@fws.gov
Subject: Accepted: 1002 EA Review @ Thu Nov 16, 2017 11am - 12pm (tracy_fischbach@fws.gov)
Attachments: invite.ics

Edward Decleva has accepted this invitation.
1002 EA Review
Hi all,
For those outside Refuges, you're attendance is not required, but if you are still able and willing to help, you are very welcome. We will go through the document relatively quickly in order to determine where significant gaps remain and what to do about them. We do know we are allowed to say, "Additional literature review is needed to fully consider the consequences and cumulative effects of exploration activities on XXXXX resource." I will have the Vidyo on. If you need a conference call line, please let me know.
Thanks!

When Thu Nov 16, 2017 11am – 12pm Alaska Time
Where FWS-FW7 NWRS Conference Room/Regional Office (map <https://maps.google com/maps?q=FWS-FW7+NWRS+Conference+Room/Regional+Office&hl=en>)
Video call b5 - CIP [redacted]
Calendar tracy_fischbach@fws.gov
Who • tracy_fischbach@fws.gov - organizer
• stephanie_brady@fws.gov
• john_trawicki@fws.gov
• christopher_putnam@fws.gov
• doug_damberg@fws.gov
• socheata_lor@fws.gov
• nicole_gustine@fws.gov
• edward_decleva@fws.gov
• brian_mccaffery@fws.gov
• ryan_r_wilson@fws.gov
• jenifer_kohout@fws.gov
• wendy_loya@fws.gov
• peter_wikoff@fws.gov
• margaret_perdue@fws.gov
• john_w_martin@fws.gov
• steve_berendzen@fws.gov
• joanna_fox@fws.gov

Invitation from Google Calendar <https://www.google.com/calendar/>
You are receiving this email at the account tracy_fischbach@fws.gov because you are subscribed for invitation replies on calendar tracy_fischbach@fws.gov.
To stop receiving these emails, please log in to https://www.google.com/calendar/ and change your notification settings for this calendar.
Forwarding this invitation could allow any recipient to modify your RSVP response. Learn More <https://support.google.com/calendar/answer/37135#forwarding> .

From: Kevin Proescholdt
To: Nickas, George; Serra, Dawn; Smith, Jeff; Macfarlane, Gary; Johnson, Dana M.; Koehler, Matthew; Wuerthner, George; Mauer, Fran; Kaye, Roger; Wolke, Howie
Subject: Fwd: Google Alert - wilderness
Date: Thursday, November 16, 2017 7:43:41 AM

The Plot to Loot America's **Wilderness**

The Nation.

One day in Mid-March, James Cason, the associate deputy secretary at the Department of the Interior, convened an impromptu meeting of the senior ...

Flag as irrelevant

At Stake in Arctic Wildlife Refuge Drilling Vote: Money, **Wilderness** and a Way of Life

InsideClimate News

The refuge's Coastal Plain is home to polar bears, caribou and other wildlife. For many people living here, subsistence hunting is a way of life.

Senators vote for Arctic Refuge drilling based on inflated numbers - The Wilderness Society (press release) (blog)
Earthjustice Responds To Senate Committee Vote On Arctic Refuge - Common Dreams
Drilling ANWR's 1002 Area Edges Closer to a Vote - EnerCom Inc. (press release) (blog)
Full Coverage

Flag as irrelevant

The travails of fighting fire in **wilderness**: Fly in helicopters but rely on mule teams for supplies

Idyllwild Town Cier

“It's **wilderness**, so roads were out of the question,” he said. “There were some river drainages, but the number one tactical advantage would be ridge ...

Flag as irrelevant

From: National Wildlife Federation Action Fund
To: Jenifer Kohout
Subject: Today you can help save polar bears in the Arctic.
Date: Thursday, November 16, 2017 8:06:15 AM

Join with us to stop drilling in the Arctic National Wildlife Refuge. | View in Browser

DONATE

Dear Jenifer,

Right now, pregnant polar bears are digging dens in tall snowdrifts within the Coastal Plain of Alaska's Arctic National Wildlife Refuge.

But these vulnerable polar bears and their cubs are in serious jeopardy. A measure before Congress would open up part of the Refuge to the devastation of oil and gas drilling.

We're fighting back, but we can't do it alone.

Please help save polar bears by making a generous gift today to our Arctic Protection Program.

DONATE »

We know drilling will have permanent impacts on the Refuge and its wildlife.

More polar bears den and give birth in this pristine slice of Refuge wilderness than in any other place along all of Alaska's coastline. Polar bear mothers nurse and care for their cubs in the dens until March or early April, when they emerge and eventually move back to the ocean and sea ice.

If the Refuge is opened for drilling, heavy industrial trucks could trample and crush dens as they crisscross the landscape in search of potential oil reserves. Would polar bears even be able to den in habitat degraded by the roads, drilling pads, pipelines and housing constructed for oil and gas operations?

With your help, we won't have to find out. Please make a gift today to defend untouched wilderness for these bears and all Arctic wildlife.

Your support will ensure we have the resources needed to counter special interests that want to forever transform this unspoiled wilderness into drilling operations.

Already, we're flooding Congressional offices with calls, delivering petitions, and holding rallies to show public support for keeping the Refuge and its wildlife safeguarded. We're working to shine a light on backroom deals brokered by special interests and share scientific facts about the permanent damage that will result from drilling in the Refuge.

But all of this work takes time and money, and we're relying on the support of wildlife protectors like you to power our efforts. **Please contribute today to support our efforts to protect polar bears.**

I appreciate all that you do to protect wildlife and America's wilderness. Thank you for your support.

Dirk Sellers

Sincerely,

Dirk Sellers
Senior Advisor
The National Wildlife Federation Action Fund

Join the Conversation

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From:	Martin, John
To:	Fischbach, Tracy
Cc:	Gustine, Nicole; Brian McCaffery; Stephanie Brady
Subject:	Re: Hail to the Early Risers
Date:	Thursday, November 16, 2017 9:01:49 AM

All

OK, per your instructions: there ARE huge gaps in the narrative!

The first and most obvious, and which undermines all of the EA discussion is the presumption of action, yet the only defined "action" is the publication of a new regulation. If there is an inferrence to exploration as an action, which is logical and directly connected, there is an assumption that all this will occur during the winter yet there is no explicit discription of "exploration activities." Further, there is no discussion of the subsequent and logical next step for development of what has or is being explored, whether oil or gas resources. Finally, there is no discussion of full build-out or production, nor of potential field close out and clean up in say 60 years. If there is logical connectivity between all these disparate actions, it needs to be clearly and succinctly stated in the purpose and need.

That said there is no time to generate this narrative in a meaningful manner.

Second, where did the issues come from as there should be some reflection upon the foundational document, the 1987 *Coastal Plain Report/EIS*. This may be updated via the NRC *Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope* (2003); *The Natural History of an Arctic Oil Field: Development and the Biota* (2003); and National Petroleum Reserve - Alaska EIS (2012). All of these documents provide nearly identical "issues." Additional information may be gleaned from multiple periodic professional journals and agency/industry BMPs as the state-of-the-industry has evolved since the early 1970s through late 1980s.

Third, the EA will lead only to an EIS but more from cumulative complexity and uncertainty than any single or multiple impact to specific resources. A cusory review of the literature will indicate that impacts to biological and water resources are largely mitigated via BMPs - including polar bears in all their sensitivity. Interruptions and disturbances will certainly occur and there is a constant risk of toxic exposures or spills but no more or less than have occurred with the TAPS or existing oilfields of the larger North Slope over the past 50 years. If the Service is seeking a smoking gun, it will have to be in the fact that once the Arctic is disturbed, pristine conditions will lost forever. The greatest impacts will occur long-term and cumulative in concert with climate change and the uncertainty that we do not have the tools to predict what those impacts will be.

In continuing with the EA, it must be decided to simplify to context of the rule change or the full suite of development through production to clean up and restoration. If so, the EA in its present form is wholly inadequate.

In the interim, I will endeavor to do what I can to improve the EA but I need guidance on what direction we are going.

(And it would really be helpful if we could get this out of google so real formatting tools could be used - and you should be aware it is likely to blow up when finally

rolled over to Adobe or Word).

John

On Wed, Nov 15, 2017 at 9:30 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Ok. I've added Brian's sections. I think a big fix is going to be straightening out the headings in Chapter 4. This is also where we need significant work. Chapter 3 looks ok. Not great, but ok. We also need to start moving the citations to the reference section. Because we have so few clearly laid out effects, we may want to consider just removing those tables from Chapter 2 for now.
>
> -T
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
>
> Hours: Mon - Thurs 9:15 am to 3:15 pm
> "Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie
>
> **Need access to Refuge Documents?**
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> Region 7 GeoPDF Map Portal

On Wed, Nov 15, 2017 at 3:12 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Hi all,
>
> I know that you are up and moving earlier than I will be in the morning, so here's my request.
>
> Nicole, can you start at the top of the document and start cleaning up fragmented sentences. Accept big changes that are obvious replacements of placeholder language and start looking for consistency issues. For instance, it should probably be "North Slope" not north slope or northslope. Also, keep an eye out for still remaining Kodiak language from my cut/paste. No deer in Arctic as far as I know.
>
> Brian and John, please look through the document and note glaring holes and think about strategies for plugging them. Think boiler plate language that gives us wiggle to fill it out later. For instance, "Additional literature review is needed to fully consider the consequences and cumulative effects of exploration activities on XXXXX resource."
>
> Also, everyone consider what maps we may need/want. Sheila Dufford at Arctic will be able to help us get some of those put together.

Thanks everyone for all that you are doing. I REALLY appreciate it and I know the Refuge does as well.

I'll be one my email later this evening and early in the morning.

Cheers, Tracy

20171113_EA_ARC 1002 Reg Change_DRAFT

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

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From: Martin, John
To: Fischbach, Tracy
Cc: Gustine, Nicole; Brian McCaffery; Stephanie Brady
Subject: Re: Hail to the Early Risers
Date: Thursday, November 16, 2017 9:20:08 AM

I dont think additional resource maps are worth the effort.

Keep in mind that each exploration application will be an EIS, and hopefully better detailed than our effort here which is just hitting the highlights.

Suggested useage change - use (short title) 1987 *Coastal Plain Report/EIS*, rather than 1987 *Coastal Plain Report* - as this makes the older document more relevant to the EA.

On Wed, Nov 15, 2017 at 9:30 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Ok. I've added Brian's sections. I think a big fix is going to be straightening out the headings in Chapter 4. This is also where we need significant work. Chapter 3 looks ok. Not great, but ok. We also need to start moving the citations to the reference section. Because we have so few clearly laid out effects, we may want to consider just removing those tables from Chapter 2 for now.
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> On Wed, Nov 15, 2017 at 3:12 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
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> > Hi all,
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> > I know that you are up and moving earlier than I will be in the morning, so here's my request.
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> > Nicole, can you start at the top of the document and start cleaning up fragmented sentences. Accept big changes that are obvious replacements of placeholder language and start looking for consistency issues. For instance, it should probably be "North Slope" not north slope or northslope. Also, keep an eye out for still remaining Kodiak language from my cut/paste. No deer in Arctic as far as I know.
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Also, everyone consider what maps we may need/want. Sheila Dufford at Arctic will be able to help us get some of those put together.

Thanks everyone for all that you are doing. I REALLY appreciate it and I know the Refuge does as well.

I'll be one my email later this evening and early in the morning.

Cheers, Tracy

20171113_EA_ARC 1002 Reg Change_DRAFT

Tracyann S Fischbach
Natural Resources Planner
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FWS Region 7 Land Mapper (Public version)
Region 7 GeoPDF Map Portal

From: Flanagan, Cathleen
To: Gustine, Nicole
Cc: John Trawicki
Subject: Re: Tetline WRIA
Date: Thursday, November 16, 2017 9:33:27 AM

Not a worry Nicole. I am working on the Togiak WRIA and have plenty to do before you wrap up the Tetlin edits. If you finish by the holiday, that would be perfect.

Thanks again for your help.

On Thu, Nov 16, 2017 at 6:14 AM, Gustine, Nicole <nicole_gustine@fws.gov> wrote:

> Cathy,
>
> I wanted to let you know that I got pulled into the Arctic 1002 EA and didn't get to focus on the appendixes as much as I had planned. I hope to finish up my edits before the holiday next week. My apologies.
>
> Sincerely,
>
> Nicole Gustine, Refuge Specialist
> U.S Fish and Wildlife Service
> 1011 E. Tudor Rd., MS-225
> Anchorage, Alaska 99503
> b6 [redacted] - cell
> **Hours: Tue - Thurs 6am to 1pm**

--
Cathleen Flanagan
Regional Water Rights Coordinator/Hydrologist
US FWS
1011 E Tudor Rd.
Anchorage, AK 99503
907-786-3903

From:	Brady, Stephanie
To:	Michael Brady
Subject:	Fwd: Notes from Weekly NR Meeting
Date:	Thursday, November 16, 2017 9:25:38 AM
Attachments:	Weekly Natural Resources Staff Meeting 11-13-17.docx

---

stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |
U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska |
907.306.7448

---------- Forwarded message ----------
From: **Wikoff, Peter** <peter_wikoff@fws.gov>
Date: Mon, Nov 13, 2017 at 4:41 PM
Subject: Notes from Weekly NR Meeting
To: Stephanie Brady <Stephanie_Brady@fws.gov>, Tracy Fischbach <tracy_fischbach@fws.gov>, John Martin <john_w_martin@fws.gov>, Brian McCaffery <brian_mccaffery@fws.gov>, "Gustine, Nicole" <nicole_gustine@fws.gov>, peter_wikoff <peter_wikoff@fws.gov>

Hi All,
Here are my notes from today's meeting.

--
Peter Wikoff
Natural Resource Planner
US Fish and Wildlife Service
1011 East Tudor Rd., MS-211
Anchorage, AK 99503

907-786-3837

Weekly Natural Resources Staff Meeting
November 13, 2017

Ryan was out, Doug Damberg presiding.

Archaeology:
Ed DeCleva was first up. He recently sent a paper to refuge managers describing the need for an inventory of museum property at each station. Ariana Elm will be available to help refuges with this task until early May.

Details:
Mitch will be the head of Natural Resources in the National Office for the next 4 months.
Soch will be acting in Mitch's stead.
Ryan is our regional hunting and fishing chief.
Brandon Nye is on a 45-60 day hurricane detail.
Susana Henry is in Puerto Rico on a hurricane detail.

There are opportunities for people to detail into Soch's, Ryan's, or Diane Granfor's spots.

Hiring:
b5 - DP (not responsive) [redacted]
RO is asking Stations for needs and will try to fill necessary positions.
Doug Mills sent out guidance for hiring wavier packets on 10/24. This included a check list and forms.
Steve Delehanty commented that not all PDs are in "PD Express" and that this is causing problems.

Native Relations:
The next Alaska Native Relations training will be in January. This session will be open to other agencies. If you are interested in going, apply as soon as the announcement comes out.

We no longer need to send "tribal leaders" letters to HQ for approval. Crystal will send direction soon.

Business Teams: Ronnie Sanchez
They are still working on position descriptions. The North Zone is staffed. There are 5 vacancies in the South Zone and RO.

Budget:
Doug's best guess is that there will be a CR to carry into next year. The RO will pull "vacancy dollars" into the RO like they did last year. These funds will cover changes of station, etc.

b5 - DP (not responsive) [redacted]
b5 - DP (not responsive) [redacted]
None of the footage they film at this time is to be broadcast. They do not need a permit until they begin production filming. If the tv crews are too much of a bother, just tell them no. If you don't want them in your house, just say no.

Miscellaneous:
Karen met with Steve W. (DOI rep in AK) to discuss aviation and joint management areas.

EPAPs are due at the end of November.
Doug will send out the charter for the hunting and fishing directive this week.
The CFC campaign starts tomorrow at 9:00 in the Gordon Watson.

Round the Region:

Yukon Delta: The have hired a new RIT from the lower Yukon. RITs are conducting harvest surveys. They have been in meetings for waterfowl, salmon, and FRMP projects.

Togiak: Waterfowl surveys and Invent TV crews.

Yukon Flats: Submitted a CD for commercial filming. Expect to film lynx captures in late winter. Will hire 2 seasonals this summer.

Tetlin: Shawn is in Anchorage at a NPS hearing. They have meetings in Northway.

Kanuti: Moose numbers are good.

Kodiak: Regional fisheries meeting. Bison issues.

Selawik: They are having an event in the office for native American month.

Koyukuk/N/I: Conducting moose surveys with good snow cover. ADF&G is cooperating.

Izembek: The bunkhouse is empty, will start kitchen remodel soon. Working on the duplex. Migratory bird surveys were good. They had a busy fall hunt though goose quotas were not filled. Invent TV wants to film on the refuge.

Kenai: Invent TV wants to film. b5 - DP (not responsive)

APB: Not reporting.

Arctic: RAC meeting this week. Getting lots of requests for information on oil and gas. The RO has helped field a lot of O&G questions. Steve, the chief biologist, is moving to b6 will telework part time.

Alaska Maritime: They have a hiring package for temps. They have been doing a lot of environmental education with schools, using the Tiglax. The Tiglax is going into a shipyard for major maintenance this winter. Still waiting for the contract. They are cutting alder near the visitor center to improve the view.

From: Trawicki, John
To: Burkart, Greta; Perdue, Margaret
Subject: Re: Help with evaluating water resources in the Arctic 1002 Area - Due Noon on Thursday, Nov 16
Date: Thursday, November 16, 2017 9:34:05 AM

John Martin is working on fisheries, you may want to touch base with him.

On Thu, Nov 16, 2017 at 7:15 AM, Trawicki, John <john_trawicki@fws.gov> wrote:

> thanks. I am in a Science of Oil Spill class this week. Be sure to send items to Meg. It is ok to say we do not know, or there is insufficient information to evaluate, or additional in formation or analysis is warranted, but this needs to be within reason.
>
> Meg- I moved Greta's version to the w:/ and made a few suggestions in track changes. text me if you want me to return to the office to review.
> Thank you both for working on this.
>
> john t
>
> On Thu, Nov 16, 2017 at 7:03 AM, Burkart, Greta <greta_burkart@fws.gov> wrote:
>
> > Thanks - I will work on a reference list now.
> >
> > Greta Burkart, PhD
> > Aquatic Ecologist
> > US Fish and Wildlife Service
> > Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
> > 101 12 th Ave Rm 236
> > Fairbanks, AK 99701
> > ph: (907) 456-0519
> > fax: (907) 456-0428
> > email: greta_burkart@fws.gov
> > www.facebook.com/arcticnationalwildliferefuge
> >
> > On Thu, Nov 16, 2017 at 6:34 AM, Trawicki, John <john_trawicki@fws.gov> wrote:
> >
> > > hi greta
> > >
> > > just getting to work this am. will keep you posted. have not read your edits yet, but thankyou for your input.
> > >
> > > On Thu, Nov 16, 2017 at 6:19 AM, Burkart, Greta <greta_burkart@fws.gov> wrote:
> > >
> > > > Hi John and Meg,
> > > >
> > > > I have edited Meg's version and added an environmental consequences section (see attached). I am going to take a break, but can work on this up until 8am Alaska Standard Time. Let know if you will be working on it during this time period as well and will will keep of edits.
> > > >
> > > > Thanks!
> > > >
> > > > Greta

Greta Burkart, PhD
Aquatic Ecologist
US Fish and Wildlife Service
Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
101 12 th Ave Rm 236
Fairbanks, AK 99701
ph: (907) 456-0519
fax: (907) 456-0428
email: greta_burkart@fws.gov
www.facebook.com/arcticnationalwildliferefuge

On Wed, Nov 15, 2017 at 3:28 PM, Perdue, Margaret <margaret_perdue@fws.gov> wrote:

> Hi Greta ---
>
> We would particularly be interested in any climate trend information affecting hydrology or known hydrologic changes. If you have any references showing changes in timing of break-up or freeze-up, changes in precipitation amount or timing or changes from snow to rain, snowpack depth/ extent etc.
>
> If not we will figure out what we can...
>
> Thanks
>
> On Wed, Nov 15, 2017 at 1:51 PM, Burkart, Greta <greta_burkart@fws.gov> wrote:
>
> > I have to go give a poster presentation in 15 minutes, but will pull everything together after that and send it really late tonight or by the time you guys get into work tomorrow morning. What do you have so far?
> >
> > Greta
> >
> > Greta Burkart, PhD
> > Aquatic Ecologist
> > US Fish and Wildlife Service
> > Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
> > 101 12 th Ave Rm 236
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> > ph: (907) 456-0519
> > fax: (907) 456-0428
> > email: greta_burkart@fws.gov
> > www.facebook.com/arcticnationalwildliferefuge
> >
> > On Wed, Nov 15, 2017 at 1:43 PM, Trawicki, John <john_trawicki@fws.gov> wrote:
> >
> > > Hi Greta- if you can send Meg and I what you have we can incorporate

into what Meg has put together. Can you send it today? This is due tomorrow at by 10 AM.

call me if you need to . 907-786-3474, or 360-1656

On Wed, Nov 15, 2017 at 1:22 PM, Burkart, Greta <greta_burkart@fws.gov> wrote:

> Hi -- If Meg has not pulled something together, I do have a draft of something and can send it by tomorrow evening.
>
> Thanks,
>
> Greta
>
> Greta Burkart, PhD
> Aquatic Ecologist
> US Fish and Wildlife Service
> Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
> 101 12 th Ave Rm 236
> Fairbanks, AK 99701
> ph: (907) 456-0519
> fax: (907) 456-0428
> email: greta_burkart@fws.gov
> www.facebook.com/arcticnationalwildliferefuge
>
> On Tue, Nov 14, 2017 at 11:33 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
>
> > Hi Meg,
> >
> > Do you have this website? http://dnr.alaska.gov/mlw/mapguide/wr_intro.cfm
> >
> > Tracyann S Fischbach
> > Natural Resources Planner
> > National Wildlife Refuge System - Region 7
> > Division of Natural Resources & Conservation Planning
> > (907) 786-3369
> >
> > Hours: Mon - Thurs 9:15 am to 3:15 pm
> > "Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie
> >
> > **Need access to Refuge Documents?**
> > Online Document Database (ServCat)
> > ***Need Refuge land status info for Alaska?***
> > FWS Region 7 Land Mapper (FWS version)
> > FWS Region 7 Land Mapper (Public version)
> > Region 7 GeoPDF Map Portal
> >
> > On Tue, Nov 14, 2017 at 11:15 AM, Perdue, Margaret

<margaret_perdue@fws.gov> wrote:

Hi Tracy ---

I checked in with John, I had forgotten that Greta is at the NAASH meeting at NCTC this week.

I can try to pull language together ... but Greta if you have anything drafted for the WRIA for Arctic or other references that would address the issues that Tracy outlined please send them to me.

Thanks

Meg

On Tue, Nov 14, 2017 at 10:54 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

Hi Greta,

The Refuge program is in a big push to get a beefed up EA done for the regulation change that would open the Arctic's 1002 area for oil & gas exploration. The draft EA is due to HQ by this Friday morning, November 17, so I need draft sections to me by **noon on Thursday, Nov 16** . I was told that you are probably the best person to write the water resources section. If not, please let me know ASAP.

I need a relatively short 1-2 page Affected Environment section and a 1-2 pages Environmental Consequences section for water resources.

The **Affected Environment** section would include:
What water resources have been there historically.
What water resources are there now.
What is the trend. (Showing this in a chart or graph makes it very easy to understand.)

This section is just the facts, and should include all water resources that you think may be affected by exploration in the 1002 area. This could include waters outside the Refuge. Including a map of the area evaluated is super helpful. Also, if we don't know, we can just say that. Please do cite all of your resources.

The **Environmental Consequences** section would include:
How are the resources listed in the Affected Environment going to be affected by exploration activities. This would include ice roads, ice pads, etc. According to the State's proposal it takes about 1 million gallons of water to make 1 mile of road. Where would/could water be taken to use for building ice roads? Do other species use those waters? We want to keep it short and sweet. We have very little time for this effort.

Thank you SO much!

-Tracy

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

Hours: Mon - Thurs 9:15 am to 3:15 pm
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--
Meg Perdue, Water Quality Specialist
Water Resources Branch - National Wildlife Refuge System
U.S. Fish & Wildlife Service Regional Office MS 235
1011 E. Tudor Rd
Anchorage, AK 99503
phone: 907-786-3421 fax: 907-786-3976
email: margaret_perdue@fws.gov

--
John Trawicki
Water Resources Branch Chief
National Wildlife Refuge System, Alaska
U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99503
Work: (907) 786-3474
Mobile: (907) 360-1656

"The single biggest problem with communication is the illusion that it has taken place"
George Bernard Shaw

--
Meg Perdue, Water Quality Specialist
Water Resources Branch - National Wildlife Refuge System
U.S. Fish & Wildlife Service Regional Office MS 235
1011 E. Tudor Rd
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--
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Anchorage, AK 99503
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Mobile: (907) 360-1656

"The single biggest problem with communication is the illusion that it has taken place"
George Bernard Shaw

From: Google Calendar on behalf of Nicole Gustine
To: tracy_fischbach@fws.gov
Subject: Declined: 1002 EA Review @ Thu Nov 16, 2017 11am - 12pm (tracy_fischbach@fws.gov)
Attachments: invite.ics

Nicole Gustine has declined this invitation.
1002 EA Review
Hi all,
For those outside Refuges, you're attendance is not required, but if you are still able and willing to help, you are very welcome. We will go through the document relatively quickly in order to determine where significant gaps remain and what to do about them. We do know we are allowed to say, "Additional literature review is needed to fully consider the consequences and cumulative effects of exploration activities on XXXXX resource." I will have the Vidyo on. If you need a conference call line, please let me know.
Thanks!

When Thu Nov 16, 2017 11am – 12pm Alaska Time
Where FWS-FW7 NWRS Conference Room/Regional Office (map <https://maps.google com/maps?q=FWS-FW7+NWRS+Conference+Room/Regional+Office&hl=en>)
Video call b5 - CIP
[redacted]
Calendar tracy_fischbach@fws.gov
Who • tracy_fischbach@fws.gov - organizer
• stephanie_brady@fws.gov
• john_trawicki@fws.gov
• christopher_putnam@fws.gov
• doug_damberg@fws.gov
• socheata_lor@fws.gov
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• ryan_r_wilson@fws.gov
• jenifer_kohout@fws.gov
• wendy_loya@fws.gov
• peter_wikoff@fws.gov
• margaret_perdue@fws.gov
• john_w_martin@fws.gov
• steve_berendzen@fws.gov
• joanna_fox@fws.gov

Invitation from Google Calendar <https://www.google.com/calendar/>
You are receiving this email at the account tracy_fischbach@fws.gov because you are subscribed for invitation replies on calendar tracy_fischbach@fws.gov.
To stop receiving these emails, please log in to https://www.google.com/calendar/ and change your notification settings for this calendar.
Forwarding this invitation could allow any recipient to modify your RSVP response. Learn More <https://support.google.com/calendar/answer/37135#forwarding> .

From: Google Alerts
To: sara_boario@fws.gov
Subject: Google Alert - Arctic National Wildlife Refuge
Date: Thursday, November 16, 2017 10:06:26 AM

Google Alerts

Arctic National Wildlife Refuge

Daily update · November 16, 2017

NEWS

Senate One Step Closer To Allowing Drilling In Fragile **Arctic Wildlife Refuge**

HuffPost

The move would come with unclear economic benefits, and opponents warn it could destroy Alaska's pristine **Arctic National Wildlife Refuge**.

At Stake in **Arctic Refuge** Drilling Vote: Money, Wilderness and a Way of Life - InsideClimate News
The Latest: Bill to Open **Arctic Refuge** to Drilling Advances - U.S. News & World Report
Overnight Energy: Senate committee advances **Arctic refuge** drilling bill - The Hill
Full Coverage

Flag as irrelevant

The Energy 202: **ANWR** drilling is one step closer to happening.

Washington Post

Drilling for oil in the **Arctic National Wildlife Refuge** is one step closer to reality. On Wednesday, the Senate Energy and Natural Resources Committee ...

Flag as irrelevant

Arctic refuge drilling closer as Senate panel moves ahead | WSB-TV

WSB Atlanta

WASHINGTON (AP) - Oil and gas drilling in Alaska's **Arctic National Wildlife Refuge** is moving ever closer after a nearly four-decade political standoff.

Flag as irrelevant

Moderate Collins back in prominent role in Senate tax drama

Reuters

A committee that Murkowski chairs on Wednesday passed a bill to open **ANWR** to drilling, which is now expected to be attached to the tax legislation.

Senators Clash Over Last Minute Changes to Tax Bill - New York Times
First GOP senator opposes tax bill - Reading Eagle
Johnson says he will not support tax-reform bill - The Hill
Full Coverage

Flag as irrelevant

10 Things to Know for Thursday

San Francisco Chronicle

The president declines to join national Republicans who've called on ... gas drilling in the **Arctic National Wildlife Refuge** is moving ever closer after a ...

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Business Highlights

ABC News

WASHINGTON (AP) — Oil and gas drilling in Alaska's **Arctic National Wildlife Refuge** moved closer Wednesday as a key Senate panel approved a bill ...

Flag as irrelevant

Chasing the better bird

Watertown Public Opinion

Olaf Danielson traveled to the **Arctic National Wildlife Refuge** in Alaska to see the Brooks Range, crossing another item off his bucket list. (Courtesy ...

Flag as irrelevant

Jerke: Christians can and do support oil, gas drilling

Greeley Tribune

The author suggests the **Arctic National Wildlife Refuge** in Alaska is pristine and should never be touched. I have been to Prudhoe Bay right beside the ...

Flag as irrelevant

Shocker: Al Franken doesn't know what he's talking about

Power Line (blog)

The good news is that the committee approved the bill to open Alaska's **Arctic National Wildlife Refuge** to drilling, sans Franken's ridiculous ...

Flag as irrelevant

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Send Feedback

From: McCaffery, Brian
To: Fischbach, Tracy
Cc: Martin, John; Brady, Stephanie; Gustine, Nicole
Subject: Re: Hail to the Early Risers
Date: Thursday, November 16, 2017 10:29:59 AM
Attachments: Literature Cited for McCaffery text.docx

Here are the references for the text I wrote yesterday. I assume the current Arctic Refuge CCP is already cited and listed.

BJM

On Thu, Nov 16, 2017 at 7:28 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Ok. I'm going to be off-line for a little bit here helping get kids ready for school. I'll see you at 9, if not sooner. Thanks all! -T
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
>
> Hours: Mon - Thurs 9:15 am to 3:15 pm
> "Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie
>
> **Need access to Refuge Documents?**
> Online Document Database (ServCat)
> ***Need Refuge land status info for Alaska?***
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>
> On Thu, Nov 16, 2017 at 7:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
>
> > Oh, and yes, we are missing the generic description of what exploration may look like. I thought that Chris Putnam was doing that but maybe not. That is one piece that needs to be added to give this document context. It's really off-kilter without it. I think that's probably my next task. Chapter 4 is also full of unwritten sections. Feel free to grab one and see what we can add in there. The one big issue that isn't in there yet is affects to the wilderness nature of the coastal plain. It isn't Wilderness, but it is wilderness, and we can expect 1000s of comments about that when/if this goes out for public review.
> >
> > -T
> >
> > Tracyann S Fischbach
> > Natural Resources Planner
> > National Wildlife Refuge System - Region 7
> > Division of Natural Resources & Conservation Planning
> > (907) 786-3369
> >
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On Thu, Nov 16, 2017 at 7:22 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Hi all,
>
> Great points, John. Currently, there is discussion/argument going on in FWS HQ about what they actually want. SOL wants a document that includes an analysis of exploration, but not of drilling since drilling is not currently legal. FWS HQ wants a really narrowed down document, similar to what we already produced a month or so ago. We have been told to not spend a lot of time generating new analyses. Ha! Like we have time. So, today we need to decide which sections we want to spend time on and which ones we can just grab info from the NPRA EA or EIS or the 1987 EIS. Frankly, we don't have time to dig to get all of the gems that are available to us with even just a lit review. I anticipate that this won't be the last version that we'll see.
>
> -T
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
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>
> On Thu, Nov 16, 2017 at 7:13 AM, Martin, John <john_w_martin@fws.gov> wrote:
>
> > I was going to but feel I might be useful elsewhere.
> >
> > There are significant errors in the new narrative lit cited. Everything in the Literature Cited section was scrubbed yesterday before I left.
> >
> > thanks
> >
> > On Thu, Nov 16, 2017 at 7:11 AM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:
> >
> > > I will start moving references - unless someone else is doing this?

stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |
U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska |
907.306.7448

On Wed, Nov 15, 2017 at 9:30 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Ok. I've added Brian's sections. I think a big fix is going to be straightening out the headings in Chapter 4. This is also where we need significant work. Chapter 3 looks ok. Not great, but ok. We also need to start moving the citations to the reference section. Because we have so few clearly laid out effects, we may want to consider just removing those tables from Chapter 2 for now.
>
> -T
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
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On Wed, Nov 15, 2017 at 3:12 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Hi all,
>
> I know that you are up and moving earlier than I will be in the morning, so here's my request.
>
> Nicole, can you start at the top of the document and start cleaning up fragmented sentences. Accept big changes that are obvious replacements of placeholder language and start looking for consistency issues. For instance, it should probably be "North Slope" not north slope or northslope. Also, keep an eye out for still remaining Kodiak language from my cut/paste. No deer in Arctic as far as I know.
>
> Brian and John, please look through the document and note glaring holes and think about strategies for plugging them. Think boiler plate language that gives us wiggle to fill it out later. For instance, "Additional literature review is needed to fully consider the consequences and cumulative effects of exploration activities on XXXXX resource."
>
> Also, everyone consider what maps we may need/want. Sheila Dufford at Arctic will be able to help us get some of those put together.

Thanks everyone for all that you are doing. I REALLY appreciate it and I know the Refuge does as well.

I'll be one my email later this evening and early in the morning.

Cheers, Tracy

20171113_EA_ARC 1002 Reg Change_DRAFT

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

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--
Brian J. McCaffery
U. S. Fish and Wildlife Service
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources
Branch of Conservation Planning and Policy

Phone: (907) 330-7514
e-mail: brian_mccaffery@fws.gov

"Do something that scares the living hell outta your boss!" -- Dan Ashe, former Director, USFWS

Literature Cited for McCaffery text

Booms, T. L., T. J. Cade, and N. J. Clum. 2008. Gyrfalcon (*Falco rusticolus*), version 2.0. *In*. The Birds of North America (P. G. Rodewald, editor). Cornell Laboratory of Ornithology, Ithaca, New York, USA. https://doi.org/10.2173/bna.114

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Young, D. D., Jr., C.L. McIntyre, P. J. Bente, T.R. McCabe, and R.E. 1995. Nesting by Golden Eagles on the North Slope of the Brooks Range in northeastern Alaska. J. Field Ornithol. 66:373-379.

I've no clue how to cite this one:

BLM CPAI-NPR-A Final Seismic Environmental Assessment, 2016

The cover shows both BLM and Conoco Phillips in such a way that you can't tell who is responsible for producing the EA, there is no title to the EA referencing a specific project or proposal, and the only identifying designations are separated on the front page:

DOI-BLM-AKF01000-2017-001-EA

And then below Conoco Phillips address:

FF097222

From: Brady, Stephanie
To: McCaffery, Brian
Cc: Fischbach, Tracy; Martin, John; Gustine, Nicole
Subject: Re: Hail to the Early Risers
Date: Thursday, November 16, 2017 10:33:52 AM

---

yes and thanks I will incorporate.

stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |
U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska |
907.306.7448

On Thu, Nov 16, 2017 at 8:29 AM, McCaffery, Brian <brian_mccaffery@fws.gov> wrote:

> Here are the references for the text I wrote yesterday. I assume the current Arctic Refuge CCP is already cited and listed.
>
> BJM
>
> On Thu, Nov 16, 2017 at 7:28 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
>
> > Ok. I'm going to be off-line for a little bit here helping get kids ready for school. I'll see you at 9, if not sooner. Thanks all! -T
> >
> > Tracyann S Fischbach
> > Natural Resources Planner
> > National Wildlife Refuge System - Region 7
> > Division of Natural Resources & Conservation Planning
> > (907) 786-3369
> >
> > Hours: Mon - Thurs 9:15 am to 3:15 pm
> > "Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie
> >
> > **Need access to Refuge Documents?**
> > Online Document Database (ServCat)
> > ***Need Refuge land status info for Alaska?***
> > FWS Region 7 Land Mapper (FWS version)
> > FWS Region 7 Land Mapper (Public version)
> > Region 7 GeoPDF Map Portal
> >
> > On Thu, Nov 16, 2017 at 7:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
> >
> > > Oh, and yes, we are missing the generic description of what exploration may look like. I thought that Chris Putnam was doing that but maybe not. That is one piece that needs to be added to give this document context. It's really off-kilter without it. I think that's probably my next task. Chapter 4 is also full of unwritten sections. Feel free to grab one and see what we can add in there. The one big issue that isn't in there yet is affects to the wilderness nature of the coastal plain. It isn't Wilderness, but it is wilderness, and we can expect 1000s of comments about that when/if this goes out for public review.
> > >
> > > -T

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

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On Thu, Nov 16, 2017 at 7:22 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Hi all,
>
> Great points, John. Currently, there is discussion/argument going on in FWS HQ about what they actually want. SOL wants a document that includes an analysis of exploration, but not of drilling since drilling is not currently legal. FWS HQ wants a really narrowed down document, similar to what we already produced a month or so ago. We have been told to not spend a lot of time generating new analyses. Ha! Like we have time. So, today we need to decide which sections we want to spend time on and which ones we can just grab info from the NPRA EA or EIS or the 1987 EIS. Frankly, we don't have time to dig to get all of the gems that are available to us with even just a lit review. I anticipate that this won't be the last version that we'll see.
>
> -T
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
>
> Hours: Mon - Thurs 9:15 am to 3:15 pm
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>
> **Need access to Refuge Documents?**
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>
> On Thu, Nov 16, 2017 at 7:13 AM, Martin, John <john_w_martin@fws.gov> wrote:
>
> > I was going to but feel I might be useful elsewhere.

There are significant errors in the new narrative lit cited. Everything in the Literature Cited section was scrubbed yesterday before I left.

thanks

On Thu, Nov 16, 2017 at 7:11 AM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:

> I will start moving references - unless someone else is doing this?
>
> stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448
>
> On Wed, Nov 15, 2017 at 9:30 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
>
> > Ok. I've added Brian's sections. I think a big fix is going to be straightening out the headings in Chapter 4. This is also where we need significant work. Chapter 3 looks ok. Not great, but ok. We also need to start moving the citations to the reference section. Because we have so few clearly laid out effects, we may want to consider just removing those tables from Chapter 2 for now.
> >
> > -T
> >
> > Tracyann S Fischbach
> > Natural Resources Planner
> > National Wildlife Refuge System - Region 7
> > Division of Natural Resources & Conservation Planning
> > (907) 786-3369
> >
> > Hours: Mon - Thurs 9:15 am to 3:15 pm
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> > FWS Region 7 Land Mapper (FWS version)
> > FWS Region 7 Land Mapper (Public version)
> > Region 7 GeoPDF Map Portal
> >
> > On Wed, Nov 15, 2017 at 3:12 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
> >
> > > Hi all,
> > >
> > > I know that you are up and moving earlier than I will be in the morning, so here's my request.
> > >
> > > Nicole, can you start at the top of the document and start cleaning up fragmented sentences. Accept big changes that are obvious replacements of placeholder language

and start looking for consistency issues. For instance, it should probably be "North Slope" not north slope or northslope. Also, keep an eye out for still remaining Kodiak language from my cut/paste. No deer in Arctic as far as I know.

Brian and John, please look through the document and note glaring holes and think about strategies for plugging them. Think boiler plate language that gives us wiggle to fill it out later. For instance, "Additional literature review is needed to fully consider the consequences and cumulative effects of exploration activities on XXXXX resource."

Also, everyone consider what maps we may need/want. Sheila Dufford at Arctic will be able to help us get some of those put together.

Thanks everyone for all that you are doing. I REALLY appreciate it and I know the Refuge does as well.

I'll be one my email later this evening and early in the morning.

Cheers, Tracy

20171113_EA_ARC 1002 Reg Change_DRAFT

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

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FWS Region 7 Land Mapper (Public version)
Region 7 GeoPDF Map Portal

--
Brian J. McCaffery

U. S. Fish and Wildlife Service
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources
Branch of Conservation Planning and Policy

Phone: (907) 330-7514
e-mail: brian_mccaffery@fws.gov

"Do something that scares the living hell outta your boss!" -- Dan Ashe, former Director, USFWS

From: Burkart, Greta
To: John W Martin
Subject: Need any help with fisheries EA?
Date: Thursday, November 16, 2017 10:38:23 AM
Attachments: NAASH Greta one slide.pptx
WR_1002_AffectedEnv_GB edits.docx

Hi John,

Let me know if you need any help with the fisheries section of the EA. I can review versions, find references for you, make maps, or anything else you need.

I think one of the biggest effects on fish communities will be the draining and subsequent freeze-down of littoral zone habitats. Cott et al 2008 talks about this in his review of water level modifications with a focus on fish in ice-covered lakes. For more information see: http://onlinelibrary.wiley.com/doi/10.1111/j.1752-1688.2007.00166.x/abstract

Meg, John T and I are working on the Water Resources part of the E.A. I have attached one of the latest versions.

I have also attached a poster that I just gave at the NASH meeting. It doesn't have many references, but has some conceptual models and maps that I created using historic data and potential pumping scenarios based on current NPR-A withdrawal regulations and fish presence.

If there is anything you need let me know. My cell phone number is b6 [redacted]. I might be out of cellular contact for part of the day, but I can receive text messages from other iphones.

Thanks,

Greta

Greta Burkart, PhD
Aquatic Ecologist
US Fish and Wildlife Service
Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
101 12 th Ave Rm 236
Fairbanks, AK 99701
ph: (907) 456-0519
fax: (907) 456-0428
email: greta_burkart@fws.gov
www.facebook.com/arcticnationalwildliferefuge

Immediate Needs for Water Quantity & Quality Studies in the 1002 Area of the Arctic National Wildlife Refuge



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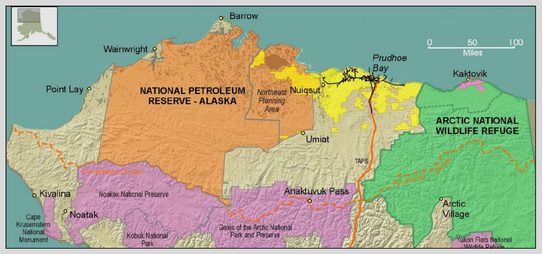
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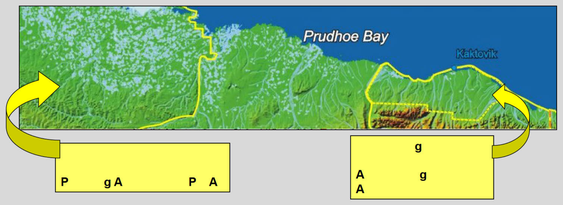
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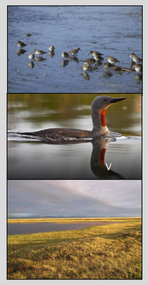
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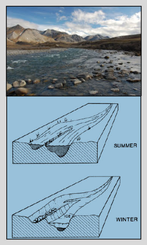


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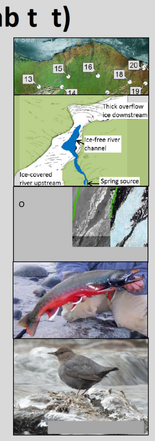


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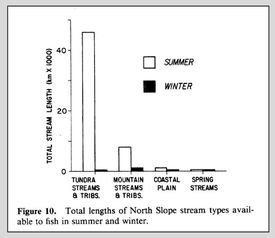
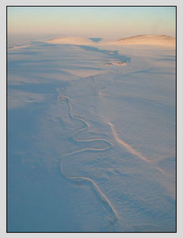


Figure 10. Total lengths of North Slope stream types available to fish in summer and winter.





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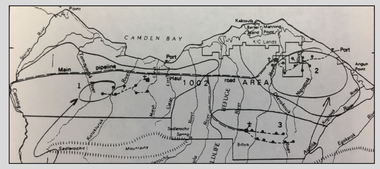
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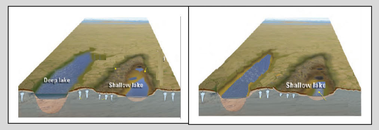
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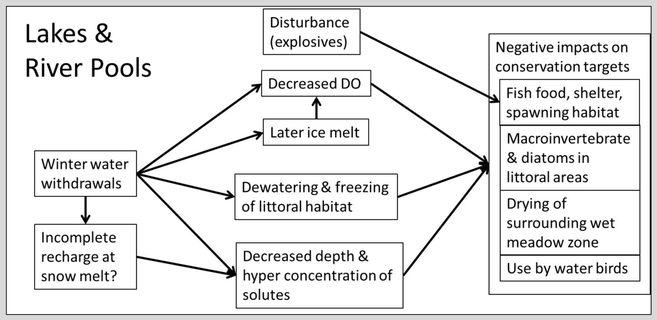
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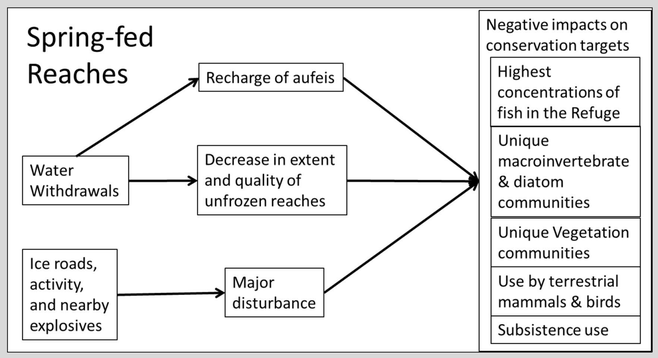
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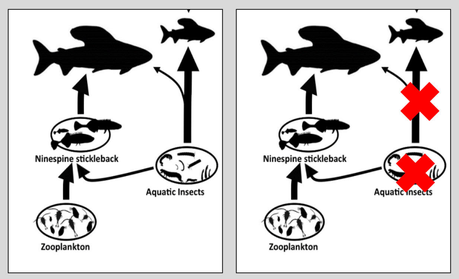








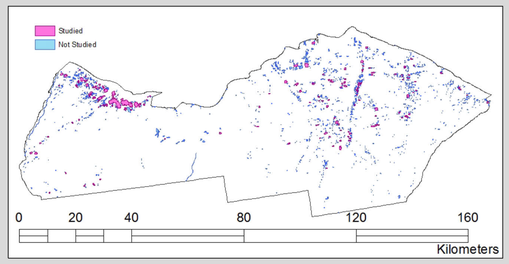
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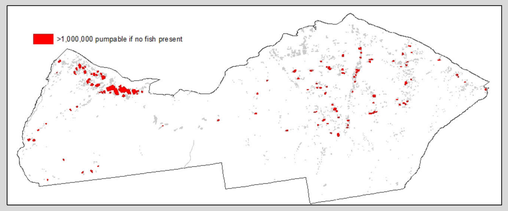
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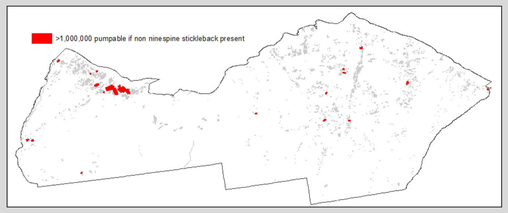
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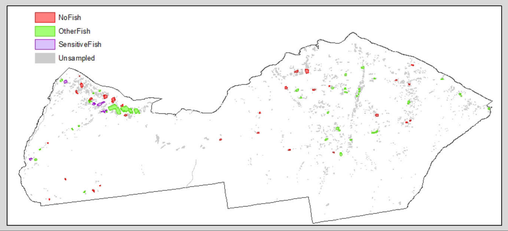
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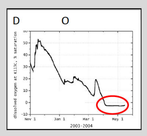
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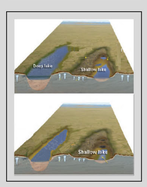
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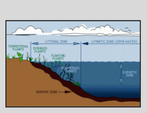




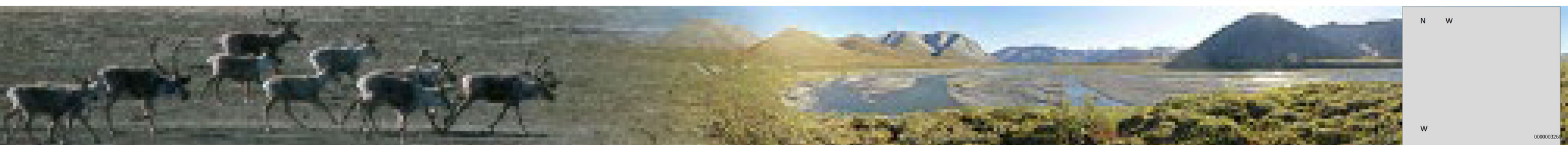












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Affected Environment

Water resources on the coastal plain of the Arctic National Wildlife Refuge consist of streams, lakes, and springs. Streams of the Arctic coastal plain flow north, several forming large alluvial fans as they flow into the Beaufort Sea where they contribute substantial volumes of water and sediment to coastal ecosystems (CCP). Like other areas of the Arctic, the coastal plain is underlain by continuous permafrost limiting infiltration of surface water and limiting groundwater resources. Groundwater that may exist below permafrost is thought to be saline or brackish (Williams 1970). While ninety-nine percent of the 1002 Area is classified as wetlands fresh water is limited and confined to the shallow zone above permafrost (Clough et al. 1987). Lakes are not evenly distributed across the coastal plain with concentrations occurring near the mouth of the Canning River in the west and the Sadlerochit and Jago River regions to the east with very few lakes occupying the central Katakturuk River region (Trawicki et al. 1991). Total annual precipitation averages 6.2 inches per year (snow vs rain) (Arctic Environmental Information Center 1986- May 91 report, update) leading to climate and permafrost as dominant factors that limit water availability. The non-frozen water found on the coastal plain during the winter months is located in small isolated pools beneath ice hummocks associated with stream drainages , lakes with depths greater than 7 feet, and flowing surface waters associated with springs (Lyons and Trawicki 1994).

Streams and Rivers

The 1002 Area has a relatively high density of streams and rivers compared to other areas of the North Slope (Brackney 2008- CCP). These habitats support thirteen species of fish, including Dolly Varden an important subsistence fish. The hydrography of these systems is strongly influenced by the climate which is characterized by extremely low winter temperatures and short, cool summers. Streamflow rapidly declines in most systems shortly after freeze up in September and ceases in most streams by December when they are generally frozen to the stream bed resulting in no flow or flow so low as to not be measureable (Lyons and Trawicki 1994). A few exceptions to this occur where springs result in open reaches and aufeis areas that develop providing important fish over-wintering habitat (Arcone 1989). Break up on the Arctic coastal plain occurs during a brief period in late May or early June. Snowmelt begins in the mountains and foothills progressing towards the coastal plain. Rapidly melting water runs over the ground as sheetflow with infiltration limited by permafrost. Water in drainages rises rapidly, often flowing over ice covered stream channels. More than half of the annual discharge for these streams can occur during a period of several days to a few weeks (Clough et al. 1987, Sloan 1987). Based on origin, hydrologic regime, and chemical and biological characteristics, Craig and McCart (1975) classified North Slope streams into three categories: mountain, spring-fed, and tundra. Mountain streams are typically fast flowing and fed by varying proportions of snowmelt, glacier meltwater, and spring-fed tributaries. Waters are cold (usually less than 50 °F), occasionally turbid, moderately hard, and support low invertebrate densities. The most common species of fish in mountain streams is Dolly Varden. Mountain streams that receive glacial inputs are unique to the eastern North Slope, in the Jago, Hulahula, and Okpilak watersheds, discharge from glacial sources is the dominant source of flow when precipitation is

low and air temperatures are high and transport large volumes of water, sediment and nutrients to downstream ecosystems. Spring-fed streams are often tributaries of mountain streams and have relatively stable flows and temperatures throughout the year. Spring-fed waters are characterized by low levels of dissolved solids and very high densities of macroinvertebrates. Many spring-fed streams provide critical spawning and overwintering habitat for Dolly Varden. Tundra streams originate in the Brooks Range Foothills and coastal plain ecoregions, are fed by surface runoff, tend to be meandering systems, and have low to moderate invertebrate densities. Waters are typically warmer and exhibit lower pH and conductivity relative to mountain and spring-fed streams. Huryn et al. (2004) found that gradients in freezing probability, nutrient concentrations, and substratum instability control invertebrate communities in these systems. Some projections indicate that glacial inputs could disappear within the next 50 years altering hydrology by reducing instream connectivity and negatively impacting fish migrating to critical overwintering habitat (Nolan et al. 2011). Surface water availability and instream connectivity will potentially be adversely impacted by deepening of the active layer on the coastal plain, increasing duration of the summer season, and increased evapotranspiration rates (CCP).

Springs and Aufeis Areas

Six springs are located on the Arctic coastal plain identified through reconnaissance investigation by Childers et al. (1977): Sadlerochit Spring, Red Hill Spring, Katakturuk River tributary Spring, Hulahula River Spring, Okerokovik River Spring, and Aichilik River Spring. During the winter months pressurized water discharges from a spring pushing up through the ice to the surface where it spreads out and freezes forming aufeis areas that can become extensive. These formations melt more slowly than snow, generally persist into the summer and may provide a temporary source of freshwater (Kane and Slaughter 1973). Open water associated with springs provides important winter habitat particularly once surface water runoff ceases due to freezing (Lyons and Trawicki 1994). Most springs in Arctic Refuge have survived since the last glacial maximum (Yoshikawa et al. 2007), suggesting that they will continue to flow and be refugia for aquatic biota in a changing climate.

Lakes

The density of lakes in the Arctic coastal plain is low compared to the rest of the North Slope and as noted earlier their distribution is not uniform, nor is their size and depth (CCP). Jorgenson and Shur (2007) classified the coastal plain into regions based on lake origin: thaw, depression, riverine, and delta. Depression lake basins are formed in undulating sandy, alluvial marine or eolian deposits, and are the majority found on the coastal plain concentrated in the depression lakes region between the Hulahula and Niguanak rivers. Riverine lakes include oxbow and floodplain lakes along sinuous channels and thaw lakes formed in ice-rich abandoned channels. Riverine lakes are most concentrated along the Jago and Niguanak rivers. Delta lakes include thaw, riverine, and tidal lakes and most are found in deltas of the Hulahula, Jago, Aichilik, and Canning rivers (CCP). The majority of lakes on the coastal plain are shallow

lakes with surface areas ranging from 1,500 acres to less than 10 acres (Trawicki et al. 1991). Recharge of these systems is generally limited to snow melt and direct precipitation in the immediate vicinity of the lake (Lyons and Trawicki 1994). When not connected to larger drainage networks, evaporation has a strong influence on water chemistry and plays an important role in regulating lake water balance (CCP). Maximum winter ice thickness on lakes in the Arctic is between 6-7 feet (Bilello and Bates 1969, 1971, 1972, and 1975). Clough et al. (1987) reported that most lakes have basins less than 7 feet deep and thus freeze to the substrate. These shallow lakes generally melt from the surface downward in spring. Deeper lakes that do not freeze to substrate may have ice present on the surface well into July. Due to the level of winter freezing, the depth of lakes restricts the presence of fish, Hobbie (1984) found fish present only in lakes with depths greater than 5.6 feet. Shallow lakes generally lack fish because they usually freeze solid but they provide important habitat to emergent vegetation, invertebrates, and migratory birds due to the earlier availability of ice-free areas. Trawicki et al. (1991) identified fish presence in lakes on the coastal plain to be more frequent and widespread than previously suspected. Ninespine stickleback (*Pungitius puingitus*) were found in 34 of 52 lakes surveyed (65%) in 1989. In the past half a century, the duration of ice cover, thermal regimes, and rates of primary productivity have likely changed. In the future, changes in temperature, active layer depth, fire frequency and severity, and erosion rates could affect lake distribution, water quality, water levels, size, and connectivity to other habitats (CCP).

Winter Specific Hydrologic Data

Hydrologic data for the 1002 area are limited, short-term (less than five years) data were collected over two decades ago at 11 stream gage sites on five drainage systems across the coastal plain and an inventory of 119 lake basins was conducted to create lake contour maps water volume calculations and estimates of winter water volume beneath ice cover. These data were collected in large part to address questions regarding winter water availability in the 1002 area in the event of development activities. In the case of the river studies winter water was found to occur over a wide area in most of the major river drainages but it was restricted to small isolated pools beneath ice hummocks scattered throughout the braided portions of these rivers. The volume of water available was estimated to be small, 9 million gallons over the 237 miles of inventoried area. Total estimated volume of the study lakes ranged from 55,382 acre-feet (18 billion gallons) when free of ice to 3,366 acre-feet (1.1 billion gallons) beneath a maximum ice thickness of seven feet. Ninety percent of the available water was contained in just nine of the 119 surveyed lakes, the majority were found in the Canning River delta area (up to eighty percent of the total volume), and only two lakes were located in the region between the Katakturuk and Sadlerochit rivers.

Climate Change Effects

Historically, in the nearby NPR-A the coastal regions have not thawed until after the second week of June (NPR-A EIS, 2013). By mid-century, these areas are projected to thaw the first week of June. By the late century these areas are expected to as early as June 1 by late century. Changes in freeze-up date are predicted to be even greater. Historic data indicates NPR-A waterbodies freeze by mid-September. Models indicate freeze-up will not occur until late September in southern regions and early October

along the coast. By the end of the century, coastal waterbodies may not freeze until the end of October. These changes will result in a six-week increase in the length of the ice-free season.

Landscape drying trends have been observed in northeastern Alaska (add reference). Increased temperatures and an extended growing season could increase the evapotranspiration rate, increasing the water deficit (defined as the amount by which evapotranspiration exceeds precipitation) and potentially affecting the annual water balance. The annual water balance represents the water available for plants and animals, stream flow, and groundwater recharge. Shallow water systems, including lakes and wetlands, would decrease in number and extent as the annual water balance experiences an ongoing deficit. Permafrost loss on the Refuge could also result in draining of many shallow water systems on the Refuge; the thawing of ice wedges and ice lenses could create more connections between surface water and groundwater systems. If wetlands and lakes continue to dry, an increase in vegetative cover can be expected; and they could eventually transition to dry meadows and shrublands. This would reduce the amount of habitat available for wetland-dependent species, such as waterfowl.

Environmental Consequences

Because unfrozen water is limited in winter, conflicts between overwintering fish populations and industrial water withdrawals seem likely (West et al. 1992). Water withdrawal and its direct influence on reducing available habitat (wetted space) probably impacts fish populations more than any other winter alteration (Cunjak 1996). Since the distribution of adult and juvenile fish is extremely restricted during the long arctic winter when most of the drainage is frozen solid (Craig and Poulin 1975), water removal , causing reduced groundwater flow or altered baseflow and ice and temperature regimes has the potential to affect all life stages of some populations. Seismic activity would could potentially reduce fish populations, divert fish from their normal locations, or contaminate fish populations and habitat.

Seismic Exploration and Thermokarst Activity

Seismic exploration can cause thermokarst, especially when snow is insufficient to protect soil and vegetation (WesternGeco 2003). Removal or damage of the organic mat exposes soils to erosion by wind and water, which could deposit sediment into water bodies resulting in higher turbidity and concentrations of suspended sediment. To cause high turbidity, the peat mat must be sufficiently eroded to expose underlying mineral soils, and the mineral soils must be fine grained.

Effects of Water Withdrawal from Lakes

The primary source of water during the winter months is unfrozen water that lies beneath the ice cover of both shallow and deep lakes. This water is somewhat saline because of the exclusion of ions during the freezing of the upper part of the lake. Water from lakes may be used for ice roads, pads and airstrips, and for drilling and production water and potable water at drilling facilities. Typically the volume of water taken from an individual lake depends on the depth of the lake, volume of unfrozen water in the lake, and the presence and type of fish documented.

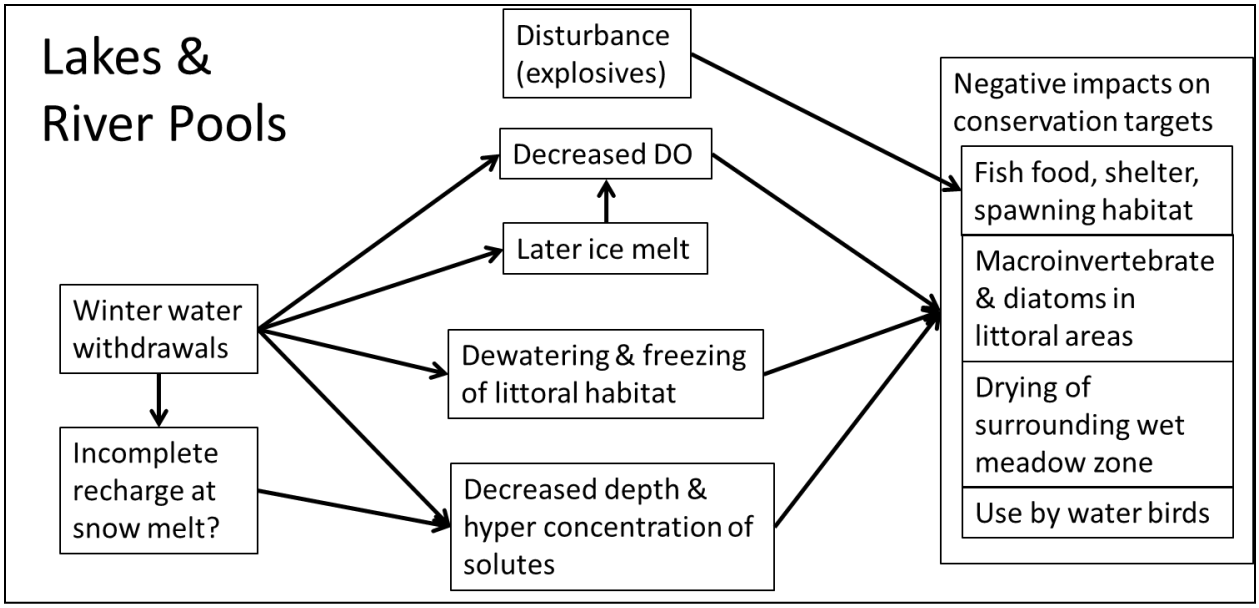


Figure X. Potential impacts seismic exploration lakes and rivers

Removal or compaction of snow can increase the depth of freezing on lakes, sometimes by one foot or more. As a result, the water quantity available in a lake during the winter months can be greatly reduced, and the salinity of the water beneath the ice can be increased. Maintaining the natural hydrologic regime may not be possible under various pumping scenarios. To reduce impacts to the natural hydrologic regime, regulations typically prohibit snow compaction on fish-bearing lakes, but snow compaction is unavoidable when ice aggregates are removed from lakes.

There are no studies assessing the effects of permitted withdrawals on lake water chemistry on the North Slope of Alaska. Hinzman et al. 2006 conducted a study on to assess the effects of what turned out to be relatively small water withdrawals in on water chemistry and lake recharge. This work was funded by the Department of Energy and oil field companies, did not undergo a standard peer-review process, yet it is widely cited by the BLM and DOE. Unfortunately, only a small fraction of the permitted withdrawal volume was actually pumped from the study lakes, the study design had almost no ability to detect change, and the researchers were unable to get their dissolved oxygen sensors functioning to conduct any relevant measurements in pumped lakes. Thus, we have no information on potential impacts of heavy pumping that is currently allowed by water withdrawal permits on the North Slope of Alaska. Despite the low ability to detect change, Hinzman et al. 2006 did find that one of four pumped lakes did not fully recharge at snow melt. This suggests that water withdrawals far less than permitted volumes can have significant impacts on lake hydrology and the availability of wetted habitat. Canadian studies on ice-covered lakes have found that water withdrawals have a substantial and wide range of negative impacts on aquatic ecosystems (Cott et al 2008). These include reduction of habitat for fish, waterfowl, and furbearers; reduction in oxygen available to overwintering fish; and dewatering and freezing of littoral habitats which kills plants, invertebrates, and fish eggs. Isolated lakes may be particularly vulnerable as they may not recharge at snowmelt. Organisms in small isolated lakes are particularly sensitive to water withdrawals. The effects of water withdrawals on wet meadow zones

surrounding lakes are unknown, but would likely be great if lakes are not fully recharged at snowmelt. This would result in a reduction in habitat for waterfowl and shorebirds that use these lakes during the summer.

Effects during exploration on water chemistry from water withdrawals could be short term if lakes are fully recharged during spring. Impacts to overwintering fish and littoral zone communities will likely be more substantial and longer-term, especially in isolated lakes.

Effects of Ice Roads, Ice Pads and Ice Bridges

Ice roads and ice pads are used extensively during the winter exploration season for access and for exploration drilling and testing. Ice roads require about 1 million to 1.5 million gallons of water per linear mile and generally can be built at a rate of about 1.5 inches of thickness per day (USDOI BLM 1998). Ice pads can require up to 5 million gallons of water to build and range in size from 3 to 10 acres. Floating ice bridges may be necessary to cross large rivers and must be of sufficient thickness to handle heavy truck and rig traffic. Construction of an ice road capable of transporting a drilling rig across a river such as the Canning River may be designed to freeze most of the water column below the road, but would need to ensure that circulation is not restricted unless there was already grounded ice present. Smaller rivers require ice bridges, which are often constructed of aggregate chips and water and placed on grounded ice. Ice roads would be breached at stream crossings, especially if fish passage is a concern or the quantity of expected flow is significant during breakup. Ice roads and bridges can cause additional freeze-down, reducing the already limited overwinter water volume and water quality available as fish habitat. During snow melt ice bridge can create ice dam flooding if not removed properly.

Use of Explosives

Use of explosives is a major disturbance to fish and wildlife. These are particularly stressful to fish that are captive in over wintering habitats and would likely have a negative impact on terrestrial and aquatic animals that congregate near spring-fed oases during winter.

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From: Gieryic, Michael
To: Tracy Fischbach
Cc: Joseph Darnell
Subject: ANWR 1002 Reference Documents
Date: Thursday, November 16, 2017 10:49:13 AM
Attachments: CRS Report - ANWR 14Dec2016.pdf

Tracy,

At the end of the attached Congressional Research Service report (pp. 14-15) there are several NEPA documents and other reference reports listed that pertain to the 1002 Area, some of which appear to address oil and gas activities and their impacts. I am sharing this with you with the thought that some of the documents might be helpful to reference in the EA.

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Arctic National Wildlife Refuge (ANWR): Votes and Legislative Actions Since the 95th Congress

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Specialist in Natural Resources Policy

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CRS REPORT
Prepared for Members and
Committees of Congress

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Summary

Current law forbids the federal government from offering energy leases or from allowing activities leading to energy development in the Arctic National Wildlife Refuge (ANWR, or the Refuge) in northeastern Alaska. For several decades, a major energy debate has been whether to approve energy development in ANWR, and if so, under what conditions, or to continue to prohibit development to protect the area's biological resources. ANWR is rich in fauna, flora, and commercial oil potential. Its development has been debated for more than 50 years, and the level of debate fluctuates with gasoline and natural gas prices, terrorist attacks, infrastructure damage from hurricanes in the Gulf of Mexico, and turmoil in the Middle East.

This report provides a summary of legislative attempts to address issues of energy development and preservation in the Refuge from the 95th Congress (1977-1978) onward. (The substance of the issue is covered in other CRS reports.) There have been several periods of active congressional consideration, punctuated by periods of less activity and debate. In the 96th Congress (1979-1980), multiple floor votes occurred in the House and Senate, leading ultimately to the passage of the Alaska National Interest Lands Conservation Act (P.L. 96-487). In the 104th Congress (1995-1996), floor votes related to ANWR development measures contained in budget reconciliation bills occurred in both bodies. These led, eventually, to a presidential veto. The 107th Congress (2001-2002) saw votes in both bodies in the context of measures to address energy resources. Ultimately, no ANWR provisions were approved. In the 108th and 109th Congresses (2003-2006), multiple floor votes occurred in both the House and the Senate, in some cases over amendments that were identical in each Congress. The ANWR development provisions were considered as parts of bills concerning energy programs, budget resolutions, and defense authorization.

Although no floor votes on the Refuge occurred in the House or the Senate during the 111th Congress, in the 112th Congress, the House approved H.R. 3408 on February 16, 2012. The measure included a provision to open the 1.5 million acre Coastal Plain to energy development. On March 13, 2012, the Senate rejected S.Amdt. 1826 to S. 1813, which would have expanded drilling into areas including the ANWR Coastal Plain. No House or Senate floor votes related to the Refuge occurred in the 113th Congress.

In the 114th Congress, there were House floor votes that related to the Coastal Plain, either directly or indirectly. One amendment (H.Amdt. 961) to designate the Coastal Plain as wilderness was rejected by the House; three amendments would block funds to implement a wilderness recommendation in a Refuge planning document. No related Senate floor votes occurred in the 114th Congress.

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Background and Analysis

The Arctic National Wildlife Refuge (ANWR, or the Refuge) consists of 19 million acres in northeast Alaska. It is administered by the Fish and Wildlife Service (FWS) in the Department of the Interior (DOI). Its 1.5 million acre Coastal Plain on the North Slope of the Brooks Range is viewed by industry as one of the more likely undeveloped U.S. onshore oil and gas prospects.[1] In its last economic assessment in 2005, the U.S. Geological Survey (USGS) estimated that, at $55/barrel (bbl) in 2003 dollars ($72.26 in 2016 dollars), there is a 95% chance that 5.0 billion bbl or more could be economically recovered and a small (5%) chance that 10.9 billion bbl or more could be recovered on the federal lands in the Coastal Plain; the mean estimate was 7.3 billion bbl.[2] (For comparison, U.S. oil consumption from all sources was about 7.1 billion bbl in 2015.) There is a small chance that, taken together, the fields on this federal land could hold as much economically recoverable oil as the giant field at Prudhoe Bay, found in 1967 on the coastal plain west of ANWR.[3] That state-owned portion of the coastal plain is now estimated to have held 11 billion-13 billion barrels of oil at the time.

The Refuge, and especially its coastal plain, is home to a wide variety of plants and animals. The presence of caribou, polar bears (designated as threatened under the Endangered Species Act),[4] grizzly bears, wolves, migratory birds, and many other species in a nearly undisturbed state has led some to call the area "America's Serengeti." The Refuge and two neighboring parks in Canada have been proposed for an international park, and several species found in the area (including polar bears, caribou, migratory birds, and whales) are protected by international treaties or agreements.

The analysis below covers the history of congressional actions on this issue, with a focus on the years since the 108th Congress. See **Table 1** and **Table 2** for votes in the House and Senate from the 96th Congress through the 114th Congress.

The conflict between potentially large oil deposits and nearly pristine nature creates a dilemma: Should Congress open the area for oil and gas development, or should the area's ecosystem be given permanent protection from development? What factors should determine whether to open the area? If it is opened, how can damages be avoided, minimized, or mitigated? To what extent should Congress legislate special management of the area (if it is developed), and to what extent

[1] This report will use the term *Coastal Plain* to refer to land legally designated under Section 1002 of the Alaska National Interest Lands Conservation Act (ANILCA; P.L. 96-487) and under subsequent executive branch rulings. In lower case (*coastal plain*), the term will be used in the geographic sense (i.e., the area north of the foothills of the Brooks Range, from the Chukchi Sea in the west to the Canadian border in the east). For more on the distinction, see the report section on "The 1980s."

[2] U.S. Geological Survey (USGS), *Economics of 1998 U.S. Geological Survey's 1002 Area Regional Assessment: An Economic Update*, Open-File Report 2005-1217 (Washington, DC: 2005). See Table 4. The three figures shown here include very minor amounts of natural gas liquids, which would be produced along with any oil. As of December 2016, crude oil (Brent) was trading at about $55/bbl in 2016 dollars.

[3] See U.S. Department of the Interior, Geological Survey, *The Oil and Gas Resource Potential of the Arctic National Wildlife Refuge 1002 Area, Alaska*, 1999, 2-CD set, USGS Open File Report 98-34; and U.S. Department of the Interior, Geological Survey, *Economics of 1998 U.S. Geological Survey's 1002 Area Regional Assessment: An Economic Update*, USGS Open File Report 2005-1359, Washington, DC, 2005. Note that on-site research on any oil resources in the Coastal Plain has not been carried out since the mid-1980s, in light of the fact that development and activities leading to development are currently illegal. However, some additional modeling of older data, aided by results from exploration on nearby onshore or offshore tracts, has produced a few new interpretations from time to time. In consequence, many older publications are the best available.

[4] 16 U.S.C. 1533.

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should federal agencies be allowed to manage the area under existing law? If Congress takes no action, the Refuge remains closed to energy development, as provided in Section 1003 of P.L. 96-487.

Table 1. Votes in the House of Representatives on Energy Development Within the Arctic National Wildlife Refuge

Congress	Date	Voice/ Roll Call	Brief Description
95th			No floor votes.
96th	5/16/1979	#152	Udall-Anderson substitute for H.R. 39 adopted by House (268-157); included provisions designating all of the Refuge as wilderness.
	5/16/1979	#153	H.R. 39 passed House (360-65).
	11/12/1980	voice (unanimous)	Senate version (leaving 1002 area development issue to a future Congress) of H.R. 39 passed House.
97th			No floor votes.
98th			No floor votes.
99th			No floor votes.
100th			No floor votes.
101st			No floor votes.
102nd			No floor votes.
103rd			No floor votes.
104th	11/17/1995	#812	House agreed (237-189) to conference report on H.R. 2491 (H.Rept. 104-350), FY1996 budget reconciliation (a large bill that included 1002 area development provisions).
105th			No floor votes.
106th			No floor votes.
107th	8/1/2001	#316	House passed Sununu amendment (H.Amdt. 297) to H.R. 4 to limit specified surface development of 1002 area to a total of 2,000 acres (228-201).
	8/1/2001	#317	House rejected Markey-Johnson (CT) amendment (H.Amdt. 298) to H.R. 4 to strike 1002 area development title (206-223).
	8/2/2001	#320	H.R. 4, an omnibus energy bill, passed House (240-189). Title V of Division F contained 1002 area development provisions.
108th	4/10/2003	#134	House passed Wilson (NM) amendment (H.Amdt. 67) to H.R. 6 to limit certain features of 1002 area development to a total of 2,000 acres (226-202).
	4/10/2003	#135	House rejected Markey-Johnson (CT) amendment (H.Amdt. 69) to H.R. 6 to strike 1002 area development title (197-228).
	4/11/2003	#145	House passed H.R. 6, a comprehensive energy bill (247-175); Division C, Title IV would have opened the 1002 area to energy development.
109th	3/17/2005	#88	House adopted (218-214) the concurrent budget resolution, H.Con.Res. 95, which included spending targets that would be difficult to achieve unless ANWR development legislation was passed.

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Congress	Date	Voice/ Roll Call	Brief Description
	4/20/2005	#122	House rejected (200-231) Markey amendment (H.Amdt. 72) to strike the ANWR provision in its omnibus energy bill (H.R. 6) allowing leases for exploration, development, and production in ANWR.
	4/21/2005	#132	House passed an omnibus energy bill (H.R. 6) with an ANWR development title (249-183).
	4/28/2005	#149	House adopted (214-211) the conference report on the concurrent budget resolution, H.Con.Res. 95; it contained assumptions predicated on ANWR development.
	12/18/2005	#669	House adopted (308-106) the conference report on the Defense appropriations bill (H.R. 2863), which would have allowed oil and gas leasing in ANWR.
	12/22/2005	voice	House passed S.Con.Res. 74, which corrected the enrollment of H.R. 2863, removing the ANWR development provision.
	5/25/2006	#209	House passed H.R. 5429 to open ANWR to development (225-201).
110th	8/4/2007	#831	House rejected motion to recommit H.R. 3221 to the Energy and Commerce Committee with instructions to report back with language authorizing ANWR development (169-244).
	5/14/2008	#321	House rejected motion to instruct conferees for S.Con.Res. 70 to adjust budget levels to assume increased revenues from opening ANWR to development (185-229).
111th			No floor votes.
112th	2/16/2012	#71	House passed H.R. 3408, which included a provision to open up a portion of ANWR to oil and gas exploration and production and expand lease sales (237-187). See text.
113th			No floor votes
114th	7/7/2015	voice	House passed H.Amdt. 577 by Rep. Young (AK) to H.R. 2822 (Interior appropriations) to prevent use of funds to implement Refuge Comprehensive Conservation Plan, which recommended that Congress designate the Coast Plain as wilderness.
	2/26/2016	#99	House rejected H.Amdt. 961 by Rep. Huffman to H.R. 2406 to designate Coastal Plain of Refuge as wilderness (176-227).
	7/13/2016	#460	House approved H.Amdt. 1355 by Rep. Young (AK) to H.R. 5538 to prevent use of funds to implement Refuge Comprehensive Conservation Plan, which recommended that Congress designate the Coastal Plain as wilderness. (237-191).
	7/14/2016	#477	House passed H.R. 5538, which included H.Amdt. 1355 (above) as Section 497 (231-196).

Source: Congressional Research Service (CRS).

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Table 2. Votes in the Senate on Energy Development Within the Arctic National Wildlife Refuge

Congress	Date	Voice/ Roll Call	Brief Description
95th			No floor votes.
96th	7/22-23/1980	#304	Motion to table Tsongas amendment in the nature of a substitute (which included a title to designate all of ANWR as wilderness) to H.R. 39 defeated (33-64).
	8/18/1980	#354	Senate adopted cloture motion on H.R. 39 (63-25).
	8/19/1980	#359	Senate passed Tsongas-Roth-Jackson-Hatfield substitute to H.R. 39 (78-14); this bill is current law, and leaves decision about any 1002 area development for a future Congress.
97th			No floor votes.
98th			No floor votes.
99th			No floor votes.
100th			No floor votes.
101st			No floor votes.
102nd	11/1/1991	#242	Cloture motion on S. 1220 failed; one title would have opened 1002 area to development (50-44).
103rd			No floor votes.
104th	5/24/1995	#190	Senate voted to table Roth amendment (S.Amdt. 1150) to strip 1002 area revenue assumptions from S.Con.Res. 13 (56-44).
	10/27/1995	#525	Senate voted to table Baucus amendment to strip 1002 area development provisions in H.R. 2491 (51-48).
105th			No floor votes.
106th	4/6/2000	#58	Senate voted to table Roth amendment to strip 1002 area revenue assumptions from the FY2001 budget resolution (S.Con.Res. 101) (51-49).
107th	12/3/2001	#344	Lott-Murkowski-Brownback amendment (S.Amdt. 2171) to Daschle amendment to H.R. 10 included 1002 area development title in H.R. 4, as passed by the House. A cloture motion on the amendment failed (1-94).
	4/18/2002	#71	Senate failed to invoke cloture on Murkowski amendment (S.Amdt. 3132) to S. 517, an omnibus energy bill. It contained ANWR development language similar to that in the House-passed version of H.R. 4 (46-54).
108th	3/19/2003	#59	Senate passed Boxer amendment (S.Amdt. 272) to delete certain revenue assumptions from S.Con.Res. 23, the FY2004 budget resolution; floor debate indicated that the amendment was clearly seen as a vote on developing the 1002 area (52-48).
109th	3/16/2005	#52	Senate voted to reject Cantwell amendment (S.Amdt. 168) to strike revenue assumptions from its FY2006 budget resolution (S.Con.Res. 18) that would have given procedural protection to legislation authorizing oil drilling in part of the Refuge (49-51).
	11/3/2005	#288	Senate voted to reject Cantwell amendment (S.Amdt. 2358) to its FY2006 budget reconciliation bill (S. 1932) that would have deleted the provision establishing an oil and gas leasing program in ANWR (48-51).
	12/21/2005	#364	Senate failed to invoke cloture on the conference report on the FY2006 Defense appropriations bill (H.R. 2863), which included provisions to open

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Congress	Date	Voice/ Roll Call	Brief Description
			ANWR to development (56-44).
	12/21/2005	#365	Senate adopted a concurrent resolution (S.Con.Res. 74) that instructed the Clerk of the House to strike provisions from the conference report to H.R. 2863 that would have allowed oil drilling in the Refuge (48-45).
	3/16/2006	#74	Senate passed the FY2007 budget resolution (S.Con.Res. 83) with a reconciliation instruction (§201) directing the Committee on Energy and Natural Resources to reduce budget authority by an amount equal to assumed revenues from development in ANWR (51-49).
110th	5/13/2008	#123	Senate rejected McConnell amendment (S.Amdt. 4720) to S. 2284 to open ANWR to energy development (42-56); earlier unanimous consent agreement had raised majority for adoption of amendment to 60 votes.
111th			No floor votes.
112th	3/13/2012	#38	Senate rejected Roberts amendment (S.Amdt. 1826) (41-57; 60-vote threshold) to S. 1813, which would have opened Coastal Plain of ANWR to oil and gas drilling.
113th			No floor votes.
114th			No floor votes.

Source: CRS.

Basic information on the Refuge can be found at the FWS website, http://arctic.fws.gov/.[5] A presentation of some arguments in favor of development can be found at http://www.anwr.org, sponsored by Arctic Power, a nonprofit coalition of most groups supporting ANWR energy development. Some opponents' arguments can be found at http://www.alaskawild.org/places-we-protect/arctic-refuge/, supported by the Alaska Wilderness League, or at http://www.protectthearctic.com/, supported by the National Audubon Society. Maps of the coastal plain showing existing oil development areas on state and federal land can be found at http://dog.dnr.alaska.gov/GIS/Maps.htm.

Legislative History of the Refuge, 1957-2000

The Early Years

The energy and biological resources of northern Alaska have raised controversy for decades, from legislation in the 1970s to a 1989 oil spill from the *Exxon Valdez* at the southern terminal of the pipeline that would carry ANWR oil to markets to more recent efforts to use ANWR resources to address energy needs or to help balance the federal budget. In November 1957, DOI announced plans to withdraw lands in northeastern Alaska to create an "Arctic National Wildlife *Range*." The first group actually to propose to Congress that the area become a national wildlife range, in recognition of the many game species found in the area, was the Tanana Valley (Alaska) Sportsmen's Association in 1959. On December 6, 1960, after statehood, the Secretary of the Interior issued Public Land Order 2214 reserving the 9.5 million-acre area as the Arctic National Wildlife Range.

[5] This website and the others listed in this paragraph were last visited in December 2016.

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The 1970s

In 1971, Congress enacted the Alaska Native Claims Settlement Act (ANCSA, P.L. 92-203, 85 Stat. 688) to resolve all Native aboriginal land claims against the United States. ANCSA provided for monetary payments and also created Village Corporations that received the surface estate to approximately 22 million acres of lands in Alaska. Village selection rights included the right to choose the surface estate (surface rights, as opposed to rights to exploit any energy or minerals beneath the surface) in a certain amount of lands within the National Wildlife Refuge System. Under §22(g) of ANCSA, the chosen lands were to remain subject to the laws and regulations governing use and development of the particular refuge. Kaktovik Inupiat Corporation (KIC, the local Native corporation created under ANCSA, and headquartered within ANWR) received rights to three townships along the coast of the Refuge. ANCSA also created Regional Corporations, which could select subsurface rights to some lands and full title to others. Subsurface rights in national wildlife refuges were not available, but in-lieu selections to substitute for such lands were provided.

The 1980s

In 1980, Congress enacted the Alaska National Interest Lands Conservation Act (ANILCA, P.L. 96-487, 94 Stat. 2371), which included several sections about ANWR. The Arctic Range was renamed the Arctic National Wildlife Refuge, and was expanded, mostly southward and westward, to include an additional 9.2 million acres.[6] Section 702(3) of ANILCA designated much of the original range as a wilderness area, but did not include the coastal plain.[7] ANILCA defined the *Coastal Plain* as the lands on a specified map—language that was interpreted as excluding most Native lands, even though these lands are *geographically* part of the coastal plain.[8] Section 1002 of ANILCA directed that a study of the Coastal Plain (which therefore is often referred to as the *1002 area*) and its resources be completed within five years and nine months of enactment. The resulting 1987 report was called the *1002 report* or the Final Legislative Environmental Impact Statement (FLEIS).

Section 1003 of ANILCA prohibited oil and gas development in the entire Refuge, or "leasing or other development leading to production of oil and gas from the range" unless authorized by an act of Congress.[9]

From 1990 to 2000

There were several attempts to authorize opening ANWR to energy development in the 1990s. In the 104th Congress, the FY1996 budget reconciliation bill (H.R. 2491, §§5312-5344) would have opened the 1002 area to energy development, but the measure was vetoed, as many observers had expected. President Clinton cited the Refuge sections as one of his reasons for the veto.

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[6] Additional land was added in later years, bringing the current total to 19.3 million acres. Portions of the Refuge added in 1980 and later were not included in the wilderness system.

[7] For more on wilderness designation, see CRS Report RL31447, *Wilderness: Overview, Management, and Statistics*, by Katie Hoover.

[8] See footnote 1, for the difference between *Coastal Plain* and *coastal plain*. The coastal plain stretches from the Canadian border west to Bering Strait. Its width varies from about 10 miles (at the Canadian border) to over 100 miles south of Barrow.

[9] For more on legal issues in legislation on ANWR and related developments, see archived CRS Report RL31115, *Legal Issues Related to Proposed Drilling for Oil and Gas in the Arctic National Wildlife Refuge (ANWR)*, by Pamela Baldwin.

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While bills were introduced, the 105th Congress did not debate the ANWR issue. In the 106th Congress, bills to designate the 1002 area of the Refuge as wilderness and others to open the Refuge to energy development were introduced. Revenue assumptions about ANWR were included in the FY2001 budget resolution (S.Con.Res. 101) reported by the Senate Budget Committee on March 31, 2000. An amendment to remove this language was tabled. However, conferees rejected the language. The conference report on H.Con.Res. 290 did not contain these budget assumptions, and the report was passed by both chambers on April 13. S. 2557 was introduced May 16, 2000; it included a title to open the Refuge to development. Hearings were held on the bill, but a motion to proceed to consideration of the bill on the Senate floor did not pass.

Only three recorded votes relating directly to ANWR development occurred from the 101st through 106th Congresses. All were in the Senate:

- In the 104th Congress, on May 24 1995, a motion to table an amendment that would have stripped ANWR development titles from the Senate version of H.R. 2491 passed (Roll Call #190). (See above.)
- In the same Congress, on October 27, 1995, another motion to table a similar amendment to H.R. 2491 also passed (Roll Call #525).
- In the 106th Congress, the vote to table an amendment to strip ANWR revenue assumptions from the budget resolution (S.Con.Res. 101; see above) was passed (April 6, 2000; Roll Call #58).

Legislative History of the Refuge, 2001-2002

In the 107th Congress, action on ANWR development followed a complex legislative path, with similar or identical language appearing multiple times in different bills. H.R. 4, an omnibus energy bill containing ANWR development provisions, passed the House on August 2, 2001 (yeas 240, nays 189; Roll Call #320). The text of H.R. 2436 (H.Rept. 107-160, Part I) was incorporated in H.R. 4 as Title V, Division F. The measure would have opened ANWR to exploration and development. The previous day, an amendment by Representative Sununu to limit specified surface development to a total of 2,000 acres was passed (yeas 228, nays 201; Roll Call #316). Representatives Markey and Johnson (CT) offered an amendment to strike the title; this was defeated (yeas 206, nays 223; Roll Call #317). The House appointed conferees on June 12, 2002. (See below for action after Senate passage of H.R. 4.)

In the first session of the 107th Congress, Senator Lott (on behalf of himself and Senators Murkowski and Brownback) offered an amendment (S.Amdt. 2171) to an amendment on pension reform (S.Amdt. 2170) to H.R. 10. Their amendment included, among other energy provisions, the ANWR development title in H.R. 4, as passed by the House. A cloture motion was filed on the Lott amendment, and the Senate failed to invoke cloture (yeas 1, nays 94; Roll Call #344) on December 3, 2001. Instead, the Senate voted the same day in favor of invoking cloture on the underlying amendment (S.Amdt. 2170), (yeas 81, nays 15; Roll Call #345). Because cloture was invoked on the underlying amendment, Senate rules required that subsequent and pending amendments to it be germane. The Senate's presiding officer subsequently sustained a point of order against the Lott amendment, which was still pending, on the grounds that it was not germane to the underlying amendment on pension reform, and thus the amendment fell.

The next vehicle for Senate floor consideration was S. 517, which concerned energy technology development. On February 15, 2002, Senator Daschle offered an amendment (S.Amdt. 2917), an omnibus energy bill. It did not contain provisions to develop the Refuge, but two amendments (S.Amdt. 3132 and S.Amdt. 3133) to do so were offered by Senators Murkowski and Stevens,

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respectively, on April 16. The language of the two amendments was, in most sections, identical to that of H.R. 4 (Division F, Title V). Key differences included a requirement for a presidential determination before development could proceed, an exception to the oil export prohibition for Israel, and a number of changes in allocation of any development revenues, as well as allowing some of those revenues to be spent without further appropriation. On April 18, the Senate essentially voted to prevent drilling for oil and gas in the Refuge. The defeat came on a vote of 46 yeas to 54 nays (Roll Call #71) on a cloture motion to block a threatened filibuster on Senator Murkowski's amendment to S. 517, which would have ended debate and moved the chamber to a direct vote on the ANWR issue.

Lacking a provision to develop ANWR, the text of S. 517, as amended, was substituted for the text of the House-passed H.R. 4, and passed the Senate (yeas 88, nays 11; Roll Call #94) on April 25, 2002. Conferees attempted to iron out the substantial differences between the two versions in the time remaining in the second session. The conference committee chairman, Representative Tauzin, indicated that the ANWR issue, as one of the most controversial parts of the bill, would be considered toward the end of the conference, after less controversial provisions. In the end, no conference agreement was reached, and H.R. 4 died at the end of the 107th Congress.

Legislative History of the Refuge, 2003-2004

Work began on FY2003 Appropriations for Interior and Related Agencies in the 107th Congress but was not completed until the 108th Congress. (A series of continuing resolutions provided funding for DOI into the 108th Congress.) In the 107th Congress, for the FY2003 Interior appropriations bill, the House Committee on Appropriations had agreed to report language on the Bureau of Land Management (BLM) energy and minerals program in general, and stated that no funds were included in the FY2003 funding bill "for activity related to potential energy development within [ANWR]" (H.Rept. 107-564, H.R. 5093). But §1003 of ANILCA prohibited "development leading to production of oil and gas" unless authorized by Congress. Thus, the committee's report language was viewed by some as barring the use of funds for pre-leasing studies and other preliminary work related to oil and gas drilling in ANWR. The report of the Senate Committee on Appropriations did not contain this prohibition.

Conferees on the FY2003 Consolidated Appropriations Resolution (P.L. 108-7), which incorporated Interior appropriations, included language in the joint explanatory statement stating that they "do not concur with the House proposal concerning funding for the [BLM] energy and minerals program." This change from the House report language was interpreted by some as potentially making available funds for preliminary work for development in ANWR. However, as noted, the prohibition contained in ANILCA remains in effect, so the ability to use money in the bill for particular pre-leasing activities was not clear.

FY2004 Reconciliation

During the 108th Congress, development proponents sought to move ANWR legislation through the FY2004 budget reconciliation process to avoid a possible Senate filibuster later in the session.[10] The House agreed to the FY2004 budget resolution (H.Con.Res. 95) on March 21 (yeas 215, nays 212; Roll Call #82). The resolution contained reconciliation instructions to the House

[10] Reconciliation bills in the Senate are considered under special rules that do not permit filibusters. See CRS Report 98-814, *Budget Reconciliation Legislation: Development and Consideration*, by Bill Heniff Jr., and CRS Report RL30862, *The Budget Reconciliation Process: The Senate's "Byrd Rule"*, by Bill Heniff Jr.

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Resources Committee for reductions, but did not specify the expected source of the savings. If the House language had been adopted, ANWR development language might have been considered as part of a reconciliation measure to achieve the savings. S.Con.Res. 23, as reported by the Senate Budget Committee, stated:

> The Senate Committee on Energy and Natural Resources shall report a reconciliation bill not later than May 1, 2003, that consists of changes in laws within its jurisdiction sufficient to decrease the total level of outlays by $2,150,000,000 for the period of fiscal years 2004 through 2013.

To meet this directive, the committee would have to choose between cuts of that magnitude or reporting legislation to open ANWR to development. On March 19, 2003, Senator Boxer offered S.Amdt. 272 to delete this provision. Floor debate indicated that the Boxer amendment was clearly seen as a vote on whether to develop ANWR. The amendment passed (yeas 52, nays 48; Roll Call #59). The amended Senate version of the resolution was ultimately accepted by both House and Senate. As a result, while the Committee on Energy and Natural Resources could still have reported legislation to authorize opening the Refuge, such legislation would not have been eligible for inclusion in a reconciliation bill. Without the procedural protections associated with reconciliation, a filibuster could have been used to prevent a vote on an authorization bill.[11] In the end, the conferees on the budget resolution included no instructions to the House Resources and Senate Energy and Natural Resources Committees.

Comprehensive Energy Legislation

The House passed H.R. 6, a comprehensive energy bill, on April 11, 2003. Division C, Title IV would have opened the 1002 area to energy development. On April 10, the House had passed the Wilson (NM) amendment to H.R. 6 to limit certain features of development to a total of 2,000 acres (yeas 226, nays 202; Roll Call #134), without restricting the total number of acres that could be leased. As in the 107th Congress, Representatives Markey and Johnson (CT) offered an amendment to strike the title; this was defeated (yeas 197, nays 228; Roll Call #135). H.R. 4514 was identical to the ANWR title of the House version of H.R. 6 except in one provision on revenue disposition. In addition, one bill (H.R. 39) was introduced to open the 1002 area to development, and two bills (H.R. 770 and S. 543) were introduced to designate the 1002 area as wilderness.

The initial version of the Senate energy bill (S. 14) had no provision to open the Refuge, and Chairman Domenici stated that he did not plan to include one. After many weeks of debate in the Senate, as prospects of passage seemed to be dimming, Senators agreed to drop the bill they had been debating and to go back to the bill passed in the Senate of the 107th Congress, when the Senate was under control of the other party. On July 31, 2003, they substituted the language of that bill for that of the House-passed H.R. 6. There was widespread agreement that the unusual procedure was a means of getting the bill to conference. Members, including Chairman Domenici, indicated at the time their expectation that the bill that emerged from conference would likely be markedly different from the version of H.R. 6 that had just been passed by the Senate. One of the key differences between the two bills was the presence of ANWR development language in the House version, and its absence in the Senate version. Conference Chairman Domenici included the House title on ANWR in his working draft, but in the end, the conference committee deleted ANWR development features in the conference report (H.Rept. 108-375); the conference report was agreed to by the House on November 18, 2003 (yeas 246,

[11] See CRS Report RS20368, *Overview of the Congressional Budget Process*, by Bill Heniff Jr.

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nays 180; Roll Call #630); the Senate considered the measure, but a cloture vote failed (57 yeas, 40 nays; Roll Call #456) on November 21, 2003.

In the second session, the Senate turned to a more narrowly focused energy bill (S. 2095) that might have then gone to a second conference with the House; like the Senate's version of H.R. 6, this new bill did not contain ANWR development provisions. No scenario for energy legislation that was discussed publicly included provisions that would have opened the Refuge to development. However, the President's proposed FY2005 budget assumed legislation would be passed that would open the Refuge and would therefore produce revenues. The President's proposal would have assisted efforts to assume ANWR revenues in a budget resolution, and therefore aided its inclusion in a reconciliation package, as was attempted in the first session.

Legislative History of the Refuge, 2005-2006

As explained below, the Refuge debate took two basic legislative routes in the 109th Congress: (1) budget resolutions and reconciliation bills (S.Con.Res. 18, H.Con.Res. 95, S. 1932, H.R. 4241, S.Con.Res. 83, and H.Con.Res. 376), which cannot be filibustered; and (2) other bills (H.R. 6, an omnibus energy bill; H.R. 2863, Defense appropriations; and H.R. 5429, a bill in the second session to open the Refuge to development), which can be subject to filibusters. In none of these measures did Congress reach agreement to allow development.

Budget Resolutions and Reconciliation Bills

The budget resolution and reconciliation were a focus of attention, particularly in the Senate.[12] The FY2006 Senate budget resolution (S.Con.Res. 18) passed by the Senate Budget Committee included instructions to the Senate Committee on Energy and Natural Resources to "report changes in laws within its jurisdiction sufficient to reduce outlays by $33,000,000 in FY2006, and $2,658,000,000 for the period of fiscal years 2006 through 2010." The resolution assumed that the committee would report legislation to open ANWR to development, and that leasing would generate $2.5 billion in revenues for the federal government over five years. Senator Cantwell offered a floor amendment (S.Amdt. 168) on March 16, 2005, to remove these instructions. The amendment was defeated (yeas 49, nays 51; Roll Call #52). The FY2006 House budget resolution (H.Con.Res. 95, H.Rept. 109-17), while instructing the House Resources Committee to provide somewhat smaller reductions in outlays, did not include specific assumptions about ANWR revenues.

In the end, the conference agreement (H.Con.Res. 95, H.Rept. 109-62) approved by the House and Senate on April 28, 2005, contained reductions in spending targets of $2.4 billion over FY2006 to FY2010 for the House Resources and Senate Energy Committees that would have been difficult to achieve unless ANWR development legislation were passed. The inclusion of the Senate target particularly set the stage for including ANWR development legislation in a reconciliation bill, since reconciliation bills cannot be filibustered (i.e., they require only a simple majority, rather than 60 votes to stop a filibuster).

Under the Congressional Budget Act of 1974 (CBA, Titles I-IX of P.L. 93-344, as amended, 2 U.S.C. §§601-688), while the target reductions of the budget resolutions are binding on the

[12] For more on the budget process and budget enforcement, see CRS Report RS20368, *Overview of the Congressional Budget Process*, by Bill Heniff Jr., and CRS Report 98-815, *Budget Resolution Enforcement*, by Bill Heniff Jr. For more on ANWR and reconciliation, see out-of-print CRS Report RS22304, *ANWR and FY2006 Budget Reconciliation Legislation*, available upon request.

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committees, the associated assumptions are not. The Senate Energy and Natural Resources Committee chose to meet its target by recommending ANWR legislation, and the Budget Committee incorporated the recommendation as Title IV of S. 1932, the Deficit Reduction Act of 2005. There was some question procedurally as to whether Senate rules would permit ANWR legislation to be part of a reconciliation bill.[13] The House Resources Committee included ANWR legislation, and other spending reductions and offsetting collections, thereby more than meeting the Committee's targets. These measures were incorporated by the House Budget Committee into an omnibus reconciliation bill (H.R. 4241). However, before the House bill came to the floor, considerable opposition to the ANWR provision developed among a number of Republicans, 24 of whom signed a letter to the Speaker opposing its inclusion. The provision was removed before floor consideration; S. 1932 (with the text of H.R. 4241 inserted in lieu—i.e., minus an ANWR provision) passed the House on November 18, 2005 (yeas 217, nays 215; Roll Call #601). ANWR was a major issue in conference. In the end, the conference report (H.Rept. 109-362) omitted ANWR development provisions. The President signed the measure on February 8, 2006 (P.L. 109-171).

The Senate passed the FY2007 budget resolution (S.Con.Res. 83; yeas 51, nays 49; Roll Call #74; no written report) on March 16, 2006. Its sole reconciliation instruction (Section 201) directed the Committee on Energy and Natural Resources to reduce budget authority by an amount equal to predicted bonus bids, royalties, and rental revenues from ANWR development. The FY2007 budget resolution as passed by the House on May 18, 2006, did not include any such instruction (H.Con.Res. 376, H.Rept. 109-402; yeas 218, nays 210; Roll Call #158). The Senate and House, however, did not complete action on the FY2007 budget resolution, and therefore neither chamber developed or considered any subsequent reconciliation legislation.

ANWR in the Defense Appropriations Bill

As Congress moved toward the December recess, and the chance of an agreement on reconciliation with a Refuge provision seemed to fade, Senator Stevens (Chair of the Defense Appropriations Subcommittee) added an ANWR development title to the "must-pass" FY2006 Defense appropriations bill (H.R. 2863) during conference. Senators opposing Refuge development faced a choice between filibuster of the popular measure or acquiescing to opening the Refuge. Members began a filibuster, and a cloture motion failed (yeas 56, nays 44; Roll Call #364). While the conference report was approved, the relevant two Divisions (C and D) were removed through House and Senate passage of S.Con.Res. 74, correcting the enrollment of the bill (P.L. 109-148).

Omnibus and Other Energy Legislation

The House Resources Committee considered and marked up its portion of the omnibus energy bill on April 13, 2005, before the bill was introduced. The provisions, including an ANWR development title, were approved by the committee and incorporated into the House version of H.R. 6 and introduced by Representative Barton (Chair of the Energy and Commerce Committee) on April 18. During House consideration on April 20, Representatives Markey and Johnson offered an amendment (H.Amdt. 73) to strike the title; it was rejected (yeas 200, nays 231; Roll Call #122). The House passed H.R. 6 on April 21 (yeas 249, nays 183; Roll Call #132). The Senate passed its version of H.R. 6 on June 28, 2005 (yeas 85, nays 12; Roll Call #158). The

[13] See CRS Report RL30862, *The Budget Reconciliation Process: The Senate's "Byrd Rule"*, by Bill Heniff Jr.

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Senate bill contained no ANWR development provisions. The ANWR title was omitted in the final measure (P.L. 109-58).

On May 25, 2006, the House passed H.R. 5429, to open ANWR to development (yeas 225, nays 201; Roll Call #209). In nearly all respects, the bill was similar to the ANWR title in the House version of H.R. 6. The bill was not taken up by the Senate.

Legislative History of the Refuge, 2007-2008

The President's FY2008 budget proposed enacting legislation to open the Coastal Plain to oil and gas exploration and development.[14] The budget proposed that the first lease sale be held in FY2009. Under the proposal, this and subsequent sales were estimated to generate $7.0 billion in revenues over the following five years, to be divided evenly between the U.S. Treasury and the state of Alaska.

As in the 109th Congress, there was an effort in the second session to assume ANWR revenues in the budget resolution (S.Con.Res. 70). The vehicle was a motion to adjust budget levels to assume increased revenues from opening ANWR to leasing and exploration. However, on May 14, 2008, the House rejected the motion (yeas 185, nays 229; Roll Call #321). In the Senate, during debate on S. 2284 (a bill originally concerning flood insurance) on May 13, 2008, the Senate rejected the McConnell amendment (S.Amdt. 4720) to open ANWR to energy development (yeas 42 - nays 56; Roll Call #123). In addition, rising gasoline prices during 2008 intensified interest in opening ANWR to development, and a number of bills to open the Coastal Plain to development were introduced during the second session. As the session closed, falling energy prices tended to reduce interest.

Legislative History of the Refuge, 2009-2010

No bills on the Refuge received floor consideration in the 111th Congress in either the House or the Senate.

Legislative History of the Refuge, 2011-2012[15]

In the 112th Congress, House consideration of ANWR legislation was unusually complex from a parliamentary standpoint. First, the Committee on Natural Resources reported its version of H.R. 3407, providing for oil drilling on the Coastal Plain, on February 9, 2012. Then, on February 15, the House adopted H.Res. 547, a complex special rule proposed by the Committee on Rules to specify how the House would consider the proposals embodied in H.R. 3407 and several other bills. The resolution provided that the House would first take up H.R. 3408 (on development of shale oil resources), as amended with a substitute for the entire text of the measure, in advance of floor consideration. The substitute, specified by the Committee on Rules, included not only H.R. 3408 itself as reported by the Committee on Natural Resources, but also a version of H.R. 3407 (on ANWR development); H.R. 3410 (on the further development of outer continental shelf oil

[14] U.S. Office of Management and Budget, *Analytical Perspectives, Budget of the U.S. Government, Fiscal Year 2008* (Washington, DC), p. 279. The proposed authorization for exploration and development would be separate legislation, rather than part of the Interior appropriations bill. (The proposal was not part of the FWS Budget Justification for FY2008.)

[15] This section was prepared with the assistance of Richard S. Beth, CRS Specialist on Congress and the Legislative Process, (rbeth@crs.loc.gov, 7-8667).

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and gas); and H.R. 3548 (authorizing the Keystone XL pipeline, from the Committee on Energy and Commerce).[16]

After adopting H.Res. 547, the House proceeded to consider H.R. 3408 in the form specified by the resolution (which included ANWR development), and on February 16, 2012, after considering several floor amendments, passed it (yeas 237, nays 187; Roll Call #71). Pursuant to additional provisions of H.Res. 547, however, the House did not transmit its version of H.R. 3408, as amended (with the provisions on ANWR development and other subjects), to the Senate for action. Instead, H.Res. 547 provided that the House would consider first a version of H.R. 3813 (increasing the contributions of federal employees to their retirement program) and then a version of H.R. 7 (reauthorizing federal highway and transportation programs, as amended by inclusion of a version of H.R. 3864, which would have funded the programs through revenues from, among other things, offshore leasing and any federal share of ANWR revenues). H.Res. 547 did not provide for final action by the House on H.R. 7. Action on H.R. 7 would have occurred under some future special rule, to be adopted later. H.Res. 547 provided, however, that if the House had passed H.R. 3813 and H.R. 7, as well as H.R. 3408, the provisions of all three bills as passed would have been incorporated into H.R. 7, which would then have been transmitted to the Senate in that form. However, the House did not take up H.R. 3813 or H.R. 7 under the provisions of H.Res. 547. As a result, H.R. 3408 (including the ANWR development provisions and other matters) did not move forward.

On March 13, 2012, the Senate rejected S.Amdt. 1826 (Roberts, Kansas) to S. 1813 that would have opened up the Coastal Plain oil and gas drilling (yeas 41, nays 57; Roll Call #38). Under the Senate agreement of March 7, 2012, approval of the amendment would have required 60 votes in the affirmative.[17]

Legislative History of the Refuge, 2013-2014

There were no floor votes in either Chamber during the 113th Congress.

Legislative History of the Refuge, 2015-2016

On April 3, 2015, the Obama Administration issued a Comprehensive Conservation Plan (CCP) for the Refuge.[18] Although the CCP outlined management plans for the entire refuge, controversy focused on the plan's recommendation that the Coastal Plain be designated as wilderness. Such designation would require passage of legislation by Congress and signature by the President. Given the remoteness of the refuge and the existing prohibitions on energy development in Section 1003 of ANILCA, the recommendation had little effect on existing refuge management. However, concern over any possible future effects resulted in legislative efforts to ensure no

[16] The text of all the bills covered by H.Res. 547, as the Committee on Rules proposed for them to be considered by the House, was specified by Committee's print no. 112-14, available as of March 20, 2012, on the website of the Committee on Rules at http://docs house.gov/billsthisweek/20120213/CPRT-112-HPRT-RU00-HR7RCP.pdf. The Committee on Rules stated that the pertinent provisions of its substitute were substantially similar to the bills as reported by the committees. One purpose of linking H.R. 3407 on ANWR and H.R. 7 on surface transportation was to provide a non-tax revenue source to supplement other revenues supporting transportation programs. For a press report of this linkage, see, for example, *Energy and Environment Daily*, February 19, 2012, available at http://www.eenews net/EEDaily/2012/02/09/2.

[17] S. 1813, without any ANWR provisions, passed the Senate on March 14, 2012 (yeas 74, nays 22; Roll Call #48).

[18] The document was published a few days later: Fish and Wildlife Service, "Record of Decision for the Arctic National Wildlife Refuge Final Comprehensive Conservation Plan/Final Environmental Impact Statement; Fairbanks, Alaska," 80 *Federal Register* 19678-19685, April 13, 2015.

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effect. On July 7, 2015, the House approved H.Amdt. 577 by Representative Young (AK) on a voice vote. The amendment prevented the use of funds provided in H.R. 2822 to implement the CCP.

Similarly, in the second session, the House approved H.Amdt. 1355, again prohibiting the use of funds provided in H.R. 5538 to implement the CCP (yeas 237, nays 191; Roll Call #460). The House then approved the bill containing the amendment (yeas 231, nays 196; Roll Call #477) on July 14, 2016.

On February 26, 2016, during consideration of H.R. 2406, Representative Huffman offered H.Amdt. 961 to designate the Coastal Plain as wilderness. The amendment was rejected (yeas 176, nays 227; Roll Call #99).

The Senate took no floor votes on the Coastal Plain during the 114th Congress.

For Additional Reading

On-site research on any oil resources in the 1002 area has not been carried out since the mid-1980s, in light of the fact that development and activities leading to development continue to be prohibited by Section 1003 of ANILCA. However, some additional modeling of older data, aided by results from exploration on nearby onshore or offshore tracts, has produced a few new interpretations from time to time. In consequence, many older publications remain useful, and are included below.

CRS Reports

CRS Report 98-814, *Budget Reconciliation Legislation: Development and Consideration*, by Bill Heniff Jr.

CRS Report RL30862, *The Budget Reconciliation Process: The Senate's "Byrd Rule"*, by Bill Heniff Jr.

CRS Report 98-815, *Budget Resolution Enforcement*, by Bill Heniff Jr.

CRS Report RL31033, *Energy Efficiency and Renewable Energy Fuel Equivalents to Potential Oil Production from the Arctic National Wildlife Refuge (ANWR)*, by Fred Sissine.

CRS Report RL31115, *Legal Issues Related to Proposed Drilling for Oil and Gas in the Arctic National Wildlife Refuge (ANWR)*, by Pamela Baldwin.

CRS Report RS22326, *Legislative Maps of ANWR*, by M. Lynne Corn.

CRS Report RL32108, *North Slope Infrastructure and the ANWR Debate*, by M. Lynne Corn.

CRS Report RS22143, *Oil and Gas Leasing in the Arctic National Wildlife Refuge (ANWR): The 2,000-Acre Limit*, by M. Lynne Corn and Pamela Baldwin.

CRS Report RS20368, *Overview of the Congressional Budget Process*, by Bill Heniff Jr.

CRS Report RS20602, *Presidential Authority to Create a National Monument on the Coastal Plain of the Arctic National Wildlife Refuge, and Possible Effects of Designation*, by Pamela Baldwin.

CRS Report RL31447, *Wilderness: Overview, Management, and Statistics*, by Katie Hoover.

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Other Reports

(See above comment on older reports.)

National Academy of Sciences, *Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope*, March 2003, 452 pp., at http://www.nas.edu/.

C. Nelleman and R. D. Cameron, "Cumulative Impacts of an Evolving Oil-field Complex on the Distribution of Calving Caribou," *Canadian Journal of Zoology*, vol. 76 (1998), p. 1425.

U.S. Department of the Interior, Bureau of Land Management, *Overview of the 1991 Arctic National Wildlife Refuge Recoverable Petroleum Resource Update*, April 8, 1991, 8 pp., 2 maps.

U.S. Department of the Interior, Fish and Wildlife Service, Geological Survey, and Bureau of Land Management, *Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment*, Report and Recommendation to the Congress of the United States and Final Legislative Environmental Impact Statement, 1987, 208 pp.

U.S. Department of the Interior, Geological Survey, *The Oil and Gas Resource Potential of the Arctic National Wildlife Refuge 1002 Area, Alaska*, USGS Open File Report 98-34, 2-CD set, 1999.

U.S. Department of the Interior, Geological Survey, *Arctic Refuge Coastal Plain Terrestrial Wildlife Research Summaries*, Biological Science Report USGS/BRD/BSR-2002-0001.

U.S. Department of the Interior, Geological Survey, "Evaluation of additional potential development scenarios for the 1002 Area of the Arctic National Wildlife Refuge," memorandum from Brad Griffith, Assistant Leader, Alaska Cooperative Fish and Wildlife Research Unit, to Charles D. Groat, Director, U.S. Geological Survey, April 4, 2002.

U.S. Department of the Interior, Geological Survey, *Economics of 1998 U.S. Geological Survey's 1002 Area Regional Assessment: An Economic Update*, USGS Open File Report 2005-1359, 2005.

U.S. General Accounting Office,[19] *Arctic National Wildlife Refuge: An Assessment of Interior's Estimate of an Economically Viable Oil Field*, GAO/RCED-93-130, July 1993, 31 pp.

Author Contact Information

M. Lynne Corn
Specialist in Natural Resources Policy
lcorn@crs.loc.gov, 7-7267

[19] This agency is now called the Government Accountability Office.

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From: Burkart, Greta
To: Trawicki, John
Cc: Perdue, Margaret
Subject: Re: Help with evaluating water resources in the Arctic 1002 Area - Due Noon on Thursday, Nov 16
Date: Thursday, November 16, 2017 10:52:44 AM
Attachments: WR_1002_AffectedEnv_GB edits with reference section.docx

---

Hi John and Meg,

I have attached the same document with a reference list. I think I have all of them, but I am not sure I have the correct reference for Hobbie 1984.

Thanks,

Greta

Greta Burkart, PhD
Aquatic Ecologist
US Fish and Wildlife Service
Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
101 12 th Ave Rm 236
Fairbanks, AK 99701
ph: (907) 456-0519
fax: (907) 456-0428
email: greta_burkart@fws.gov
www.facebook.com/arcticnationalwildliferefuge

On Thu, Nov 16, 2017 at 7:33 AM, Trawicki, John <john_trawicki@fws.gov> wrote:

> John Martin is working on fisheries, you may want to touch base with him.
>
> On Thu, Nov 16, 2017 at 7:15 AM, Trawicki, John <john_trawicki@fws.gov> wrote:
>
> > thanks. I am in a Science of Oil Spill class this week. Be sure to send items to Meg. It is ok to say we do not know, or there is insufficient information to evaluate, or additional in formation or analysis is warranted, but this needs to be within reason.
> >
> > Meg- I moved Greta's version to the w:/ and made a few suggestions in track changes. text me if you want me to return to the office to review.
> > Thank you both for working on this.
> >
> > john t
> >
> > On Thu, Nov 16, 2017 at 7:03 AM, Burkart, Greta <greta_burkart@fws.gov> wrote:
> >
> > > Thanks - I will work on a reference list now.
> > >
> > > Greta Burkart, PhD
> > > Aquatic Ecologist
> > > US Fish and Wildlife Service
> > > Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
> > > 101 12 th Ave Rm 236

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ph: (907) 456-0519
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www.facebook.com/arcticnationalwildliferefuge

On Thu, Nov 16, 2017 at 6:34 AM, Trawicki, John <john_trawicki@fws.gov> wrote:

> hi greta
>
> just getting to work this am. will keep you posted. have not read your edits yet, but thankyou for your input.
>
> On Thu, Nov 16, 2017 at 6:19 AM, Burkart, Greta <greta_burkart@fws.gov> wrote:
>
> > Hi John and Meg,
> >
> > I have edited Meg's version and added an environmental consequences section (see attached). I am going to take a break, but can work on this up until 8am Alaska Standard Time. Let know if you will be working on it during this time period as well and will will keep of edits.
> >
> > Thanks!
> >
> > Greta
> >
> > Greta Burkart, PhD
> > Aquatic Ecologist
> > US Fish and Wildlife Service
> > Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
> > 101 12 th Ave Rm 236
> > Fairbanks, AK 99701
> > ph: (907) 456-0519
> > fax: (907) 456-0428
> > email: greta_burkart@fws.gov
> > www.facebook.com/arcticnationalwildliferefuge
> >
> > On Wed, Nov 15, 2017 at 3:28 PM, Perdue, Margaret <margaret_perdue@fws.gov> wrote:
> >
> > > Hi Greta ---
> > >
> > > We would particularly be interested in any climate trend information affecting hydrology or known hydrologic changes. If you have any references showing changes in timing of break-up or freeze-up, changes in precipitation amount or timing or changes from snow to rain, snowpack depth/ extent etc.
> > >
> > > If not we will figure out what we can...
> > >
> > > Thanks

On Wed, Nov 15, 2017 at 1:51 PM, Burkart, Greta <greta_burkart@fws.gov> wrote:

> I have to go give a poster presentation in 15 minutes, but will pull everything together after that and send it really late tonight or by the time you guys get into work tomorrow morning. What do you have so far?
>
> Greta
>
> Greta Burkart, PhD
> Aquatic Ecologist
> US Fish and Wildlife Service
> Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
> 101 12 th Ave Rm 236
> Fairbanks, AK 99701
> ph: (907) 456-0519
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> email: greta_burkart@fws.gov
> www.facebook.com/arcticnationalwildliferefuge
>
> On Wed, Nov 15, 2017 at 1:43 PM, Trawicki, John <john_trawicki@fws.gov> wrote:
>
> > Hi Greta- if you can send Meg and I what you have we can incorporate into what Meg has put together. Can you send it today? This is due tomorrow at by 10 AM.
> >
> > call me if you need to . 907-786-3474, or 360-1656
> >
> > On Wed, Nov 15, 2017 at 1:22 PM, Burkart, Greta <greta_burkart@fws.gov> wrote:
> >
> > > Hi -- If Meg has not pulled something together, I do have a draft of something and can send it by tomorrow evening.
> > >
> > > Thanks,
> > >
> > > Greta
> > >
> > > Greta Burkart, PhD
> > > Aquatic Ecologist
> > > US Fish and Wildlife Service
> > > Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
> > > 101 12 th Ave Rm 236
> > > Fairbanks, AK 99701
> > > ph: (907) 456-0519
> > > fax: (907) 456-0428
> > > email: greta_burkart@fws.gov
> > > www.facebook.com/arcticnationalwildliferefuge
> > >
> > > On Tue, Nov 14, 2017 at 11:33 AM, Fischbach, Tracy

<tracy_fischbach@fws.gov> wrote:

> Hi Meg,
>
> Do you have this website? http://dnr.alaska.gov/mlw/mapguide/wr_intro.cfm
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
>
> Hours: Mon - Thurs 9:15 am to 3:15 pm
> "Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie
>
> **Need access to Refuge Documents?**
> Online Document Database (ServCat)
> ***Need Refuge land status info for Alaska?***
> FWS Region 7 Land Mapper (FWS version)
> FWS Region 7 Land Mapper (Public version)
> Region 7 GeoPDF Map Portal
>
> On Tue, Nov 14, 2017 at 11:15 AM, Perdue, Margaret <margaret_perdue@fws.gov> wrote:
>
> > Hi Tracy ---
> >
> > I checked in with John, I had forgotten that Greta is at the NAASH meeting at NCTC this week.
> >
> > I can try to pull language together ... but Greta if you have anything drafted for the WRIA for Arctic or other references that would address the issues that Tracy outlined please send them to me.
> >
> > Thanks
> >
> > Meg
> >
> > On Tue, Nov 14, 2017 at 10:54 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
> >
> > > Hi Greta,
> > >
> > > The Refuge program is in a big push to get a beefed up EA done for the regulation change that would open the Arctic's 1002 area for oil & gas exploration. The draft EA is due to HQ by this Friday morning, November 17, so I need draft sections to me by **noon on Thursday, Nov 16** . I was told that you are probably the best person to write the water resources section. If not, please let me know ASAP.
> > >
> > > I need a relatively short 1-2 page Affected Environment section and a 1-2 pages Environmental Consequences section for water resources.
> > >
> > > The **Affected Environment** section would include:

What water resources have been there historically.
What water resources are there now.
What is the trend. (Showing this in a chart or graph makes it very easy to understand.)

This section is just the facts, and should include all water resources that you think may be affected by exploration in the 1002 area. This could include waters outside the Refuge. Including a map of the area evaluated is super helpful. Also, if we don't know, we can just say that. Please do cite all of your resources.

The **Environmental Consequences** section would include:
How are the resources listed in the Affected Environment going to be affected by exploration activities. This would include ice roads, ice pads, etc. According to the State's proposal it takes about 1 million gallons of water to make 1 mile of road. Where would/could water be taken to use for building ice roads? Do other species use those waters? We want to keep it short and sweet. We have very little time for this effort.

Thank you SO much!

-Tracy

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

Hours: Mon - Thurs 9:15 am to 3:15 pm
"Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie

Need access to Refuge Documents?
Online Document Database (ServCat)
Need Refuge land status info for Alaska?
FWS Region 7 Land Mapper (FWS version)
FWS Region 7 Land Mapper (Public version)
Region 7 GeoPDF Map Portal

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Meg Perdue, Water Quality Specialist
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--
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Mobile: (907) 360-1656

"The single biggest problem with communication is the illusion that it has taken place"
George Bernard Shaw

--
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Affected Environment

Water resources on the coastal plain of the Arctic National Wildlife Refuge consist of streams, lakes, and springs. Streams of the Arctic coastal plain flow north, several forming large alluvial fans as they flow into the Beaufort Sea where they contribute substantial volumes of water and sediment to coastal ecosystems (CCP). Like other areas of the Arctic, the coastal plain is underlain by continuous permafrost limiting infiltration of surface water and limiting groundwater resources. Groundwater that may exist below permafrost is thought to be saline or brackish (Williams 1970). While ninety-nine percent of the 1002 Area is classified as wetlands fresh water is limited and confined to the shallow zone above permafrost (Clough et al. 1987). Lakes are not evenly distributed across the coastal plain with concentrations occurring near the mouth of the Canning River in the west and the Sadlerochit and Jago River regions to the east with very few lakes occupying the central Katakturuk River region (Trawicki et al. 1991). Total annual precipitation averages 6.2 inches per year (snow vs rain) (Arctic Environmental Information Center 1986- May 91 report, update) leading to climate and permafrost as dominant factors that limit water availability. The non-frozen water found on the coastal plain during the winter months is located in small isolated pools beneath ice hummocks associated with stream drainages , lakes with depths greater than 7 feet, and flowing surface waters associated with springs (Lyons and Trawicki 1994).

Streams and Rivers

The 1002 Area has a relatively high density of streams and rivers compared to other areas of the North Slope (Brackney 2008- CCP). These habitats support thirteen species of fish, including Dolly Varden an important subsistence fish. The hydrography of these systems is strongly influenced by the climate which is characterized by extremely low winter temperatures and short, cool summers. Streamflow rapidly declines in most systems shortly after freeze up in September and ceases in most streams by December when they are generally frozen to the stream bed resulting in no flow or flow so low as to not be measureable (Lyons and Trawicki 1994). A few exceptions to this occur where springs result in open reaches and aufeis areas that develop providing important fish over-wintering habitat (Arcone 1989). Break up on the Arctic coastal plain occurs during a brief period in late May or early June. Snowmelt begins in the mountains and foothills progressing towards the coastal plain. Rapidly melting water runs over the ground as sheetflow with infiltration limited by permafrost. Water in drainages rises rapidly, often flowing over ice covered stream channels. More than half of the annual discharge for these streams can occur during a period of several days to a few weeks (Clough et al. 1987, Sloan 1987). Based on origin, hydrologic regime, and chemical and biological characteristics, Craig and McCart (1975) classified North Slope streams into three categories: mountain, spring-fed, and tundra. Mountain streams are typically fast flowing and fed by varying proportions of snowmelt, glacier meltwater, and spring-fed tributaries. Waters are cold (usually less than 50 °F), occasionally turbid, moderately hard, and support low invertebrate densities. The most common species of fish in mountain streams is Dolly Varden. Mountain streams that receive glacial inputs are unique to the eastern North Slope, in the Jago, Hulahula, and Okpilak watersheds, discharge from glacial sources is the dominant source of flow when precipitation is

low and air temperatures are high and transport large volumes of water, sediment and nutrients to downstream ecosystems. Spring-fed streams are often tributaries of mountain streams and have relatively stable flows and temperatures throughout the year. Spring-fed waters are characterized by low levels of dissolved solids and very high densities of macroinvertebrates. Many spring-fed streams provide critical spawning and overwintering habitat for Dolly Varden. Tundra streams originate in the Brooks Range Foothills and coastal plain ecoregions, are fed by surface runoff, tend to be meandering systems, and have low to moderate invertebrate densities. Waters are typically warmer and exhibit lower pH and conductivity relative to mountain and spring-fed streams. Huryn et al. (2004) found that gradients in freezing probability, nutrient concentrations, and substratum instability control invertebrate communities in these systems. Some projections indicate that glacial inputs could disappear within the next 50 years altering hydrology by reducing instream connectivity and negatively impacting fish migrating to critical overwintering habitat (Nolan et al. 2011). Surface water availability and instream connectivity will potentially be adversely impacted by deepening of the active layer on the coastal plain, increasing duration of the summer season, and increased evapotranspiration rates (CCP).

Springs and Aufeis Areas

Six springs are located on the Arctic coastal plain identified through reconnaissance investigation by Childers et al. (1977): Sadlerochit Spring, Red Hill Spring, Katakturuk River tributary Spring, Hulahula River Spring, Okerokovik River Spring, and Aichilik River Spring. During the winter months pressurized water discharges from a spring pushing up through the ice to the surface where it spreads out and freezes forming aufeis areas that can become extensive. These formations melt more slowly than snow, generally persist into the summer and may provide a temporary source of freshwater (Kane and Slaughter 1973). Open water associated with springs provides important winter habitat particularly once surface water runoff ceases due to freezing (Lyons and Trawicki 1994). Most springs in Arctic Refuge have survived since the last glacial maximum (Yoshikawa et al. 2007), suggesting that they will continue to flow and be refugia for aquatic biota in a changing climate.

Lakes

The density of lakes in the Arctic coastal plain is low compared to the rest of the North Slope and as noted earlier their distribution is not uniform, nor is their size and depth (CCP). Jorgenson and Shur (2007) classified the coastal plain into regions based on lake origin: thaw, depression, riverine, and delta. Depression lake basins are formed in undulating sandy, alluvial marine or eolian deposits, and are the majority found on the coastal plain concentrated in the depression lakes region between the Hulahula and Niguanak rivers. Riverine lakes include oxbow and floodplain lakes along sinuous channels and thaw lakes formed in ice-rich abandoned channels. Riverine lakes are most concentrated along the Jago and Niguanak rivers. Delta lakes include thaw, riverine, and tidal lakes and most are found in deltas of the Hulahula, Jago, Aichilik, and Canning rivers (CCP). The majority of lakes on the coastal plain are shallow

lakes with surface areas ranging from 1,500 acres to less than 10 acres (Trawicki et al. 1991). Recharge of these systems is generally limited to snow melt and direct precipitation in the immediate vicinity of the lake (Lyons and Trawicki 1994). When not connected to larger drainage networks, evaporation has a strong influence on water chemistry and plays an important role in regulating lake water balance (CCP). Maximum winter ice thickness on lakes in the Arctic is between 6-7 feet (Bilello and Bates 1969, 1971, 1972, and 1975). Clough et al. (1987) reported that most lakes have basins less than 7 feet deep and thus freeze to the substrate. These shallow lakes generally melt from the surface downward in spring. Deeper lakes that do not freeze to substrate may have ice present on the surface well into July. Due to the level of winter freezing, the depth of lakes restricts the presence of fish, Hobbie (1984) found fish present only in lakes with depths greater than 5.6 feet. Shallow lakes generally lack fish because they usually freeze solid but they provide important habitat to emergent vegetation, invertebrates, and migratory birds due to the earlier availability of ice-free areas. Trawicki et al. (1991) identified fish presence in lakes on the coastal plain to be more frequent and widespread than previously suspected. Ninespine stickleback (*Pungitius puingitus*) were found in 34 of 52 lakes surveyed (65%) in 1989. In the past half a century, the duration of ice cover, thermal regimes, and rates of primary productivity have likely changed. In the future, changes in temperature, active layer depth, fire frequency and severity, and erosion rates could affect lake distribution, water quality, water levels, size, and connectivity to other habitats (CCP).

Winter Specific Hydrologic Data

Hydrologic data for the 1002 area are limited, short-term (less than five years) data were collected over two decades ago at 11 stream gage sites on five drainage systems across the coastal plain and an inventory of 119 lake basins was conducted to create lake contour maps water volume calculations and estimates of winter water volume beneath ice cover. These data were collected in large part to address questions regarding winter water availability in the 1002 area in the event of development activities. In the case of the river studies winter water was found to occur over a wide area in most of the major river drainages but it was restricted to small isolated pools beneath ice hummocks scattered throughout the braided portions of these rivers. The volume of water available was estimated to be small, 9 million gallons over the 237 miles of inventoried area. Total estimated volume of the study lakes ranged from 55,382 acre-feet (18 billion gallons) when free of ice to 3,366 acre-feet (1.1 billion gallons) beneath a maximum ice thickness of seven feet. Ninety percent of the available water was contained in just nine of the 119 surveyed lakes, the majority were found in the Canning River delta area (up to eighty percent of the total volume), and only two lakes were located in the region between the Katakturuk and Sadlerochit rivers.

Climate Change Effects

Historically, in the nearby NPR-A the coastal regions have not thawed until after the second week of June (NPR-A EIS, 2013). By mid-century, these areas are projected to thaw the first week of June. By the late century these areas are expected to as early as June 1 by late century. Changes in freeze-up date are predicted to be even greater. Historic data indicates NPR-A waterbodies freeze by mid-September. Models indicate freeze-up will not occur until late September in southern regions and early October

along the coast. By the end of the century, coastal waterbodies may not freeze until the end of October. These changes will result in a six-week increase in the length of the ice-free season.

Landscape drying trends have been observed in northeastern Alaska (add reference). Increased temperatures and an extended growing season could increase the evapotranspiration rate, increasing the water deficit (defined as the amount by which evapotranspiration exceeds precipitation) and potentially affecting the annual water balance. The annual water balance represents the water available for plants and animals, stream flow, and groundwater recharge. Shallow water systems, including lakes and wetlands, would decrease in number and extent as the annual water balance experiences an ongoing deficit. Permafrost loss on the Refuge could also result in draining of many shallow water systems on the Refuge; the thawing of ice wedges and ice lenses could create more connections between surface water and groundwater systems. If wetlands and lakes continue to dry, an increase in vegetative cover can be expected; and they could eventually transition to dry meadows and shrublands. This would reduce the amount of habitat available for wetland-dependent species, such as waterfowl.

Environmental Consequences

Because unfrozen water is limited in winter, conflicts between overwintering fish populations and industrial water withdrawals seem likely (West et al. 1992). Water withdrawal and its direct influence on reducing available habitat (wetted space) probably impacts fish populations more than any other winter alteration (Cunjak 1996). Since the distribution of adult and juvenile fish is extremely restricted during the long arctic winter when most of the drainage is frozen solid (Craig and Poulin 1975), water removal , causing reduced groundwater flow or altered baseflow and ice and temperature regimes has the potential to affect all life stages of some populations. Seismic activity would could potentially reduce fish populations, divert fish from their normal locations, or contaminate fish populations and habitat.

Seismic Exploration and Thermokarst Activity

Seismic exploration can cause thermokarst, especially when snow is insufficient to protect soil and vegetation (WesternGeco 2003). Removal or damage of the organic mat exposes soils to erosion by wind and water, which could deposit sediment into water bodies resulting in higher turbidity and concentrations of suspended sediment. To cause high turbidity, the peat mat must be sufficiently eroded to expose underlying mineral soils, and the mineral soils must be fine grained.

Effects of Water Withdrawal from Lakes

The primary source of water during the winter months is unfrozen water that lies beneath the ice cover of both shallow and deep lakes. This water is somewhat saline because of the exclusion of ions during the freezing of the upper part of the lake. Water from lakes may be used for ice roads, pads and airstrips, and for drilling and production water and potable water at drilling facilities. Typically the volume of water taken from an individual lake depends on the depth of the lake, volume of unfrozen water in the lake, and the presence and type of fish documented.

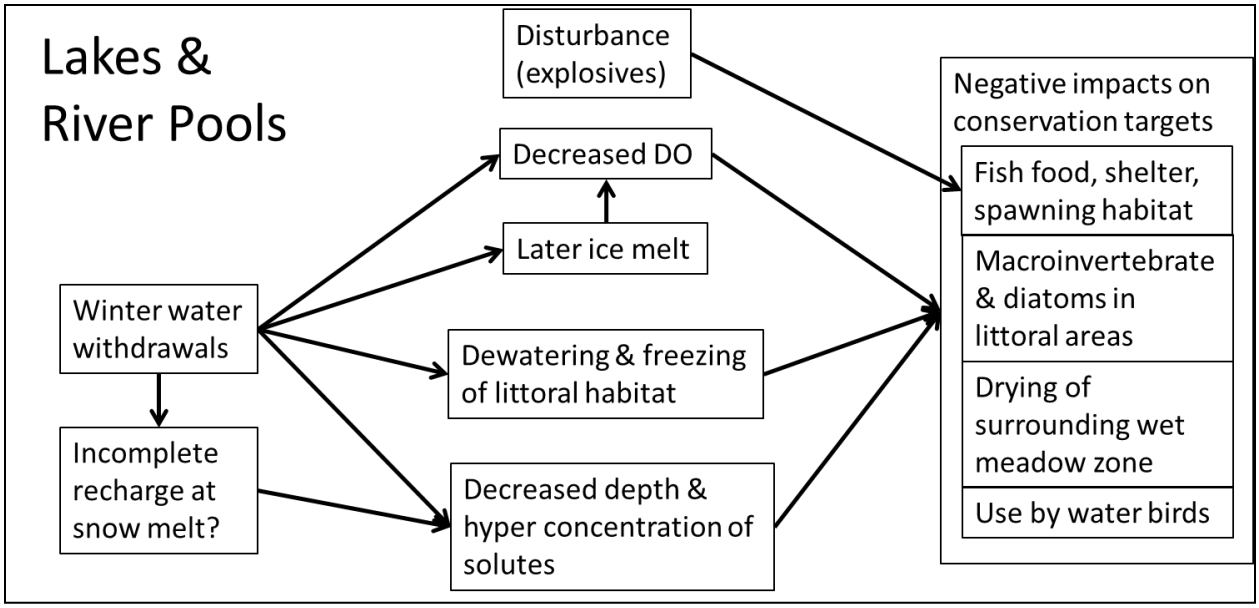


Figure X. Potential impacts seismic exploration lakes and rivers

Removal or compaction of snow can increase the depth of freezing on lakes, sometimes by one foot or more. As a result, the water quantity available in a lake during the winter months can be greatly reduced, and the salinity of the water beneath the ice can be increased. Maintaining the natural hydrologic regime may not be possible under various pumping scenarios. To reduce impacts to the natural hydrologic regime, regulations typically prohibit snow compaction on fish-bearing lakes, but snow compaction is unavoidable when ice aggregates are removed from lakes.

There are no studies assessing the effects of permitted withdrawals on lake water chemistry on the North Slope of Alaska. Hinzman et al. 2006 conducted a study on to assess the effects of what turned out to be relatively small water withdrawals in on water chemistry and lake recharge. This work was funded by the Department of Energy and oil field companies, did not undergo a standard peer-review process, yet it is widely cited by the BLM and DOE. Unfortunately, only a small fraction of the permitted withdrawal volume was actually pumped from the study lakes, the study design had almost no ability to detect change, and the researchers were unable to get their dissolved oxygen sensors functioning to conduct any relevant measurements in pumped lakes. Thus, we have no information on potential impacts of heavy pumping that is currently allowed by water withdrawal permits on the North Slope of Alaska. Despite the low ability to detect change, Hinzman et al. 2006 did find that one of four pumped lakes did not fully recharge at snow melt. This suggests that water withdrawals far less than permitted volumes can have significant impacts on lake hydrology and the availability of wetted habitat. Canadian studies on ice-covered lakes have found that water withdrawals have a substantial and wide range of negative impacts on aquatic ecosystems (Cott et al 2008). These include reduction of habitat for fish, waterfowl, and furbearers; reduction in oxygen available to overwintering fish; and dewatering and freezing of littoral habitats which kills plants, invertebrates, and fish eggs. Isolated lakes may be particularly vulnerable as they may not recharge at snowmelt. Organisms in small isolated lakes are particularly sensitive to water withdrawals. The effects of water withdrawals on wet meadow zones

surrounding lakes are unknown, but would likely be great if lakes are not fully recharged at snowmelt. This would result in a reduction in habitat for waterfowl and shorebirds that use these lakes during the summer.

Effects during exploration on water chemistry from water withdrawals could be short term if lakes are fully recharged during spring. Impacts to overwintering fish and littoral zone communities will likely be more substantial and longer-term, especially in isolated lakes.

Effects of Ice Roads, Ice Pads and Ice Bridges

Ice roads and ice pads are used extensively during the winter exploration season for access and for exploration drilling and testing. Ice roads require about 1 million to 1.5 million gallons of water per linear mile and generally can be built at a rate of about 1.5 inches of thickness per day (USDOI BLM 1998). Ice pads can require up to 5 million gallons of water to build and range in size from 3 to 10 acres. Floating ice bridges may be necessary to cross large rivers and must be of sufficient thickness to handle heavy truck and rig traffic. Construction of an ice road capable of transporting a drilling rig across a river such as the Canning River may be designed to freeze most of the water column below the road, but would need to ensure that circulation is not restricted unless there was already grounded ice present. Smaller rivers require ice bridges, which are often constructed of aggregate chips and water and placed on grounded ice. Ice roads would be breached at stream crossings, especially if fish passage is a concern or the quantity of expected flow is significant during breakup. Ice roads and bridges can cause additional freeze-down, reducing the already limited overwinter water volume and water quality available as fish habitat. During snow melt ice bridge can create ice dam flooding if not removed properly.

Use of Explosives

Use of explosives is a major disturbance to fish and wildlife. These are particularly stressful to fish that are captive in over wintering habitats and would likely have a negative impact on terrestrial and aquatic animals that congregate near spring-fed oases during winter.

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_____1971. Ice thickness observations, North American Arctic and Subarctic, 1966-67, 1967-68. U.S. Army Corp of Engineers, Cold Regions Research and Engineering Laboratory Special Report 43, Part IV, Hanover, New Hampshire.

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U.S. Department of the Interior, Bureau of Land Management. 2012. <<Change date in text to match date here>> National Petroleum Reserve-Alaska. Final Integrated Activity Plan/Enviromental Impact Statement. U.S. Bureau of Land Management, Anchorage, Alaska.

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From: Brady, Stephanie
To: McCaffery, Brian
Cc: Fischbach, Tracy; Martin, John; Gustine, Nicole
Subject: Re: Hail to the Early Risers
Date: Thursday, November 16, 2017 11:02:21 AM

I have all of the literature cited incorporated to date -

stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |
U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska |
907.306.7448

On Thu, Nov 16, 2017 at 8:29 AM, McCaffery, Brian <brian_mccaffery@fws.gov> wrote:

> Here are the references for the text I wrote yesterday. I assume the current Arctic Refuge CCP is already cited and listed.
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> BJM
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> On Thu, Nov 16, 2017 at 7:28 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
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> > Natural Resources Planner
> > National Wildlife Refuge System - Region 7
> > Division of Natural Resources & Conservation Planning
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> >
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>
> Great points, John. Currently, there is discussion/argument going on in FWS HQ about what they actually want. SOL wants a document that includes an analysis of exploration, but not of drilling since drilling is not currently legal. FWS HQ wants a really narrowed down document, similar to what we already produced a month or so ago. We have been told to not spend a lot of time generating new analyses. Ha! Like we have time. So, today we need to decide which sections we want to spend time on and which ones we can just grab info from the NPRA EA or EIS or the 1987 EIS. Frankly, we don't have time to dig to get all of the gems that are available to us with even just a lit review. I anticipate that this won't be the last version that we'll see.
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> On Thu, Nov 16, 2017 at 7:13 AM, Martin, John <john_w_martin@fws.gov> wrote:
>
> > I was going to but feel I might be useful elsewhere.

There are significant errors in the new narrative lit cited. Everything in the Literature Cited section was scrubbed yesterday before I left.

thanks

On Thu, Nov 16, 2017 at 7:11 AM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:

> I will start moving references - unless someone else is doing this?
>
> stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448
>
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and start looking for consistency issues. For instance, it should probably be "North Slope" not north slope or northslope. Also, keep an eye out for still remaining Kodiak language from my cut/paste. No deer in Arctic as far as I know.

Brian and John, please look through the document and note glaring holes and think about strategies for plugging them. Think boiler plate language that gives us wiggle to fill it out later. For instance, "Additional literature review is needed to fully consider the consequences and cumulative effects of exploration activities on XXXXX resource."

Also, everyone consider what maps we may need/want. Sheila Dufford at Arctic will be able to help us get some of those put together.

Thanks everyone for all that you are doing. I REALLY appreciate it and I know the Refuge does as well.

I'll be one my email later this evening and early in the morning.

Cheers, Tracy

20171113_EA_ARC 1002 Reg Change_DRAFT

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--
Brian J. McCaffery

U. S. Fish and Wildlife Service
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Phone: (907) 330-7514
e-mail: brian_mccaffery@fws.gov

"Do something that scares the living hell outta your boss!" -- Dan Ashe, former Director, USFWS

From: Brady, Stephanie
To: Gustine, Nicole
Cc: McCaffery, Brian; Fischbach, Tracy; Martin, John
Subject: Re: Hail to the Early Risers
Date: Thursday, November 16, 2017 11:03:29 AM

---

tracy is using that as a placeholder from the telecommunication tower EA - I would not delete as of yet - lets see what she wants to do. thx

stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |
U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska |
907.306.7448

On Thu, Nov 16, 2017 at 9:00 AM, Gustine, Nicole <nicole_gustine@fws.gov> wrote:

> Section 4.7.5 Social Environment Land Use appears to be from another document? It writes about construction, radio repeaters, Figures 3-7 to 3-13, helicopter use, and helicopter flights during construction. Recommend deleting.
>
> Sincerely,
>
> Nicole Gustine, Refuge Specialist
> U.S Fish and Wildlife Service
> 1011 E. Tudor Rd., MS-225
> Anchorage, Alaska 99503
> b6 [redacted] - cell
> **Hours: Tue - Thurs 6am to 1pm**
>
> On Thu, Nov 16, 2017 at 10:33 AM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:
>
> > yes and thanks I will incorporate.
> >
> > stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |
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"Do something that scares the living hell outta your boss!" -- Dan Ashe, former Director, USFWS

From: Fischbach, Tracy
To: Gieryic, Michael
Cc: Joseph Darnell
Subject: Re: ANWR 1002 Reference Documents
Date: Thursday, November 16, 2017 11:03:37 AM

Thank you.

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On Thu, Nov 16, 2017 at 8:49 AM, Gieryic, Michael <mike.gieryic@sol.doi.gov> wrote:

> Tracy,
>
> At the end of the attached Congressional Research Service report (pp. 14-15) there are several NEPA documents and other reference reports listed that pertain to the 1002 Area, some of which appear to address oil and gas activities and their impacts. I am sharing this with you with the thought that some of the documents might be helpful to reference in the EA.
>
> Mike Gieryic
> Attorney-Adviser
> Office of the Regional Solicitor
> U.S. Department of the Interior
> 4230 University Drive, Suite 300
> Anchorage, AK 99508
> Phone: (907) 271-1420; Fax: (907) 271-4143
> mike.gieryic@sol.doi.gov

From: Google Alerts
To: andrea_medeiros@fws.gov
Subject: Google Alert - U.S. Fish and Wildlife Service and Alaska
Date: Thursday, November 16, 2017 11:04:26 AM

Google Alerts

U.S. Fish and Wildlife Service and Alaska

Daily update · November 16, 2017

NEWS

At Stake in Arctic Refuge Drilling Vote: Money, Wilderness and a Way of Life

InsideClimate News

Credit: **U.S. Fish and Wildlife Service** ... While the drive to open the refuge is being spearheaded by **Alaska's** senior senator, it's getting a mixed ...

US Senate Panel Votes To Open **Alaskan** Refuge To Drilling - OilPrice.com
US Senate panel advances quest for oil in Arctic refuge - Reuters
Full Coverage

Flag as irrelevant

Mountains to Sea Partnership looks to conserve river corridors

Kenai Peninsula Online

The main partners are the **U.S. Fish and Wildlife Service**, Audubon **Alaska**, Cook Inletkeeper, the Kenai Watershed Forum and the Kachemak Heritage ...

Flag as irrelevant

AK walrus calf has new home in Florida



KTUU.com

ORLANDO, Florida (KTUU) - A walrus calf rescued off the coast of **Alaska** has ... The **U.S. Fish and Wildlife Service** has granted SeaWorld Orlando ...

Baby walruses meet for first time at SeaWorld Orlando - ABC Action News
SeaWorld baby walruses meet for the first time - WESH Orlando
Baby walruses Ginger and Aku meet for the first time - KMSP-TV
Full Coverage

Flag as irrelevant

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From: Gustine, Nicole
To: Fischbach, Tracy; Stephanie Brady
Subject: Re: Hail to the Early Risers
Date: Thursday, November 16, 2017 11:05:21 AM

Sounds good. I figured it was a placeholder, but wasn't 100%.

Sincerely,

Nicole Gustine, Refuge Specialist
U.S Fish and Wildlife Service
1011 E. Tudor Rd., MS-225
Anchorage, Alaska 99503
(b6 [redacted] - cell
Hours: Tue - Thurs 6am to 1pm

On Thu, Nov 16, 2017 at 11:04 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Yes, thank you! It's a place holder piece from the Kodiak EA.
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
>
> Hours: Mon - Thurs 9:15 am to 3:15 pm
> "Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie
>
> **Need access to Refuge Documents?**
> Online Document Database (ServCat)
> ***Need Refuge land status info for Alaska?***
> FWS Region 7 Land Mapper (FWS version)
> FWS Region 7 Land Mapper (Public version)
> Region 7 GeoPDF Map Portal
>
> On Thu, Nov 16, 2017 at 9:00 AM, Gustine, Nicole <nicole_gustine@fws.gov> wrote:
>
> > Section 4.7.5 Social Environment Land Use appears to be from another document? It writes about construction, radio repeaters, Figures 3-7 to 3-13, helicopter use, and helicopter flights during construction. Recommend deleting.
> >
> > Sincerely,
> >
> > Nicole Gustine, Refuge Specialist
> > U.S Fish and Wildlife Service
> > 1011 E. Tudor Rd., MS-225
> > Anchorage, Alaska 99503
> > b6 [redacted] - cell

Hours: Tue - Thurs 6am to 1pm

On Thu, Nov 16, 2017 at 10:33 AM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:

> yes and thanks I will incorporate.
>
> stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448
>
> On Thu, Nov 16, 2017 at 8:29 AM, McCaffery, Brian <brian_mccaffery@fws.gov> wrote:
>
> > Here are the references for the text I wrote yesterday. I assume the current Arctic Refuge CCP is already cited and listed.
> >
> > BJM
> >
> > On Thu, Nov 16, 2017 at 7:28 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
> >
> > > Ok. I'm going to be off-line for a little bit here helping get kids ready for school. I'll see you at 9, if not sooner. Thanks all! -T
> > >
> > > Tracyann S Fischbach
> > > Natural Resources Planner
> > > National Wildlife Refuge System - Region 7
> > > Division of Natural Resources & Conservation Planning
> > > (907) 786-3369
> > >
> > > Hours: Mon - Thurs 9:15 am to 3:15 pm
> > > "Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie
> > >
> > > **Need access to Refuge Documents?**
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> > > FWS Region 7 Land Mapper (FWS version)
> > > FWS Region 7 Land Mapper (Public version)
> > > Region 7 GeoPDF Map Portal
> > >
> > > On Thu, Nov 16, 2017 at 7:27 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
> > >
> > > > Oh, and yes, we are missing the generic description of what exploration may look like. I thought that Chris Putnam was doing that but maybe not. That is one piece that needs to be added to give this document context. It's really off-kilter without it. I think that's probably my next task. Chapter 4 is also full of unwritten sections. Feel free to grab one and see what we can add in there. The one big issue that isn't in there yet is affects to the wilderness nature of the coastal plain. It isn't Wilderness, but it is wilderness, and we can expect 1000s of comments about that when/if this goes out for public review.

-T

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

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On Thu, Nov 16, 2017 at 7:22 AM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> Hi all,
>
> Great points, John. Currently, there is discussion/argument going on in FWS HQ about what they actually want. SOL wants a document that includes an analysis of exploration, but not of drilling since drilling is not currently legal. FWS HQ wants a really narrowed down document, similar to what we already produced a month or so ago. We have been told to not spend a lot of time generating new analyses. Ha! Like we have time. So, today we need to decide which sections we want to spend time on and which ones we can just grab info from the NPRA EA or EIS or the 1987 EIS. Frankly, we don't have time to dig to get all of the gems that are available to us with even just a lit review. I anticipate that this won't be the last version that we'll see.
>
> -T
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
>
> Hours: Mon - Thurs 9:15 am to 3:15 pm
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>
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On Thu, Nov 16, 2017 at 7:13 AM, Martin, John <john_w_martin@fws.gov> wrote:

> I was going to but feel I might be useful elsewhere.
>
> There are significant errors in the new narrative lit cited. Everything in the Literature Cited section was scrubbed yesterday before I left.
>
> thanks
>
> On Thu, Nov 16, 2017 at 7:11 AM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:
>
> > I will start moving references - unless someone else is doing this?
> >
> > stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448
> >
> > On Wed, Nov 15, 2017 at 9:30 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
> >
> > > Ok. I've added Brian's sections. I think a big fix is going to be straightening out the headings in Chapter 4. This is also where we need significant work. Chapter 3 looks ok. Not great, but ok. We also need to start moving the citations to the reference section. Because we have so few clearly laid out effects, we may want to consider just removing those tables from Chapter 2 for now.
> > >
> > > -T
> > >
> > > Tracyann S Fischbach
> > > Natural Resources Planner
> > > National Wildlife Refuge System - Region 7
> > > Division of Natural Resources & Conservation Planning
> > > (907) 786-3369
> > >
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> > >
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> > >
> > > On Wed, Nov 15, 2017 at 3:12 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:
> > >
> > > > Hi all,

I know that you are up and moving earlier than I will be in the morning, so here's my request.

Nicole, can you start at the top of the document and start cleaning up fragmented sentences. Accept big changes that are obvious replacements of placeholder language and start looking for consistency issues. For instance, it should probably be "North Slope" not north slope or northslope. Also, keep an eye out for still remaining Kodiak language from my cut/paste. No deer in Arctic as far as I know.

Brian and John, please look through the document and note glaring holes and think about strategies for plugging them. Think boiler plate language that gives us wiggle to fill it out later. For instance, "Additional literature review is needed to fully consider the consequences and cumulative effects of exploration activities on XXXXX resource."

Also, everyone consider what maps we may need/want. Sheila Dufford at Arctic will be able to help us get some of those put together.

Thanks everyone for all that you are doing. I REALLY appreciate it and I know the Refuge does as well.

I'll be one my email later this evening and early in the morning.

Cheers, Tracy

20171113_EA_ARC 1002 Reg Change_DRAFT

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

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--
Brian J. McCaffery
U. S. Fish and Wildlife Service
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources
Branch of Conservation Planning and Policy

Phone: (907) 330-7514
e-mail: brian_mccaffery@fws.gov

"Do something that scares the living hell outta your boss!" -- Dan Ashe, former Director, USFWS

From: Steve Berendzen
To: Stephen Arthur
Subject: Fwd: Update on a Wednesday Evening
Date: Thursday, November 16, 2017 11:16:06 AM

Steve, I'm at NCTC & haven't been able to open this. Please check out if you can & offer up any general suggestions for ways to fill in the holes. If you'd like to join the call, I see no reason why you can't. Otherwise, I can offer potential areas where we might be able to help - you'd know better than me

Sent from my iPhone

Begin forwarded message:

From: "Fischbach, Tracy" <tracy_fischbach@fws.gov>
Date: November 16, 2017 at 1:40:01 AM EST
To: Greg Siekaniec <greg_siekaniec@fws.gov>, Karen Clark <karen_clark@fws.gov>, Mitch Ellis <Mitch_Ellis@fws.gov>, Socheata Lor <socheata_lor@fws.gov>, Doug Damberg <Doug_Damberg@fws.gov>, Steve Berendzen <Steve_Berendzen@fws.gov>, Stephanie Brady <stephanie_brady@fws.gov>
Subject: Update on a Wednesday Evening

So, we have most of Chapter 1 (intro), 2 (summary), and 3 (affected environment) done. At least as good as we'll probably get it. We have lots of holes in Chapt 4 (environmental consequences) that we'll figure out tomorrow. The big things like Polar Bears are done. Many of the other resources are harder to nail down because there hasn't been as much done with them in conjunction with oil & gas development. The writing team is meeting tomorrow at 11 am to go through the document generally to discuss the glaring holes and strategize about what to do with them. We may remove some of the sections entirely. We may put something really general in others. Stay tuned. The document has changed considerably. Because we have team members in time zones to our east, they will be doing some heavy editing in the morning before the rest of us get going.

Do let us know if you have additional guidance for us to consider at our discussion tomorrow or if you would like to dial in. I will have Vidyo on, and can get a conference call line opened if necessary.

Cheers, T

P.S. The November chapter of a Sand County Almanac includes the well-known section about being an axe-man... taking responsibility for the actions we take on the land. Thoughtful reading indeed.

20171113_EA_ARC 1002 Reg Change_DRAFT

Tracyann S Fischbach
Natural Resources Planner

National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

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From:	Dufford, Sheila
To:	Roger Kaye
Subject:	Fwd: Arctic NWR map
Date:	Thursday, November 16, 2017 11:33:52 AM

Sheila J. Dufford
Biologist / GIS Specialist
Yukon Flats National Wildlife Refuge
101 12th Avenue, Room 264
Fairbanks, AK 99701
907-456-0307
sheila_dufford@fws.gov
http://www.fws.gov/refuge/Yukon_Flats/

***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**

---------- Forwarded message ----------
From: **Fischbach, Tracy** <tracy_fischbach@fws.gov>
Date: Thu, Nov 16, 2017 at 9:05 AM
Subject: Re: Arctic NWR map
To: "Dufford, Sheila" <sheila_dufford@fws.gov>

Ok. I'm also sharing the document with you so you can see what we are working on. It's due at 2:30 this afternoon.

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

Hours: Mon - Thurs 9:15 am to 3:15 pm
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On Thu, Nov 16, 2017 at 9:04 AM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:

> Hi Tracy,
> I just added Cities & Villages layer to an existing Map. I am not in the loop on what needs to on the map or discussed in the document. I can Query what ever villages you want. I just sent you a PNG of the map. I will add the 1002 area.
>
> Please call so we can discuss over phone.

Sheila

Sheila J. Dufford
Biologist / GIS Specialist
Yukon Flats National Wildlife Refuge
101 12th Avenue, Room 264
Fairbanks, AK 99701
907-456-0307
sheila_dufford@fws.gov
http://www.fws.gov/refuge/Yukon_Flats/

***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**

On Wed, Nov 15, 2017 at 9:28 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> We'll need the outline of the 1002 area and the label at the bottom covers Venetie and Fort Yukon which the CCP mentions. We haven't talked in the document about Nuiqsut. Do we need to?
>
> Thanks so much for jumping in. -Tracy
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
>
> Hours: Mon - Thurs 9:15 am to 3:15 pm
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>
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>
> On Wed, Nov 15, 2017 at 4:55 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:
>
> > 1st Draft
> >
> > **Sheila J. Dufford**
> > **Biologist / GIS Specialist**
> > **Yukon Flats National Wildlife Refuge**
> > **101 12th Avenue, Room 264**
> > **Fairbanks, AK 99701**
> > **907-456-0307**
> > **sheila_dufford@fws.gov**
> > **http://www.fws.gov/refuge/Yukon_Flats/**
> >
> > ***There are only two ways to live your life. One is as though nothing is a miracle. The***

other is as though everything is a miracle. **- Albert Einstein**

On Wed, Nov 15, 2017 at 3:15 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> I'm on my way out, but I will call you first thing tomorrow when I get in. Thanks for being willing to help out!
>
> My big need is a map of the Refuge with villages noted. I'm sure there will be more in the near future. Thanks - Tracy
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
>
> Hours: Mon - Thurs 9:15 am to 3:15 pm
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On Wed, Nov 15, 2017 at 2:37 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:

> Tracy,
> Please call me this is easier to talk about than sending emails back & forth.
>
> Sheila
>
> **Sheila J. Dufford**
> **Biologist / GIS Specialist**
> **Yukon Flats National Wildlife Refuge**
> **101 12th Avenue, Room 264**
> **Fairbanks, AK 99701**
> **907-456-0307**
> **sheila_dufford@fws.gov**
> **http://www.fws.gov/refuge/Yukon_Flats/**
>
> ***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.*** **- Albert Einstein**
>
> On Wed, Nov 15, 2017 at 2:20 PM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:
>
> > I am looping in Tracy so she can answer your questions - I sent her and uploaded the map from the CCP to her google drive -so she has that in pdf. Thanks Sheila. Stephanie

stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448

On Wed, Nov 15, 2017 at 2:13 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:

> I pulled a copy of the CCP. Does Tracy have a map in the CCP or Otherwise that she likes that I could try and copy? I need to know what she wants on it. Just NWR boundaries and communities? Land Status? Shaded Relief? Major Rivers?
>
> Does she want an ArcGIS Project to manipulate? Or what format is she looking for?
>
> Sheila
>
> **Sheila J. Dufford**
> **Biologist / GIS Specialist**
> **Yukon Flats National Wildlife Refuge**
> **101 12th Avenue, Room 264**
> **Fairbanks, AK 99701**
> **907-456-0307**
> **sheila_dufford@fws.gov**
> **http://www.fws.gov/refuge/Yukon_Flats/**
>
> ***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**
>
> On Wed, Nov 15, 2017 at 1:55 PM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:
>
> > yes I can pull the map from the CCP - figure 1-1 - but Tracy wants to manipulate it -so she does not want a pdf - everyone in cartographer in the RO is out - that is why I asked Sheila - but if it does not exist outside of a pdf - then we will have to work with what we have. thanks.
> >
> > stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448
> >
> > On Wed, Nov 15, 2017 at 1:51 PM, Fox, Joanna <joanna_fox@fws.gov> wrote:
> >
> > > Is there not one in the CCP? I believe Realty would have all of those.
> > >
> > > _____
> > > Joanna L. Fox
> > > Deputy Refuge Manager
> > > Arctic National Wildlife Refuge
> > > 101 12th Avenue, Room 236

Fairbanks, AK 99701
(907) 456-0549

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www.facebook.com/arcticnationalwildliferefuge

"Do what you can, with what you have, where you are." -- Theodore Roosevelt

On Wed, Nov 15, 2017 at 1:43 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:

> I will check.
> Sheila
>
> **Sheila J. Dufford**
> **Biologist / GIS Specialist**
> **Yukon Flats National Wildlife Refuge**
> **101 12th Avenue, Room 264**
> **Fairbanks, AK 99701**
> **907-456-0307**
> **sheila_dufford@fws.gov**
> **http://www.fws.gov/refuge/Yukon_Flats/**
>
> ***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**
>
> On Wed, Nov 15, 2017 at 1:32 PM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:
>
> > Hi there Sheila - do you happen to have a map of Arctic refuge with the surrounding communities? We need this for the EA that Tracy is writing for the proposed rule for exploration - unfortunately, we need the map by 10am tomorrow morning - do you have anything that would work? thanks much - Stephanie
> >
> > stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448

From: McCaffery, Brian
To: McIntyre, Carol
Subject: Re: nesting golden eagles on Alaska coastal plain
Date: Thursday, November 16, 2017 11:39:40 AM

C-Mac,

Thanks for the extended cogitation on the matter. Please don't spend any more time on it now. If it turns out that it might be useful down the road as this process unfolds/steamrolls/explodes, I'll let you know. Thanks so much for all the thought and time you've already put into my earlier request--much appreciated.

Cheers,

B-Mac

On Thu, Nov 16, 2017 at 9:31 AM, McIntyre, Carol <carol_mcintyre@nps.gov> wrote:

> B-Mac,
>
> We haven't analyzed the nesting phenology data yet, but our preliminary glimpses at the data suggest that there is no long term trend in laying dates. However, eagles did lay eggs earlier in years when hares and ptarmigan were in the higher phases of their cycles.
>
> I'd need to go back to my field notes to check on detections of gyrfalcons during the surveys in the Arctic NWR. My hunch is that we probably found some, but I don't remember how many. When would you need that information?
>
> C-Mac
>
> On Wed, Nov 15, 2017 at 1:18 PM, McCaffery, Brian <brian_mccaffery@fws.gov> wrote:
>
> > C-Mac,
> >
> > Quick question. From your Denali work, have you found any evidence for earlier nesting through time? I'm interested in seeing if there is any empirical/inferential basis (as opposed to just a theoretical one) for suggesting that the nest initiation dates you and your congressman found three decades ago might be even earlier today. Any thoughts?
> >
> > And, while we're on the topic of nesting raptors, did you guys happen to detect/record nesting gyrfalcons back in the day during that study?
> >
> > Cheers,
> >
> > B-Mac
> >
> > On Wed, Nov 15, 2017 at 10:42 AM, McIntyre, Carol <carol_mcintyre@nps.gov> wrote:
> >
> > > Yep, I seem to remember that we didn't spend any or much time doing surveys in the 1002 area.
> > >
> > > I wonder if Steve Arthur might know of any sites, but you may have already contacted him.

Cool about the Black-backed Woodpecker and shrike! Our winter yard list also includes a shrike, and a northern goshawk!

Big hugs, B-Mac!

On Wed, Nov 15, 2017 at 10:27 AM, McCaffery, Brian <brian_mccaffery@fws.gov> wrote:

> Thanks, C-Mac! FYI, all of Don Young et al's sites (except perhaps the one at the west end of the Sadlerochit Mtns) were south of the 1002 area. Ted turned me on to a couple known sites in the 1002, however. Will be curious to see if your colleagues have hints of any others.
>
> Cheers,
>
> BJM
>
> PS -- Added a new bird to my WI state list yesterday--Black-backed Woodpecker. My first since my youth in California! Have also been recording red crossbills, and have gotten cuts of at least 3 different call types. Oh yeah, had our first shrike of the winter in our backyard yesterday. Winter feeder birds--you're on notice!
>
> On Wed, Nov 15, 2017 at 10:20 AM, McIntyre, Carol <carol_mcintyre@nps.gov> wrote:
>
> > Hi Bryan, Rob and Brian,
> >
> > Brian McCaffery, FWS, is looking for information on golden eagle breeding sites in the 1002 area of the Arctic National Wildlife Refuge because of the potential for winter seismic exploration to impact early-nesting eagles in late winter/early spring. The 1002 area is basically the coastal plain, north of the Brooks Range - see link below to see the map of the area.
> >
> > If you guys have any radio-tagged eagles that show breeding behavior on the coastal plain or relatively close to it, can you let Brian McCaffery know? He is copied on this email.
> >
> > Thanks!
> >
> > Carol
> >
> > https://pubs.usgs.gov/fs/fs-0028-01/fs-0028-01.htm

--
Brian J. McCaffery
U. S. Fish and Wildlife Service
Natural Resources Planner
National Wildlife Refuge System - Region 7

Division of Natural Resources
Branch of Conservation Planning and Policy

Phone: (907) 330-7514
e-mail: brian_mccaffery@fws.gov

"Do something that scares the living hell outta your boss!" -- Dan Ashe, former Director, USFWS

--
Brian J. McCaffery
U. S. Fish and Wildlife Service
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources
Branch of Conservation Planning and Policy

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From: Brady, Stephanie
To: Tracy Fischbach
Subject: Re: [Update] 1002 EA Review
Date: Thursday, November 16, 2017 12:08:39 PM

---

the meeting is at 11:00 right?

stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448

On Thu, Nov 16, 2017 at 9:55 AM, <tracy_fischbach@fws.gov> wrote:

> Hi all,
>
> If you want to join us via conference call line, the number is b5 - CIP See you all there! -Tracy
>
> **1002 EA Review**
>
> Hi all,
>
> For those outside Refuges, you're attendance is not required, but if you are still able and willing to help, you are very welcome. We will go through the document relatively quickly in order to determine where significant gaps remain and what to do about them. We do know we are allowed to say, "Additional literature review is needed to fully consider the consequences and cumulative effects of exploration activities on XXXXX resource." I will have the Vidyo on. If you need a conference call line, please let me know.
>
> Thanks!
>
> When Thu Nov 16, 2017 11am – 12pm Alaska Time
>
> Where FWS-FW7 NWRS Conference Room/Regional Office (map)
>
> Video call b5 - CIP
>
> Who
> - tracy_fischbach@fws.gov - organizer
> - stephanie_brady@fws.gov
> - john_trawicki@fws.gov
> - christopher_putnam@fws.gov
> - doug_damberg@fws.gov
> - socheata_lor@fws.gov
> - nicole_gustine@fws.gov
> - edward_decleva@fws.gov
> - brian_mccaffery@fws.gov
> - ryan_r_wilson@fws.gov
> - jenifer_kohout@fws.gov

- wendy_loya@fws.gov
- peter_wikoff@fws.gov
- margaret_perdue@fws.gov
- john_w_martin@fws.gov
- steve_berendzen@fws.gov
- joanna_fox@fws.gov

From: Steve Berendzen
To: Stephen Arthur
Subject: Fwd: [Update] 1002 EA Review
Date: Thursday, November 16, 2017 12:20:50 PM

FYI - if you want to join

Sent from my iPhone

Begin forwarded message:

From: tracy_fischbach@fws.gov
Date: November 16, 2017 at 1:55:10 PM EST
To: joanna_fox@fws.gov, christopher_putnam@fws.gov, edward_decleva@fws.gov, tracy_fischbach@fws.gov, socheata_lor@fws.gov, ryan_r_wilson@fws.gov, stephanie_brady@fws.gov, steve_berendzen@fws.gov, peter_wikoff@fws.gov, doug_damberg@fws.gov, nicole_gustine@fws.gov, sheila_dufford@fws.gov, brian_mccaffery@fws.gov, jenifer_kohout@fws.gov, john_w_martin@fws.gov, john_trawicki@fws.gov, margaret_perdue@fws.gov, wendy_loya@fws.gov
Subject: [Update] 1002 EA Review
Reply-To: tracy_fischbach@fws.gov

Hi all,

If you want to join us via conference call line, the number is b5 - CIP b5 - CIP. See you all there! -Tracy

1002 EA Review

Hi all,

For those outside Refuges, you're attendance is not required, but if you are still able and willing to help, you are very welcome. We will go through the document relatively quickly in order to determine where significant gaps remain and what to do about them. We do know we are allowed to say, "Additional literature review is needed to fully consider the consequences and cumulative effects of exploration activities on XXXXX resource." I will have the Vidyo on. If you need a conference call line, please let me know.

Thanks!

When	Thu Nov 16, 2017 11am – 12pm Alaska Time
Where	FWS-FW7 NWRS Conference Room/Regional Office (map)
Video call	b5 - CIP

Who	• tracy_fischbach@fws.gov - organizer • stephanie_brady@fws.gov • john_trawicki@fws.gov • christopher_putnam@fws.gov • doug_damberg@fws.gov • socheata_lor@fws.gov • nicole_gustine@fws.gov • edward_decleva@fws.gov • brian_mccaffery@fws.gov • ryan_r_wilson@fws.gov • jenifer_kohout@fws.gov • wendy_loya@fws.gov • peter_wikoff@fws.gov • margaret_perdue@fws.gov • john_w_martin@fws.gov • steve_berendzen@fws.gov • joanna_fox@fws.gov

From: Gieryic, Michael
To: Stephanie Brady
Subject: Call Me - 1002 EA Section b5-AC [redacted]
Date: Thursday, November 16, 2017 12:25:22 PM

Please give me a call.

Mike Gieryic
Attorney-Adviser
Office of the Regional Solicitor
U.S. Department of the Interior
4230 University Drive, Suite 300
Anchorage, AK 99508
Phone: (907) 271-1420; Fax: (907) 271-4143
mike.gieryic@sol.doi.gov

From: Wendy Loya
To: Paul Leonard
Subject: FW: EIA workshop in Barrow
Date: Thursday, November 16, 2017 12:32:59 PM
Attachments: Invitee List - EIA consultation workshop.xlsx
EIA workshop Barrow.docx

FYI, this is the workshop in Utqiakvik I have been on the steering committee for and am attending at the end of the month

From: Nils Andreassen [mailto:nandreassen@institutenorth.org]
Sent: Tuesday, November 14, 2017 1:34 PM
To: Vernae Angnaboogok; Longan, Sara W (DNR); Haller, Michael L; Imm, Teresa; Loya, Wendy; Jon Isaacs; Robert Suydam; Gordon Brower; Harcharek, Nagruk; Tuzroyluk, Sayers; Karen Pletnikoff; Liza Mack; Brown, Rusty C; Moore, John D; Wisdom, Sheyna (Fair Weather); Grace Petersen; Arnold Brower (abrower@aewc-alaska.com); Donna Hauser; Willow Environmental, LLC C. Anderson; Steven Cohn; Thurston, Dennis; Boling, Ted A. EOP/CEQ; Karvinen Päivi; Rantakallio Seija; pamela.lesser@ulapland.fi; Kjerstin Skeidsvoll Lange; Sara French; Pawley, Kim (AADNC/AANDC); lorraine_seale@gov.nt.ca; Cynthia Jacobson
Subject: EIA workshop in Barrow

Dear all,

We're still working out some details in the agenda, but please find attached the current draft and the list of attendees, as well as those we are still hoping may be able to attend.

If you haven't already and if you need to, we strongly encourage you to make hotel and flight reservations. Rooms at Top of the World are under group reservation #56187.

Goals for the workshop:

- To hear from indigenous peoples their experience with and perspectives of consultation
- To improve utilization of Indigenous Knowledge (IK) in EIAs
- To review Alaskan case studies of indigenous consultation
- To discuss methods that move consultation to meaningful engagement
- To contribute lessons learned and good practices to the EIA analysis of the Sustainable Development Working Group (SDWG) of the Arctic Council

Thank you to Voice of the Arctic Iñupiat, ICC, SDWG, NSSI, and many others in helping to develop this program.

Please let me know if you have any questions, or need help with anything.

Best,
Nils

--
Nils Andreassen
Executive Director
Institute of the North (www.institutenorth.org)
(o) 907 786-6324 (m) 907 351-4982
715 L Street, Suite 300
Anchorage, AK 99501

First	Last	Organization	Contact	Role	
Vernae	Angnaboogok	ICC Alaska	vernae@iccalaska.org	Permanent Participant/Project Team	
Sara	Longan	North Slope Science Initiative	sara.longan@alaska.gov	AK Org Committee	
Michael	Haller	BOEM	Michael.Haller@boem.gov	AK Org Committee	
Teresa	Imm	ASRC	timm@asrc.com	AK Org Committee	
		State of Alaska			determining consolidated participation
Wendy	Loya	USFWS	wendy_loya@fws.gov	AK Org Committee	
Jon	Isaacs	AECOM	jon.isaacs@aecom.com	AK Org Committee	
TBD		North Slope Borough - Wildlife Management	Robert.Suydam@north-slope.org		
Gordon	Brower	North Slope Borough - Planning	gordon.brower@north-slope.org		
Nagruk	Harcharek	UIC Science	nagruk.harcharek@uicscience.com		
Sayers	Tuzroyluk	VOICE	sayers.tuzroyluk@inupiatvoice.org		
Karen	Pletnikoff	APIA	karenp@apiai.org		may need travel support
Liza	Mack	AIA	liza.mack@aleut-international.org	Permanent Participant	needs travel support
Rusty	Brown	ConocoPhillips	Rusty.C.Brown@conocophillips.com		
John	Moore	ExxonMobil	john.d.moore@exxonmobil.com		
Sheyna	Williams	Fairweather Science	sheyna.wisdom@fairweather.com		
Grace	Petersen	Uqaqti	grace@uqaqti.com		
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Donna	Hauser	UAF - Alaska Arctic Observatory & Knowledge Hub	dhauser2@alaska.edu		may need travel support
Murial	Brower	North Slope Borough			
Tasha	Michaels	North Slope Borough - Umiaq			
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Steve	Cohn	BLM	scohn@blm.gov		
Dennis	Thurston	BOEM	dennis.thurston@boem.gov		
Steve	Street	AVCP			
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Seija	Rantakallio	Arctic EIA project team, Ministry of the Environmer	seija.rantakallio@ym.fi		
Pamela	Lesser	Arctic EIA project team, Arctic Centre, Finland	pamela.lesser@ulapland.fi		
Kjerstin	Lange	Arctic EIA project team, Arctic Economic Council	kjsla@statoil.com		
Adam	Chamberlain	Arctic EIA project team, Gwitch'in Council Internati	french.nci@gmail.com		
Kim	Pawley	Arctic EIA project team, Indigenous and Northern A	kim.pawley@canada.ca		
Lorraine	Seale	Canada, Nortwest Territories	lorraine_seale@gov.nt.ca		
Cynthia	Jacobson	CAFF, Conservation of Arctic Flora and Fauna	cynthia_jacobson@fws.gov		

Meaningful Engagement of Indigenous Peoples as part of Consultation within an Environmental Impact Assessment
In Alaska and Across the Arctic

*Utqiaġvik/Barrow, Alaska * November 27-29, 2017*
Inupiat Heritage Center

Goals:

1. To hear from indigenous peoples their experience with and perspectives of consultation
2. To improve utilization of Indigenous Knowledge (IK) in EIAs
3. To review Alaskan case studies of indigenous consultation
4. To discuss methods that move consultation to meaningful engagement
5. To contribute lessons learned and good practices to the EIA analysis of the Sustainable Development Working Group (SDWG) of the Arctic Council

Sunday, November 26, 2017 *Travel Day*

Monday, November 27, 2017

0900 Welcome
- Prayer/Elders

0930 Local and Regional Indigenous Peoples Listening Circle
Organized by Voice of the Arctic Iñupiat and ICC Alaska

Focus Questions
- What are the goals of consultation, from different perspectives?
- What are the expectations of communities, and indigenous peoples?
- Where and what have we learned from past mistakes?
- Where do we see success today?
- What are the barriers to meaningful engagement?
- What does success look like in the future?
- Application of Indigenous Knowledge?

1200 Lunch

1300 Statewide Indigenous Peoples Listening Circle
Organized by ICC Alaska
- Steve Street – IK used within EIA by Association of Village Council Presidents and Donlin Creek
- ICC AK Food Security Project
  - Vernae
- NANA-Red Dog examples

DRAFT

1600 Indigenous Knowledge Contributions and Practice – Review of Concepts and Reflection on Listening Circle Content

1700 Adjourn Day 1

Tuesday, November 28, 2017

0900 Welcome and Review of Project Goals

- Päivi A. Karvinen, Project Coordinator, Arctic EIA; Ministry of Environment Finland

0930 Case Studies – Oil, Gas and Mining – Presentations and Panel Discussion

- Nanushuk Project – EIS on State and Native-owned land
  -
- GMT2 Project – Federal EIS on BLM and Native-owned land/minerals
  - Steve Cohn, Arctic District Office, BLM
- Arctic Iñupiat Offshore, LLC (AIO) and Shell Partnership
  - Teresa Imm, Vice President, ASRC
- Liberty Project
  - Dennis Thurston and Michael Haller, BOEM
- BLM's Integrated Activity Plans
  - Steve Cohn, Arctic District Office, BLM

1030 Break

1100 Conclusions

1230 Lunch

1330 Case Studies – Fisheries, Co-Management and Research - Presentations and Panel Discussion

- Community Development Quota Program (CDQ) – NOAA and Local Norton Sound fish management
- Programmatic Offshore Arctic Development EIS for NMFS
- NSSI/BOEM/industry baseline research – CSESP
  - Sara Longan, NSSI
- North Slope Borough – analysis and application
  - Gordon Brower, Director of Planning, North Slope Borough
- National Marine Fisheries Service – open water meetings

1500 Break

1530 Conclusions

1630 Review of Findings

DRAFT

1700 Adjourn

Wednesday, November 29, 2017

0900 Welcome and Review of Day Two

0930 Best Practice Arctic Café
Based on case studies, small groups will be organized to discuss thematic areas consistent with lessons learned or best practices observed. Participants will focus on policy relevant findings, gaps and challenges, and paths to implementation:

- Government processes
- Project proponent approaches
- Innovative collaboration
- Utilization and Co-Production of Indigenous Knowledge
- Meaningful engagement
- Project and community impact

1100 Report out in plenary

1200 Lunch

1300 From Consultation to Meaningful Engagement
Small group dialogue

- Key features
- Pathways

1500 Break

1530 Good Practice Review and Prioritization

Review of Findings and Submission to SDWG project leads

1630 Closing Comments

1700 Adjourn

***

Notes:

Workshop Facilitation

- Participants – substantive expertise, robust contributions and positive engagement

DRAFT

- Co-led sessions – management, practitioner, indigenous
- Case studies – focus on best practices and lessons learned
    - "Fish bowl" – presenters are engaged with one another in sharing, with audience listening
- Audience participation – case study evaluation form
- Small group discussion – thematic areas/best practices

DRAFT

From:	Martin, John
To:	Stephanie Brady; Brian McCaffery; Tracy Fischbach; Nicole Gustine
Subject:	Suggested EA Narrative
Date:	Thursday, November 16, 2017 12:38:16 PM
Attachments:	Draft EA Mitigation Perspective Discussion For Consideration 16Nov2017.docx SUMMARY OF MITIGATION RECOMMENDATIONS FOR THE COASTAL PLAIN 1002 AREA.docx

Per your request I have attempted to bridge the exploration, development and production envelope with an introductory perspective, or alternatively a concluding perspective.

In the past several weeks, or since this thing errupted, I have been going over the state-of-the-industry and published literature - there is little that the oil and gas industry cannot mitigate, even for the most sensitive species. This is not a green light for a FONSI nor my endorsement of this activity but a reality. Where the industry fails is the interface between the pending climate changes, the ignorance of natural and water resources to provide recommendatons in the face of uncertainty (this is not a bad thing - just new territory and need for new thinking), and the lack of restoration and rehabilitation technologies and capacities in northern latitudes.

Attached for your consideration and inclusion. And it is by no means thorough or exhastive - not enough time.

For your consideration for insertion into introductory narrative – to the effect… or alternatively as a concluding narrative

As a means of perspective, the described 1987 *Coastal Plain Report/EIS* full oil and gas production footprint was anticipated to use no more than 12,650 acres among scattered parcels, or 0.84 percent of the total 1.5 million acre 1002 area (Clough and Christiansen 1987). Given advances in the oil and gas state-of-the-industry since the late 1970s through late 1980s: increasing directional drilling capacities; reduced pad sizes; multiple drillings from a single pad; low ground-bearing pressure vehicles; winter site development; buffer zones around critical resources; among other features or best management practices (BMPs), the scope and scape of the exploration, development and production may be expected to be reduced from the initial estimate. All these considerations serve to mitigate direct, indirect and cumulative effects through avoiding, minimizing, rectifying, reducing, and/or compensating the significance of context and intensity for the proposed oil and gas exploration, development, and production activities.

The 29 listed mitigation recommendations of the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987), although now largely dated, provide a basis for updating and augmenting state-of-the-industry advances since (Clough and Christiansen 1987). Specifically, this includes the changes for threatened, endangered and sensitive (TES) species: arctic pennycress (*Noccaea arctica*, formerly *Thlaspi arcticum*), more common than initially determined; the delisting of the American Peregrine Falcon (*Falco peregrinus anatum*) and Arctic Peregrine Falcon (*F.p. tundrius*); and, listing of the polar bear (Ursus maritimus), among other considerations.

[based on above – insert 1987 table of mitigation recommendations?? – strongly recommended, see attached Word doc]

Cumulative effects including some aspects of climate change, not adequately considered in the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987) are addressed at least up to the time of publication Cumulative Environmental Effects of Oil and Gas Activities on the Alaska's North Slope (NRC 2003). Additionally, biological resources in relation to oilfield developments including: vegetation and biotic communities; caribou, grizzly bear; polar bear; Arctic fox; Pacific Loon; Tundra Swan; Lesser Snow Goose; Common Eider (Pacific Eider); shorebirds; freshwater invertebrates; freshwater fish; anadromous fish; and benthic marine communities are discussed in *The Natural History of an Arctic Oil Field: Development and the Biota* (Truett and Johnson 2000). Finally, parallels from exploration, development and production of oil and gas on the North Slope may be National Petroleum Reserve – Alaska EIS (BLM 2012), which are directly comparable to the coastal plain 1002 area.

As examples of advances in state-of-the-industry, oil and gas environmental impacts can be significantly reduced if these activities occur during winter months, when the tundra is frozen and protected by snow cover, and most wildlife are absent (Gliders and Cronin 2000). In summer, the thawing snow and lengthening days bring millions of shorebirds and waterfowl in search of nesting sites along with caribou migrating from wintering locations in the interior. The oil exploration and production process involves multiple stages that may require several years or even decades to complete for each oil field. New technologies involving reduced well spacing, elimination of reserve pits, directional drilling, winter maintenance and construction from ice pads and roads, aerial support, and the use of baseline and ongoing biological monitoring programs to facilitate decision making have reduced the areal impacts of

development. The incorporation of baseline biological studies and monitoring of exploration and field development assists in minimizing impacts to high-value habitats and species. In this manner the oil and gas industry reduces encroachment on wildlife habitat and avoids disturbance to wildlife during critical periods (Gliders and Cronin 2000).

As a specific example, denning bears and particularly denning females with young were susceptible to seismic blasting during exploration surveys. Rousing bears, emerging and resettling, required energy reserves that might place individual bears at risk for long-term survival and especially cubs-of-the-year. In part this was because field crews were unaware of denning sites. Bear dens are now more closely monitored due to the threatened status of the polar bear, typically via radiotelemetry. Additionally, traditional blasting has been replaced by vibrators and sensor lines which are far less intrusive to denning bears. As a consequence, the disturbance threat has been greatly reduced through advances in technology (Reynolds and others 1986; McLellan and Shackleton 1988, 1989; Mattson 1990; Blix and Lentfer 1992; Linnell and others 20000.

However, cumulative effects of oil and gas exploration, development and production become problematic for long-term recovery and restoration. Some sites abandoned and rehabilitated to various degrees still show evidence of impacts 40 to 60 years following the activity (Walker and others 1987; Felix and Raynolds 1989; Gliders and Cronin 2000; Kemper and MacDonald 2009; Jorgenson and others 2010; McCarter and others 2017).

As an example of unknowns and uncertainty of climate change in relation to oil and gas exploration, development and production are water resources and their use for industry. While the creation of impoundments for water storage and subsequent use for drilling operations has created habitat and expanded the distribution of such species as the Arctic char (Moulton and George 2000; NRC 2003), it is only with the provision that pumping capacity is capped so that sufficient overwintering habitat is available below the maximum ice depth and large enough to contain dissolved oxygen for the longest period of ice coverage. This is important in a landscape where overwintering habitat for fish is limited (Reynolds 1997).

Climate projections for the North Slope indicate not only warming but drying through the summer months and less precipitation through the winter (ACIA 2004). This situation may lead to lower minimum depths in natural lakes or artificial impoundments where entrapments may increase that may ultimately affect fish species populations, invertebrate food resources and possibly trophic cascade effects (Ims and Fuglei 2005). As aquatic invertebrates are a primary food resource for migratory shorebirds, and reduction in this energy-rich, seasonal resource could greatly affect the survival of adults and nesting efforts (Bart and others 2012; Hof and others 2017).

Even using the largest footprint estimated for development from 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987), this may be scattered across the landscape of 1.5 million acres of the coastal plain 1002 area. As mean annual summer temperature increase, as they have to the present, migrating caribou will seek out the coolest remaining sites, including patches of snow which are used to avoid or reduce biting insects. Oil and gas developments have been demonstrated to affect movement and foraging behavior previously (Ballard and others 2000; Cameron and others 1979, 1989, 2005; Cronin and others 2000; among others). While behavioral responses may be individually or herd specific, and have not affected the overall health of North Slope caribou to this time, the point is that with future environmental change, a threshold may be crossed at some point in the future where wildlife resource requirements may come in direct conflict with industry.

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SUMMARY OF MITIGATION RECOMMENDATIONS FOR THE COASTAL PLAIN 1002 AREA
[adapted from *Arctic National Wildlife Refuge, Alaska, Coastal Plain Resources Assessment: Report and Recommendation to the Congress of the United States and Final legislative Environmental Impact Statement* (Clough et al. 1987: 29 recommendations for oil and gas exploration, development, production, and transportation, pages 167-169)].

This does not include all mitigation measures for oil and gas exploration activities, nor climate change in the past 30 years; listing and critical habitat designation for polar bear; or cumulative impacts for the coastal plain environs.

Will these suffice for 2018 and beyond, possibly the next 30+ years based upon oilfield development history in the Arctic? Or is new information or studies necessary to amend these 29 or update with new recommendations?

	Mitigation Measure or Feature	Results - Consequence
1	Limit oil exploration, except surface geology studies, to Nov 1-May 1 (exact dates to be determined by Refuge Manager). Cease exploration activities & remove or store equipment at an approved site by May 15. Local exceptions may be made.	Will limit disturbance to periods when most fish & wildlife species are absent.
2	Consolidate, site, construct, & maintain facilities & pipelines to minimize effects on sensitive fish & wildlife habitats and species. Locate nonessential facilities outside concentrated caribou calving areas.	Will avoid or minimize disturbance in, or loss of, environmentally sensitive areas and allow free passage & natural movement of fish and wildlife.
3	Design all bridges and culverts to handle at least 50-year flood events.	Will prevent damage & disturbance of fish habitats.
4	Use ice or gravel-foam-timber pads, where feasible.	Will reduce gravel requirements & acres of habitat modified.
5	Prohibit: gravel removal from active stream channels on major fish-bearing rivers; winter water removal; from fish-bearing waters, or springs and tributaries feeding into fish-bearing waters; spring, summer, or fall water removal from fish-bearing waters to levels that will not easily pass fish or maintain quality rearing-habitat.	Will minimize disturbance to fish & degradation of fish habitats.
6	Elevate pipelines to allow free passage of caribou or place ramps or bury as feasible.	Will allow migration and other movements of caribou & large mammals.
7	Separate roads and pipelines 120-180 meters (400-800 feet), depending on terrain, in areas used for caribou crossing.	Will enhance crossing of linear structures by caribou & other mammals.
8	Construct docks and causeways so that fish movements are not impeded and lagoon water chemistry is basically unchanged.	Will provide for fish and marine mammal movement & lessen degradation of near-shore marine habitat.

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9	Avoid construction in coastal areas near river systems with topographic relief or bluffs; otherwise, minimize construction activities along the coast, through the denning period, approximately mid-Mar annually. Minimize activities along the coast during late Oct-early Nov when polar bears* come ashore to den.	Will reduce disturbance to polar bears, and prevent destruction of potential bear den & raptor nest sites. * Polar bears listed with critical habitat identified since 1987.
10	Restrict surface occupancy in the zone from the coastline inland 4.8 kilometers (3.0 miles) to marine facilities & infrastructure essential to move inland beyond the restricted zone; drill pads & production facilities could be allowed within the zone 2.4-4.8 kilometers (1.5 to 3.0 miles) from the coast on a site-specific basis.	Will permit caribou use of coastal insect-relief habitat & reduce disturbance of nesting waterfowl and other species.
11	Prohibit surface occupancy in the Sadlerochit Spring Special Area (see page 19: 50 CFR § 37.32).	Will prevent degradation of a unique environment & prevent loss of water essential for fish overwintering.
12	Minimize surface occupancy in immediate vicinity of areas identified as supporting *Thlaspi arcticum**. Include information on identification & need for avoidance of *T arcticum* in all environmental orientation briefings.	Will prevent destruction of *Thlaspi arcticum*. * Note, taxonomic nomenclature change from *T arcticum to Noccaea arctica,* arctic pennycress (https://plants.usda.gov/core/profile?symbol=NOAR2); species far more common than previously determined.
13	Use bear-proof fencing around certain facilities; develop solid waste management plans; incinerate putrescible waste daily; prohibit wildlife feeding; institute employee education programs as appropriate.	Will minimize bear/human confrontations, & reduce attraction of & increases in scavenger populations.
14	Inventory project areas for cultural resources, evaluate resources, & implement mitigation to avoid or minimize impact.	Will preserve cultural resources (archeological & historic sites) to the maximum extent possible.
15	Prohibit off-road vehicle use within 8.0 kilometers (5 miles) of all pipelines, pads, roads, & other facilities, except by local residents engaged in traditional uses or if otherwise specifically permitted.	Will minimize disturbance to wildlife, reduce destruction of vegetation, & permit migration of large mammals.
16	Establish time and area closures or restrictions on certain surface activity such as exploration, vehicle movements, & other activity that can be reasonably rescheduled, in areas of wildlife concentration during muskox calving, Apr 15-Jun 5; caribou calving May 15-Jun 20; caribou insect harassment Jun 20-Aug 15; snow goose staging Aug 20-Sep 27; & fish overwintering	Will protect species from disturbance during critical periods.

	& spawning.	
17	Limit use of development infrastructure, roads, & airstrips to persons on official business.	Will reduce disturbance & human/wildlife interaction.
18	Reinject drilling muds, cuttings, & other wastes where geologically feasible. Remove hazardous wastes off refuge to an approved disposal site.	Will minimize areas needed for reserve pits & reduce potential for contaminant spills.
19	Close areas within 1.2 kilometers (0.75 miles) of high-water mark of specified water courses to permanent facilities & limit transportation crossings. Gravel removal may occur on a site-specific basis.	Will protect riparian habitat and reduce stream pollution and disturbance in an important and limited habitat.
20	Prohibit use of explosives or other noisy activities within 3.2 kilometers (2 miles) of raptor nest sites Apr 15-Aug 31 (Jun 1 if nest is unoccupied), unless specifically authorized by the FWS.	Will protect nesting peregrine falcons & other raptors from disturbance.
21	Prohibit ground level activity, permanent facilities, & long-term habitat alterations (material sites, roads, & airstrips) within 1.6 kilometers (1 mile) of known peregrine* or other raptor nest sites Apr 15-Aug 31 (Jun 1 if nest is unoccupied) unless specifically authorized.	Will protect nesting peregrine falcons & other raptors from disturbance. * Peregrine Falcon delisted since 1987.
22	Survey suitable habitat annually to locate nesting peregrines & other raptors.	Will avoid conflicts between development & nesting raptors.
23	Establish no-activity zone of at least 0.8 kilometer (0.5 mile) around any confirmed polar bear den.	Will prevent disturbance during denning.
24	Close area within 8 kilometers (5 miles) of development & associated infrastructure to hunting, trapping, & discharge of firearms, except for subsistence uses only, on a site-specific basis, where there will be major effects on those uses.	Will increase public safety and reduce direct mortality of caribou, muskoxen, bears, and waterfowl; lower disturbance and increase the likelihood of habituation by species encountering development; however, will result in negative effects to subsistence uses of some areas.
25	Develop and implement plans for control, use, and disposal of fuel and hazardous wastes.	Will reduce potential for contaminant spills.
26	Monitor populations, productivity, movements, & general health of key species. Research measures to further minimize adverse effects of development. Implement corrective actions.	Will allow early identification of problems & implementation of corrective measures for caribou, muskoxen, polar bears, snow geese, arctic char, & others.
27	Provide: environmental orientation briefings	Will increase environmental awareness of workers;

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	for workers; program for monitoring development activities; continuation of fish & wildlife population monitoring; follow-up programs to evaluate effects.	give managers continuing baseline information to analyze effects of development and improve protective measures; help to ensure effectiveness of mitigation.
28	Develop plans in conjunction with area residents & organizations to properly manage impacts on communities.	Will minimize undesirable sociocultural & socioeconomic impacts, such as chemical dependency, boom-&-bust cycle, & cultural disorientation.
29	Develop and implement an approved rehabilitation plan as part of the appropriate permit stages.	May provide total or partial restoration of habitat values in affected area.

jwm11Oct2017

From:	Jorgenson, Janet
To:	Tracy Fischbach
Cc:	Burkart, Greta; Joanna Fox
Subject:	Fwd: Can someone send me Heidi"s snow report from the teams drive?
Date:	Thursday, November 16, 2017 12:38:36 PM
Attachments:	Jorgenson_et-al_2010-RecoverySeismicTrails-paper&supplements.pdf

Hello Tracy, Greta Burkart wrote me asking for help finding a document she needed for the EA you are working on, which is how I found out about it. I wrote a paper in 2010 on impacts to tundra from seismic exploration. It included a section on 'management implications' that I would think would be useful for any EA on the subject. I've attached the paper here. I have also recently talked to people at Alaska DNR who regulate seismic tundra travel on the North Slope, to find out about current practices, since I expected to get a request for information from FWS sometime soon. Let me know if you want to hear more about this. Thank you, Janet

---------- Forwarded message ----------
From: **Burkart, Greta** <greta_burkart@fws.gov>
Date: Wed, Nov 15, 2017 at 6:10 PM
Subject: Re: Can someone send me Heidi's snow report from the teams drive?
To: "Jorgenson, Janet" <janet_jorgenson@fws.gov>
Cc: Christopher Latty <christopher_latty@fws.gov>

Thanks Janet,

The regional office is writing an EA for effects of seismic work in the 1002 area and Tracy Fischbach asked me to write something up for water resources and it has to get to them by tomorrow morning. This is just the first draft, so I am assumng they would contact you about additional drafts.

Greta

Greta Burkart, PhD
Aquatic Ecologist
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Fairbanks, AK 99701
ph: (907) 456-0519
fax: (907) 456-0428
email: greta_burkart@fws.gov
www.facebook.com/arcticnationalwildliferefuge

On Wed, Nov 15, 2017 at 2:20 PM, Jorgenson, Janet <janet_jorgenson@fws.gov> wrote:
> Is this what you wanted? What is the EA for?
>
> On Wed, Nov 15, 2017 at 1:41 PM, Burkart, Greta <greta_burkart@fws.gov> wrote:
> > Can someone send me Heidi's snow report from the teams drive? It should be under reports. I just found out that I need to write part of an EA for impacts of seismic by Thursday at noon and I do not have access to the Teams drive.

> Thanks,
>
> Greta

--
Janet C. Jorgenson
Botanist
Arctic National Wildlife Refuge
101 12th Ave, Rm 236
Fairbanks, Alaska 99701

907-456-0216

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Long term recovery patterns of arctic tundra after winter seismic exploration

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Abstract. In response to the increasing global demand for energy, oil exploration and development are expanding into frontier areas of the Arctic, where slow growing tundra vegetation and the underlying permafrost soils are very sensitive to disturbance. The creation of vehicle trails on the tundra from seismic exploration for oil has accelerated in the past decade, and the cumulative impact represents a geographic footprint that covers a greater extent of Alaska's North Slope tundra than all other direct human impacts combined. Seismic exploration for oil and gas was conducted on the coastal plain of the Arctic National Wildlife Refuge, Alaska, USA, in the winters of 1984 and 1985. This study documents recovery of vegetation and permafrost soils over a two decade period after vehicle traffic on snow covered tundra. Paired permanent vegetation plots (disturbed vs. reference) were monitored six times from 1984 to 2002. Data were collected on percent vegetative cover by plant species and on soil and ground ice characteristics. We developed Bayesian hierarchical models, with temporally and spatially autocorrelated errors, to analyze the effects of vegetation type and initial disturbance levels on recovery patterns of the different plant growth forms as well as soil thaw depth. Plant community composition was altered on the trails by species specific responses to initial disturbance and subsequent changes in substrate. Long term changes included increased cover of graminoids and decreased cover of evergreen shrubs and mosses. Trails with low levels of initial disturbance usually improved well over time, whereas those with medium to high levels of initial disturbance recovered slowly. Trails on ice poor, gravel substrates of riparian areas recovered better than those on ice rich loamy soils of the uplands, even after severe initial damage. Recovery to pre disturbance communities was not possible where trail subsidence occurred due to thawing of ground ice. Previous studies of disturbance from winter seismic vehicles in the Arctic predicted short term and mostly aesthetic impacts, but we found that severe impacts to tundra vegetation persisted for two decades after disturbance under some conditions. We recommend management approaches that should be used to prevent persistent tundra damage.

Key words: Arctic National Wildlife Refuge, Alaska, USA; arctic tundra; induced thawing; long term damage; permafrost soils; plant community; recovery; seismic exploration; thermokarst; winter trail disturbance.

Introduction

In response to the increasing global demand for energy, oil exploration and development are expanding into frontier areas of the Arctic, where slow growing tundra vegetation and the underlying permafrost soils are very sensitive to disturbance (NRC 2003). This expanding human activity is occurring with insufficient knowledge of the long term impacts to arctic ecosystems and there is an urgent need to improve the management of oil exploration and development across diverse ecosystems. In this paper, we provide results from long term monitoring of disturbance associated with oil exploration in northern Alaska that we hope will contribute to reducing impacts of industrial activity in the Arctic.

Early oil exploration in northern Alaska in the 1940s, during an era of minimal environmental concern, created numerous scars that are still visible 60 years later. This long term damage was primarily a conse quence of severe surface disturbance that induced thawing of permafrost (Lawson 1986). Since about 1970, however, impacts have been substantially reduced by conducting exploration during winter when the ground is frozen and snow covered (Hernandez 1973, Walker et al. 1987). Seismic exploration for oil requires multiple vehicles to travel on surveyed grids over the tundra. Short term studies of these winter vehicle trails (2 8 years) found disturbance was greatly reduced by land management regulations and the studies typically predicted that winter trails would recover fully within a

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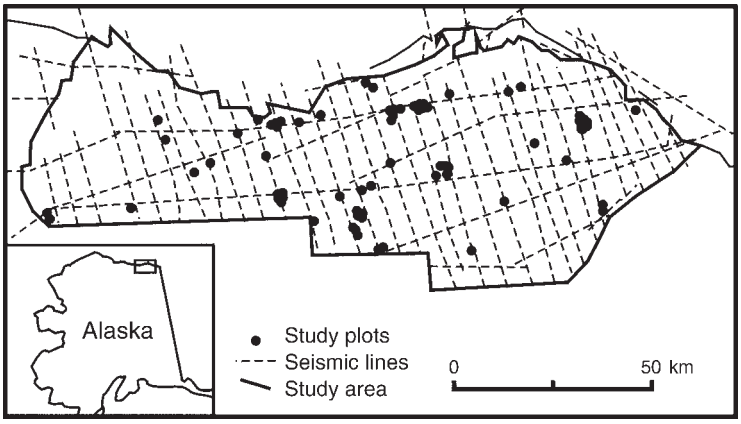


FIG. 1. Map of 1984 1985 seismic lines and study plots in Arctic National Wildlife Refuge (ANWR), Alaska, USA. Plots (paired disturbed reference) are located on seismic lines (shown) and on adjacent camp move trails (not shown).

decade (Bliss and Wein 1972, Chapin and Shaver 1981, Reynolds 1982, Densmore 1985, Walker et al. 1987). Accordingly, the oil industry and government regulators generally consider winter seismic exploration to be a low impact activity with only short term aesthetic impacts (NRC 2003).

The creation of seismic trails has accelerated in the past decade, however, and the cumulative impact represents a geographic footprint that covers a greater extent of Alaska's North Slope tundra than all other direct human impacts combined (NRC 2003). Despite the magnitude of this activity, there is insufficient information on the long term impacts of winter seismic exploration on tundra to effectively manage this rapidly expanding exploration activity and to accurately esti mate the overall amount of human disturbance in the Arctic. We address this data gap by continuing to monitor the recovery of tundra vegetation and soil that was disturbed by winter seismic exploration in 1984 and 1985 on the coastal plain of the Arctic National Wildlife Refuge (Arctic NWR), Alaska. Earlier papers docu mented recovery on trails during the first seven years of this study (Felix and Raynolds 1989*a*, *b*, Raynolds and Felix 1989, Felix et al. 1992, Emers et al. 1995, Emers and Jorgenson 1997). This paper documents recovery after 18 years.

Of particular concern for off road tundra travel is the sensitivity of permafrost to disturbance because degra dation and thaw settlement can lead to dramatic shifts in recovery patterns away from original conditions, de pending on ice contents of the permafrost. This concern is exacerbated by recent climate warming that has made ground ice more susceptible to thaw (Jorgenson et al. 2006). A warming climate also is likely to alter the competitive interactions between different plant species as they revegetate bare ground on trails. Thus, it is imperative to document recovery patterns over the last two decades to better understand how disturbance and recovery patterns may change in a warming Arctic.

Evaluating disturbance and recovery is difficult due to the complex interactions among disturbance character istics (e.g., vehicle type, number of passes), the factors that affect resistance to disturbance (e.g., vegetation, soil, snow, surface hydrology, permafrost, topography), and varying response of ecosystem components (e.g., grasses vs. evergreen shrubs). Spatial variability of these factors rarely can be controlled to provide an optimal statistical design for analyzing the patterns across a range of conditions (Ver Hoef 2002). Sample sizes can be highly variable across all combinations of disturbance levels and terrain conditions. To address these problems in analyzing post hoc disturbance data, we developed a new Bayesian hierarchical modeling approach to better estimate the effects of intensity of initial disturbance, plant growth form, vegetation type, and time to recovery.

Objectives of this study were to: (1) quantify changes in plant cover and soil thaw depth over an 18 year period after disturbance; (2) determine long term recovery patterns by comparing the responses of differing plant growth forms and plant communities to varying levels of initial disturbance; (3) compare our results to predictions from earlier reports and other studies; and (4) develop recommendations for land management that can help to reduce long term impacts.

METHODS

Study area

The study area is on the coastal plain of the Arctic National Wildlife Refuge (ANWR) in northeastern Alaska, between 69°30′ N and 70°10′ N (Fig. 1). It lies within low arctic tundra and is bordered by the Brooks Range to the south and the Beaufort Sea to the north. It has low precipitation, very low winter temperatures, and short, cool summers. Soils are underlain by continuous permafrost, and the thawed surface layer reaches an average maximum depth of 15 60 cm in August. The ground surface remains frozen and snow covered from

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TABLE 1. Vegetation types of the coastal plain of the Arctic NWR, Alaska, USA, based on Walker et al. (1982).

Type	Description
Wet sedge tundra (13% of area)	Low lying flats and drainages with the sedges *Carex aquatilis* and *Eriophorum angustifolium* and little moss or shrub cover. The poorly drained soils are saturated throughout the summer and have a thick, fibrous organic horizon.
Sedge willow tundra (30%)	Low lying flats and gentle slopes with the sedges *Eriophorum angustifolium* and *Carex aquatilis* and the willows *Salix pulchra* and *S. reticulata*. Mosses include *Tomenthypnum nitens*, *Hylocomium splendens*, *Aulacomnium* spp., *Sphagnum* spp., and *Campylium stellatum*. On fine grained retransported, glaciofluvial, and abandoned floodplain deposits. Soils have moderately thick organic layer and are saturated at intermediate depths but generally free of surface water.
Sedge *Dryas* tundra (13%)	Moderately well drained sites dominated by the dwarf shrub *Dryas integrifolia* and the sedge *Carex bigelowii*, with the willows *Salix richardsonii, S. phlebophylla*, and *S. reticulata* and mosses such as *Tomenthypnum nitens*, *Hylocomium splendens*, *Distichium capillaceum*, and *Ditrichum flexicaule*. Forbs (e.g., *Lupinus arcticus*), lichens (e.g., *Cetraria* spp.), and horsetails (e.g., *Equisetum variegatum*) are common. Found on moist calcareous slopes and pebbly glacial and marine sediments. Notable for a hummocky surface topography, patches of exposed mineral soil, and extremely variable organic horizons resulting from active and stabilized frost boils.
Tussock tundra (28%)	Moderately well drained slopes dominated by the tussock forming sedge *Eriophorum vaginatum*, with shrubs *Salix pulchra*, *Betula nana*, *Ledum palustre* ssp. *decumbens*, and *Vaccinium vitis idaea*. Bryophytes include *Hylocomium splendens*, *Sphagnum* spp., *Aulacomnium turgidum*, *Ptilidium ciliare*, and *Tomenthypnum nitens*. Occurs on deposits of loess or colluvial material on top of coarser, residual materials or glacial drift.
Shrub tundra (5%)	Dominated by low and dwarf shrubs, with *Betula nana* or *Salix pulchra* and understory species similar to tussock tundra. In the study area, occurs only on raised areas with high centered polygon surface morphology.
Riparian shrubland (2%)	Willow shrublands on river floodplains and stream banks, dominated by *Salix alaxensis*, *S. glauca*, and *S. richardsonii*, commonly with a forb understory. Willows have an average height of 0.5 m and maximum of about 1.5 m. Occurs on both young floodplain deposits with mixed gravel and fine grained material, and older terraces with a thin, fine grained alluvium layer over gravel.
Dryas terrace (3%)	Infrequently flooded river terraces with *Dryas integrifolia* and other dwarf shrubs, forbs, horsetails, mosses, and lichens similar to sedge *Dryas* tundra. Well drained soils with a very thin organic mat over river deposits.

approximately mid September to early June. Winter snow cover is shallow due to low precipitation and variable because of redistribution by high winds, resulting in sparse cover on hillcrests and deep accumulations in water courses.

Foothills of the Brooks Range cover 45% of the area (Walker et al. 1982). Broad uplands are dissected by north flowing rivers. Hilly coastal plains cover 22% of the area and have gently undulating tundra with small thaw lakes. Flat thaw lake plains with large lakes cover 3% of the area. River floodplains cover 25% of the area. Vegetation is a nearly continuous, highly interspersed mosaic of plants less than 0.5 m tall, mainly sedges, low shrubs, and mosses. Shrubs are taller along drainages. Soil texture and moisture are important determinants of the different tundra vegetation types (Table 1), which were based on Walker et al. (1982).

Description of seismic exploration activities

Seismic exploration maps subsurface geological struc tures by sending shock waves into the ground from surface vehicles and recording their reflectance patterns. Vehicles travel along a surveyed grid, with multiple vehicle passes along each line. Approximately 2000 km of seismic exploration line were completed in a 5×10 km grid over a 6300 km^2 area (Fig. 1). Over 2000 km of additional trails were created adjacent to the seismic lines by D 7 Caterpillar tractors pulling ski mounted trailers (cat trains) between crew camps. Trail widths ranged from 4 m to >50 m. Exploration occurred from January through May, 1984 and 1985, when require ments were met for minimum protective snow cover (15 cm) and depth of frozen soil surface (30 cm). The U.S. Fish and Wildlife Service enforced permit stipulations to minimize impacts to vegetation and wildlife. Monitors traveled with the seismic crews to choose routes that avoided the most easily damaged areas, such as steep slopes and snow free areas. Seismic vehicles included vibrator units (4.5 psi [=31.0 kPa]) and dynamite units (2.8 psi [=17.2 kPa]), plus smaller personnel carriers. The highest ground pressure vehicles were D 7 caterpillar tractors (10.5 psi [=72.4 kPa]).

Field sampling

Thirty permanent paired plots (disturbed, reference) were established along new vehicle trails in 1984 and 1985. Disturbed plots were chosen from across the study area to represent different vegetation types at low, medium, and high levels of initial disturbance. Reference plots were established 2 10 m away from disturbed plots on undisturbed tundra with the same topography and vegetation. Plots were observed the first two summers after disturbance (1984 and 1985, or 1985 and 1986) and in 1988, 1991, and 2002.

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TABLE 2. Disturbance rating scheme for winter seismic trails on the coastal plain of the Arctic NWR, Alaska, adapted from Radforth (1972).

Factor and level	Description
Decrease in percent cover of plants	
0	no observable change
1	0 25% change
2	25 50% change
3	over 50% change
Decrease in percent cover of shrub canopy	
0	no observable change
1	0 25% change
2	25 50% change
3	over 50% change
Change in percentage of organic or mineral soil exposed	
0	none observed
1	1 5% change
2	5 15% change
3	over 15% change
Damage to microscale structure	
0	scattered scuffing of tussocks or hummocks
1	most tussocks or hummocks scuffed, some crushed
2	most tussocks or hummocks crushed
3	ruts or crushed tussocks and hummocks nearly continuous
Trail subsidence or compression	
0	no observable compression
1	slight compression of vegetation and peat; trail may be wetter than surrounding area
2	trail wetter than surrounding area; thaw subsidence indistinct or patchy
3	trail a trough due to thaw subsidence
Change in plant species composition	
0	no observable composition change
1	0 5% species composition change
2	6 25% species composition change
3	>25% species composition change, resulting in major change in vegetation type

Each plot was assigned a disturbance rating (Table 2) adapted from a system presented in Radforth (1972). Each plot was assigned a vegetation type and was rated for six disturbance factors: difference between the disturbed and reference plot in percent total vegetative cover, percent shrub cover, and percent exposed soil; impact to microscale surface structure; trail compression or subsidence; and change in plant species composition. These measures were used to assign a summary disturbance rating. This rating was either the same as the rating for vegetative cover, or higher if one of the other factors was rated as high. The vegetation types and initial disturbance ratings were used to stratify the plots for analysis.

Point sampling (Kent and Coker 1999) was used to quantify percent cover of plant species in disturbed and reference plots. In each 4×30 m plot, a vertical point frame was used to sample 20 points (spaced at 20 cm intervals) on each of 10 evenly spaced 4 m long transects, for a total of 200 points per plot. To obtain cover estimates, a pin was lowered from the frame at each point and each species intercepted by the pin was recorded. Plant cover data were collected in midsummer near peak biomass. Plant nomenclature followed the PLANTS Database (USDA 2009).

Soils and soil ice were described in 1985 at the reference plots, to determine if natural subsurface characteristics affected initial disturbance and subsequent recovery in adjacent disturbed plots. At each plot, five soil pits were sampled at 5 m intervals. Soil horizons were measured and described following Bates et al. (1982). A 75 mm diameter permafrost core was used to obtain soil samples in permafrost. Excess soil ice content was estimated at 18 plots that did not have rocky soil. The upper 30 cm of frozen soil from each core was removed and thawed, and the volume of water in excess of soil saturation was decanted and measured. Excess ice content was calculat ed as the percentage of the total core volume: $I = 100V_i/V_c$ and $V_i = 1.09V_w$, where V_i is the volume of excess ice in the core, V_c is the the volume of the core, V_w is the volume of water in excess of soil saturation in the core, and the coefficient of expansion for water to ice is 1.09. Vertical ice wedges were avoided, so ice content refers to segregated ice held in the soil matrix.

Disturbance levels and depth of seasonally thawed soil above permafrost (thaw depth) were monitored at an additional 60 plots in 1984, 1985, 1986, 1988, 1991, 1994, 1998, and 2002. Plant cover was not sampled. Thaw depth was estimated by probing to frozen soil with a calibrated steel rod. Depths were probed at 30 points along transects in disturbed and reference plots. Measurements were taken in early August, near the time of maximum annual thaw. Thaw depth response was modeled similarly to the plant cover data. The model includes 49 plots that did not have rocky soil; no riparian types are represented.

Data analysis

A model based approach using spatial and temporal autocorrelation was used, rather than a design based method, because plots were not chosen using a probability based sampling scheme (for a discussion, see Ver Hoef 2002). Modeling random errors as autocorrelated in space and time allows valid statistical inference on regression parameters in a model based approach (Ver Hoef and Cressie 2001).

Models were created for thaw depth and for six plant growth forms: deciduous shrub, evergreen shrub, graminoid, forb (including horsetails), lichen, and bryophyte. Vegetation community types with few plots were aggregated with a similar type for modeling plant growth forms: the two shrub tundra plots were included with tussock tundra, and one wet sedge plot was included with sedge willow tundra (Table 1). Aggrega tion was not necessary for the thaw depth model because of larger sample size.

We analyzed our data with a nonlinear space time model:

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$$Y_{i,j}(\mathbf{s},t) = \pi_{ij}(\beta_{0,i} + \beta_{1,i}t + \beta_{2,i}t^2)e^{-t/\rho_i} + Z(\mathbf{s};t) + \delta(t;\mathbf{s}) + \varepsilon(\mathbf{s},t)$$

where $Y_{i,j}(\mathbf{s}, t)$ is the response variable (i.e., the percent cover in disturbed plots minus the percent cover in the reference plots for a particular plant growth form) for the ith vegetation class and the jth disturbance level at spatial location $\mathbf{s}$ in year t. The deterministic part of the nonlinear model is composed of a second order poly nomial in time ($\beta_{0,i} + \beta_{1,i}t + \beta_{2,i}t^2$) for each vegetation type. The multiplier e^{-t/ρ_i} shrinks the model toward zero over time, allowing recovery from disturbance. We scaled the basic curve with π_{ij}; $j = 1$, 2, or 3 for low, medium, and high initial disturbance (see Table 2; note that no 0 level disturbance was recorded) to allow for differences among initial disturbance levels by vegeta tion type. For parameter identifiability, we set $\pi_{i3} = 1$, so π_{i2} and π_{i1} are relative to π_{i3}. In general, we expected $\pi_{i3} > \pi_{i2} > \pi_{i1}$, but we allowed π_{i2} and π_{i1} to be up to twice as large as π_{i3} to test whether initial disturbance has a significant effect on fitting the curves.

These curves will not be perfect predictors of the response variable. We expected that residuals from the model will still have spatial and temporal patterns, so we add three random effects. The spatial random effect is $Z(\mathbf{s}; t)$. We assumed that the spatial effects were autocorrelated within a given year t, but independent across years. We used an exponential autocorrelation model:

$$\text{cov}[Z(\mathbf{s};t), Z(\mathbf{r};u)] = C_z(\mathbf{h}) = \theta_s \exp(\quad ||\mathbf{h}||/\alpha_s) I(t = u)$$

where $\mathbf{h} = \mathbf{s} \quad \mathbf{r}$ and $||\mathbf{h}||$ is the Euclidean distance between any two points $\mathbf{s}$ and $\mathbf{r}$ in space and $I(\cdot)$ is the indicator function. Note that we allowed a separate realization of the random effects for each year (that is, the "surface" was not fixed across years), but for estimation stability the parameters that control them, θ and α_s, are common for all years.

We also assumed that the temporal random effects were autocorrelated within a given location $\mathbf{s}$, but independent among locations. We again used an exponential autocorrelation model:

$$\text{cov}[\delta(t;\mathbf{s}), \delta(u;\mathbf{r})] = C_\delta(h) = \theta_t \exp(\quad |h|/\alpha_t) I(\mathbf{s} = \mathbf{r})$$

where $h = t \quad u$ is the difference between any two times t and u. We assumed that spatial random effects were independent among time periods. This allowed a separate realization of the random effects for each site (that is, the "time series" was not fixed across sites), but the parameters that control them were common to all sites. Finally, we added a component of uncorrelated errors (often called the "nugget" [subscript n] effect in geostatistics); $\varepsilon(\mathbf{s}, t)$. We assumed that $\text{var}(\varepsilon(\mathbf{s}, t)) = \theta_n$ and $\varepsilon(\mathbf{s}, t)$ is independent of $\varepsilon(\mathbf{r}, u)$ when ($\mathbf{s} \neq \mathbf{r}$) or ($t \neq u$).

Although it is reasonable to expect that there are real differences in the curves for each vegetation type by disturbance class, there were not enough samples to reliably estimate each of these curves if we simply subset the data. Instead, we used a Bayesian hierarchical model (BHM); see Cressie et al. (2009) for a recent discussion regarding ecological data. We assumed that $\beta_{0,i}$ was drawn from a normal prior distribution $\beta_{0,i} \sim \mathcal{N}(\mu_{\beta 0}, \sigma^2_{\beta 0})$; $i = 1, \ldots, n_{\text{veg}}$, where n_{veg} is the number of vegetation classes, which allowed us to "borrow strength" across the vegetation classes by using "prior" distributions. Likewise, we used the following prior distributions, $\beta_{1,i} \sim \mathcal{N}(\mu_{\beta 1}, \sigma^2_{\beta 1})$, $\beta_{2,i} \sim \mathcal{N}(\mu_{\beta 2}, \sigma^2_{\beta 2})$, $\pi_{1,i} \sim \text{UNIF}(0, 2\mu_{\pi 1})$, $\pi_{2,i} \sim \text{UNIF}(0, 2\mu_{\pi 2})$, and $\rho_i \sim \text{UNIF}(0, 2\mu_\rho)$. Using these priors, estimates of each parameter, for example $\pi_{1,i}$, will center around the mean of the prior distribution ($\mu_{\pi 1}$, for this example) when there is little or no data for that parameter in the ith vegetation class. Details on fitting the Bayesian hierar chical model are given in Appendix A.

Note that this BHM was too complicated for model selection methods, as many BHMs are. There is little tradition in model selection for these types of models; see Cressie et al. (2009). Instead we tried to develop a model that was robust, where the spatial and temporal autocorrelation absorb lack of fit, which can still be spatially and temporally patterned. The functional forms that we chose for the quadratic in time, the temporal decay, and the multiplier for disturbance type were based on functions that would fit the data and have interpretable parameters. We assessed the model using sensitivity analysis, which is included in Appendix A.

Results

Plant cover

The temporal response curves show that different types of plants had very different recovery patterns after disturbance from winter seismic exploration (Fig. 2). After initial decreases in cover for all types of plants, patterns of recovery over the next 18 years varied from rapid recovery to pre disturbance levels, to greatly increased cover, to slow and incomplete recovery. Figs. 3 5 present response curves for three plant growth forms that represent the range of differing responses to disturbance, including response to three different levels of initial disturbance in five vegetation types. Graphs for all six growth forms are in Appendix B.

Graminoid cover (sedges, grasses) at non riparian sites showed moderate initial decreases, but then increased rapidly above reference levels within five years, especially after higher level initial disturbance (Fig. 3). Cover peaked between five and eight years and then decreased gradually. The response was earliest for sedge willow tundra, in which graminoids increased above reference levels in every disturbed plot, even with low initial disturbance. The effect was delayed, but lasted longest, for plots with high initial disturbance on sedge *Dryas* tundra and sedge tussock tundra.

Deciduous shrubs, forbs, and lichens had similar recovery patterns. Deciduous shrubs were severely

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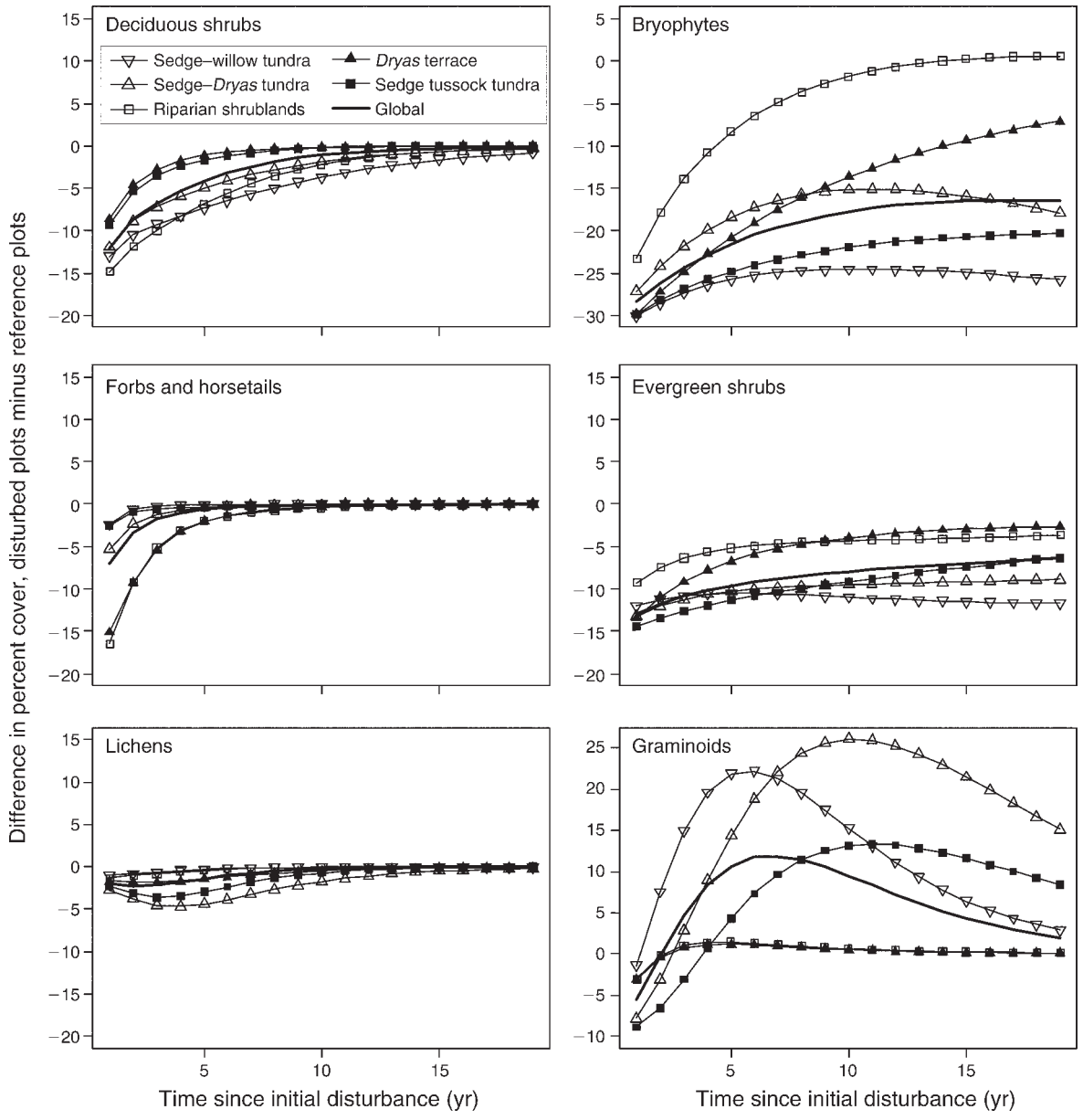


FIG. 2. Fitted models for high level disturbance for six plant growth forms in five vegetation types. Differences are percent cover in disturbed plots minus percent cover in reference plots.

damaged in all vegetation types, especially sedge willow tundra and riparian shrublands (Fig. 4). Higher disturbance levels caused greater decreases in cover, but all levels recovered rapidly during the first 10 years. For forbs, large initial decreases in cover were followed by rapid recovery in the first five years. Lichen recovery was slower. Live lichen cover continued to decrease on trails for the first five years after disturbance, perhaps because lichens on displaced chunks of organic mat died over several years.

Bryophytes (mosses and liverworts) suffered large decreases in cover after medium to high level disturbance (Fig. 5). At *Dryas* terrace and riparian shrubland sites, bryophyte cover approached reference values after 18 years, even after extreme initial reductions. Recovery of bryophytes was slow and still incomplete, however, in the other vegetation types. One third of all plots still had decreases in bryophyte cover of $\geq$20% in 2002 (e.g., 54% on reference and 34% on trail). Evergreen shrubs showed recovery patterns similar to those for bryophytes. Cover was initially greatly reduced and recovery was generally poor. The models do not indicate any recovery trends for either bryophytes or evergreen shrubs in sedge willow tundra and sedge *Dryas* tundra.

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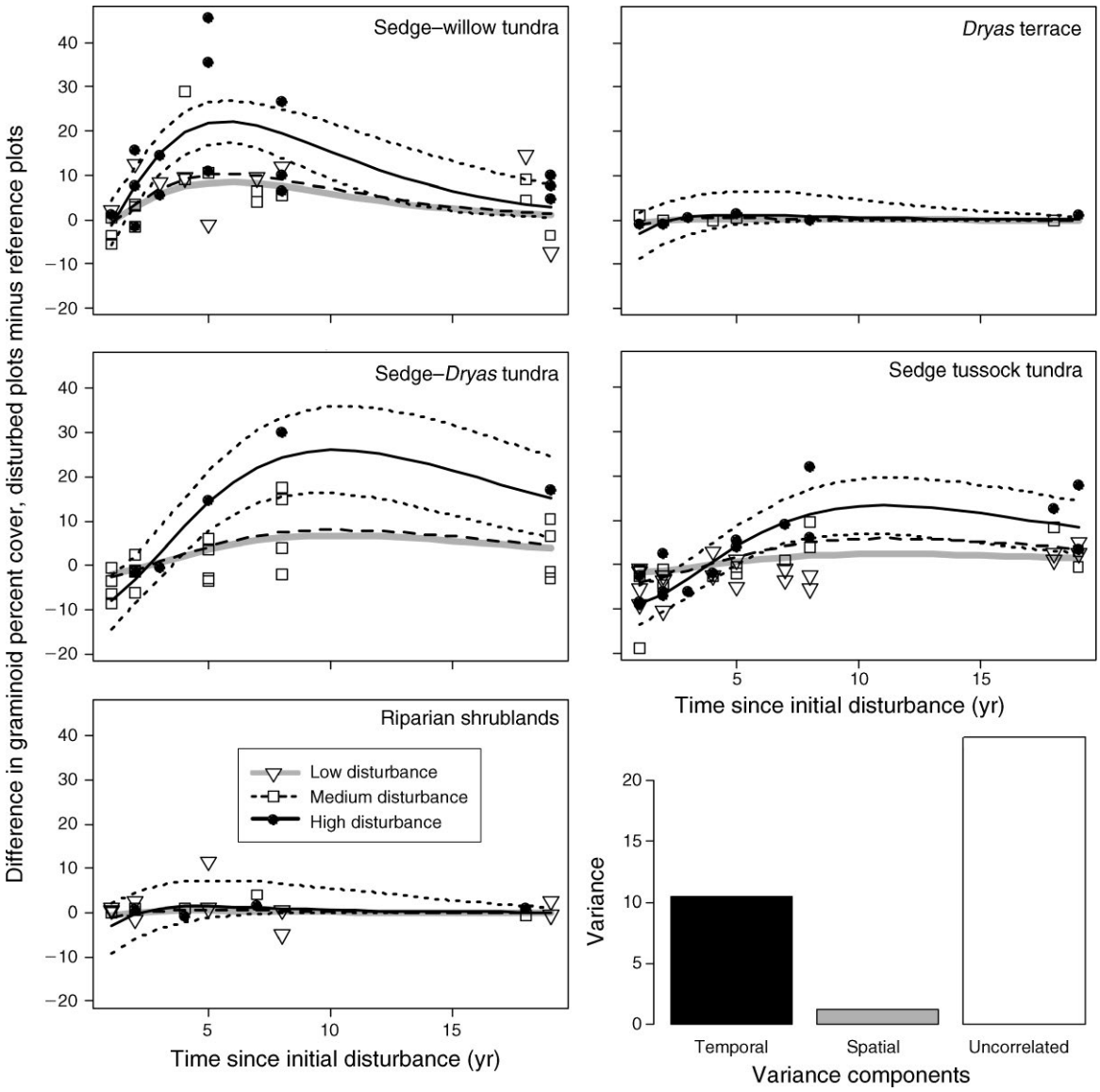


FIG. 3. Fitted models of the response of graminoids to three levels of initial disturbance in five vegetation types. Differences are percent cover in disturbed plots minus percent cover in reference plots. The short dashed line is the 95% credibility envelope of the fitted model for the highest level of initial disturbance. The variance components, which show the relative partitioning of variability in the data, are θ_t (temporal), θ_s (spatial), and θ_n (nugget [uncorrelated]).

Depth of thawed soil

Depth of thawed soil in late summer, which affects the permafrost surface and potential thaw settlement, was initially greater on trails than in the reference plots (Fig. 6). Depths continued to increase 3 8 years after disturbance before recovering. Sedge willow tundra with medium or high level disturbance had the largest increase in thaw depths (5 20 cm) for the first 3 5 years, followed by stabilization to reference levels within 10 years. Wet sedge tundra had a similar pattern, but the initial increases were only half as great. In tussock tundra and sedge *Dryas* tundra, thaw depths increased for about five years before slowly recovering to reference levels by 18 years. Response of thaw depths in shrub tundra was anomalous in that depths did not continue to increase after the first year. Riparian vegetation types (riparian shrublands and *Dryas* terrace) were not sampled due to rocky soil. All vegetation types showed a consistent trend in greater thaw depths in response to higher levels of disturbance.

Ground ice

Excess ice in the soil (the amount of water in excess of what could be held within unfrozen soil pore space) affects thaw settlement after disturbance. Excess ice in

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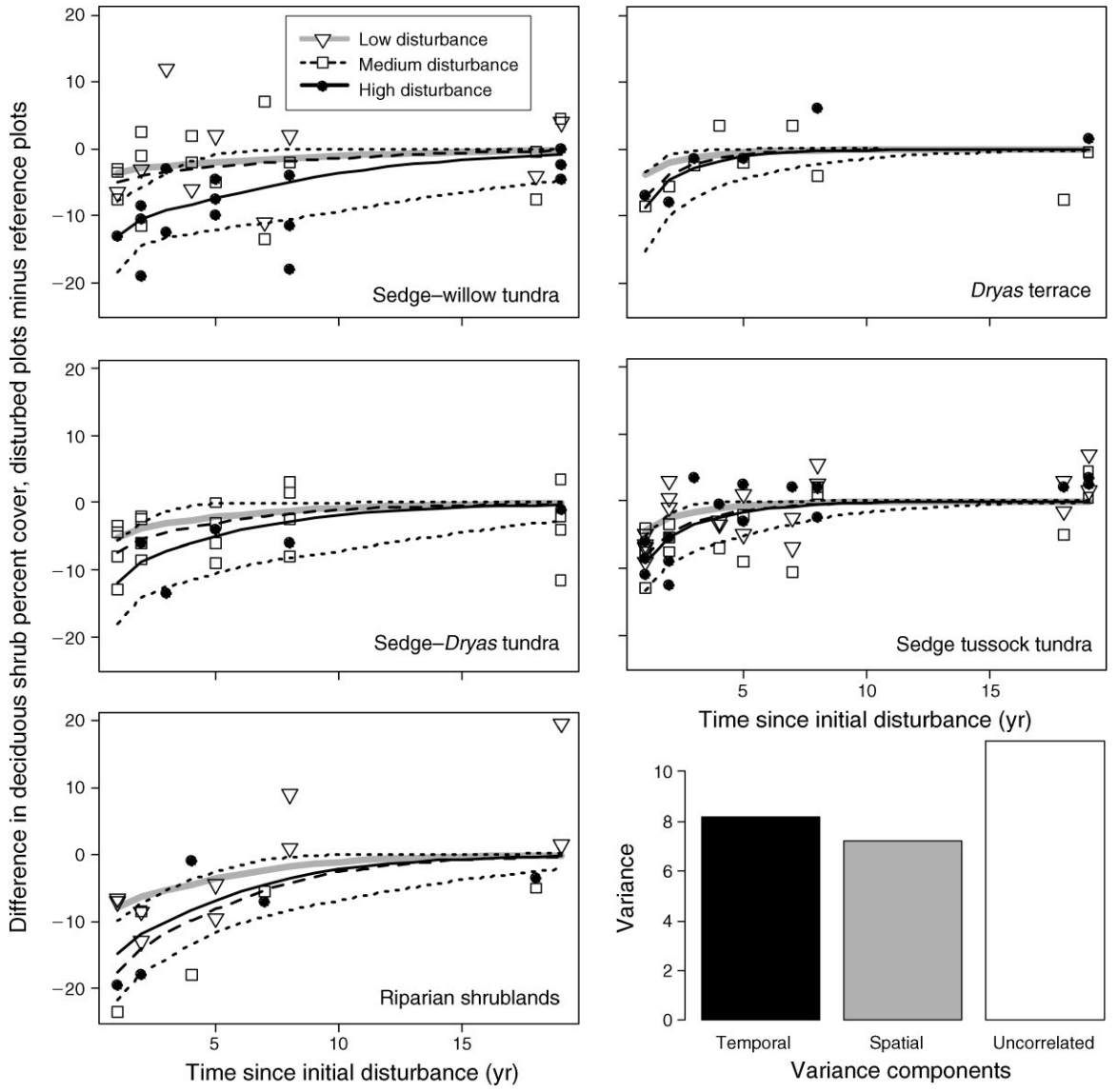


FIG. 4. Fitted models of response of deciduous shrubs to three levels of initial disturbance in five vegetation types. Differences are percent cover in disturbed plots minus percent cover in reference plots. The short dashed line is the 95% credibility envelope of the fitted model for the highest level of initial disturbance. The variance components are θ_t (temporal), θ_s (spatial), and θ_n (nugget).

the top 30 cm of the permafrost ranged from 2% to 45% by volume across 18 reference plots sampled. Ice contents were highest for sedge *Dryas* tundra and sedge willow tundra, intermediate for tussock tundra, and lowest for shrub tundra and wet sedge tundra (Fig. 7). Riparian vegetation types were not sampled due to rocky soil, but probably had little ice accumulation because of coarse soil texture.

Greater soil ice content was associated with greater trail subsidence and higher disturbance ratings (Fig. 7). Sedge *Dryas* tundra, which had the highest mean excess ice contents, also had the highest frequency of trails with a high subsidence rating (thaw settlement evident; Table 2). Moist sedge willow and tussock tundra had both intermediate ice and intermediate frequencies of medium to high thaw settlement ratings. When all plots were grouped, six of nine plots with $\geq$20% excess ice had medium or high subsidence ratings, and seven of nine were rated as highly disturbed either initially or else deteriorated to that level by 2002. Of the nine plots with $<$20% excess ice, only two showed detectable subsidence and none was rated as highly disturbed. Subsidence often was not apparent until after the first few years.

DISCUSSION

Vegetation

Tundra ecosystems showed low resistance to vehicle damage during winter, with initial decreases in cover for

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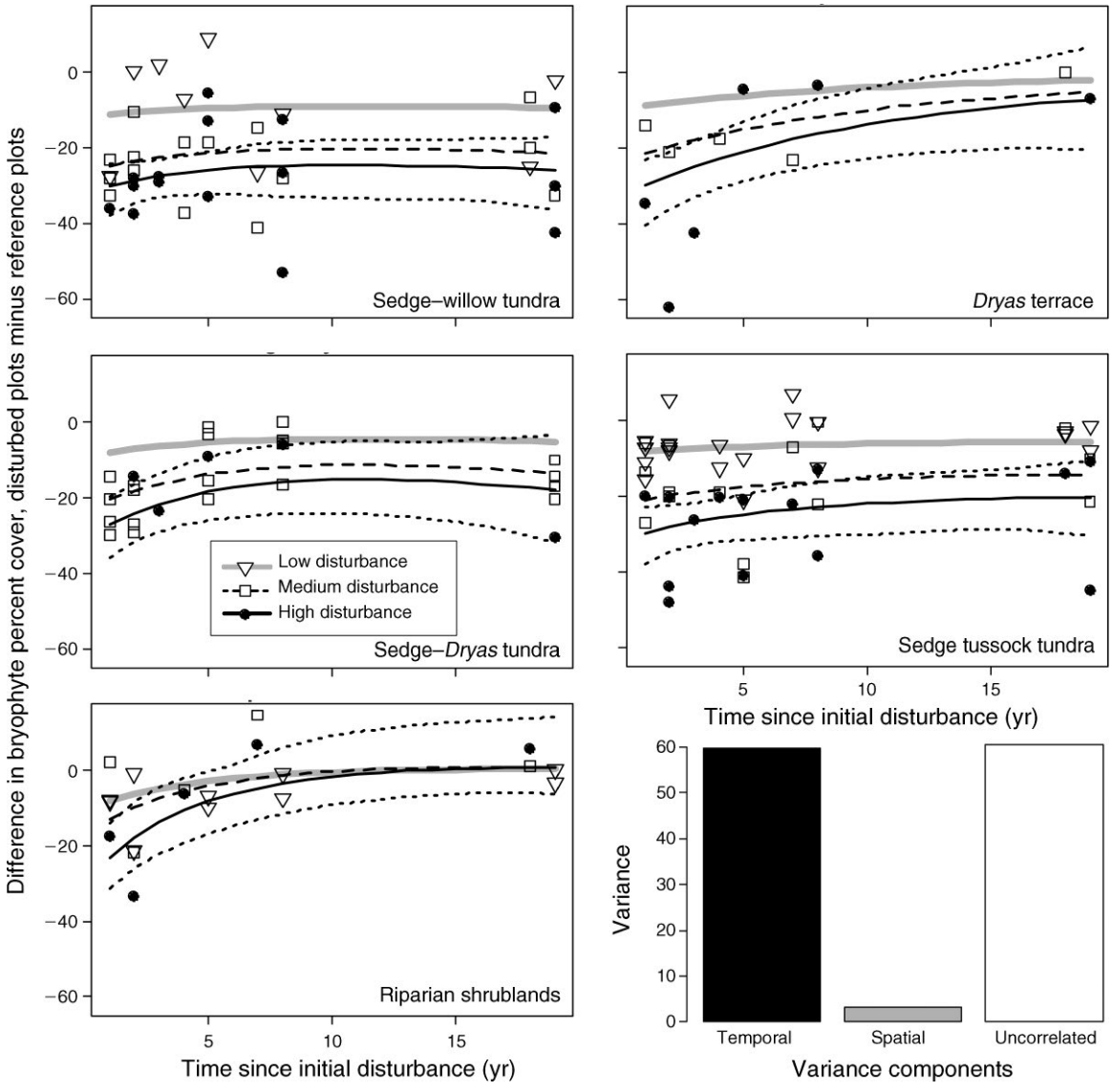


FIG. 5. Fitted models of response of bryopohytes to three levels of initial disturbance in five vegetation types. Differences are percent cover in disturbed plots minus percent cover in reference plots. The short dashed line is the 95% credibility envelope of the fitted model for the highest level of initial disturbance. The variance components are θ_t (temporal), θ_s (spatial), and θ_n (nugget).

all plant growth forms and in all plant community types. Monitoring of recovery over a two decade period indicated that different plant species and plant communities varied greatly in resilience. Resilience can be defined as the degree, manner, and pace of recovery of an ecosystem to its original state after disturbance (Westman 1978). Many differences can be explained by growth strategies of different species. However, the low resilience of some species and communities cannot be explained without an understanding of the physical changes that occurred on some trails after vehicle traffic due to thawing of ice rich permafrost.

The dramatic increase in graminoid cover on trails during the first decade was mainly due to vigorous growth of the rhizomatous sedges *Eriophorum angustifolium* Honck. and *Carex aquatilis* Wahlenb. In all years of this study, these species had the largest increases in cover above reference levels of any plant species. These resilient species thrive in disturbed areas with moist to wet soil, often to the exclusion of other species. Plant productivity and nutrient analyses in the early years of this study showed large initial increases in tissue nutrients and productivity for these species on trails in 1985 and 1988 (Emers et al. 1995). By 1991, however, the initial nutrient stimulus tapered off. Higher soil moisture on trails from compressed soil or subsidence allows more summer heat transfer to the soil, increasing soil temperature, decomposition rates, and nutrient

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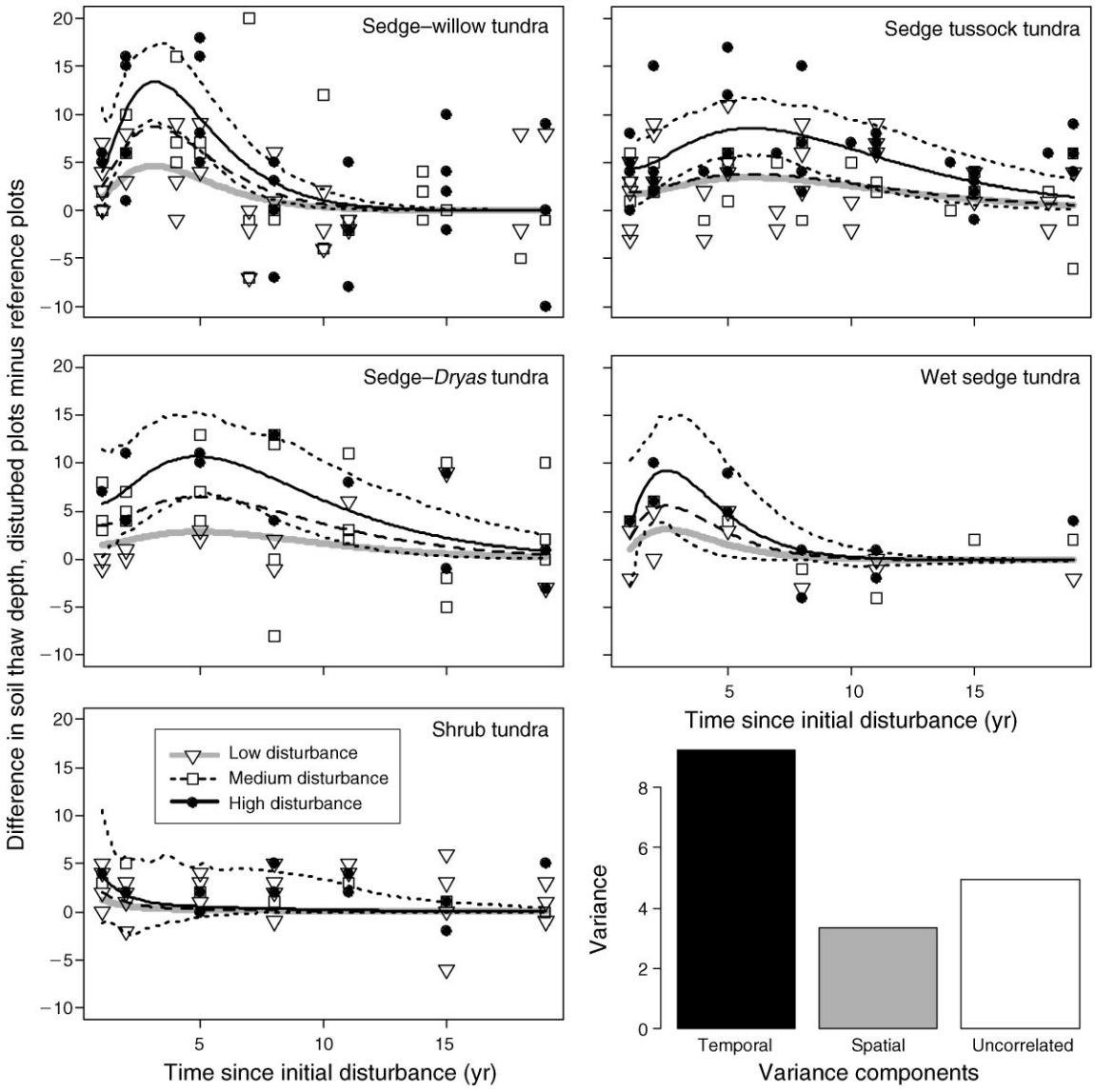


FIG. 6. Fitted models of seasonal soil thaw depth to three levels of initial disturbance in five vegetation types. Differences are depth in disturbed plots minus depth in reference plots (cm). The short dashed line is the 95% credibility envelope of the fitted model for the highest level of initial disturbance. The variance components are θ_t (temporal), θ_s (spatial), and θ_n (nugget).

mineralization, at least transiently (Chapin and Shaver 1981). In contrast, the tufted sedges *Eriophorum vaginatum* L. and *Carex bigelowii* Torr. had few increases in nutrients and productivity after disturbance (Emers et al. 1995). These two species form raised tussocks and hummocks that were damaged even at low levels of disturbance. They generally did not respond opportunistically to disturbance, but did achieve modest increases above reference levels in some plots by 2002. Grasses increased above reference levels after disturbance on sites where surface soil remained dry. Some trails on sedge *Dryas* tundra were highly visible during the first five years after disturbance, due to dense grass, mainly *Arctagrostis latifolia* and several species of *Poa* L. Grass cover decreased toward reference values after 10 years and trails became less visible. Increased grass cover in the first decade after disturbance has been reported by Hernandez (1973) and others, but the longer term outcome was unknown.

Graminoid cover on trails decreased from 10 18 years, but all of the highly disturbed non riparian plots still had more graminoid cover on the trails than in references in 2002. Some trails that subsided were still dominated by rhizomatous sedges and remained highly visible up to 24 years after disturbance and are not expected to return to the original vegetation for many more decades (Fig. 8).

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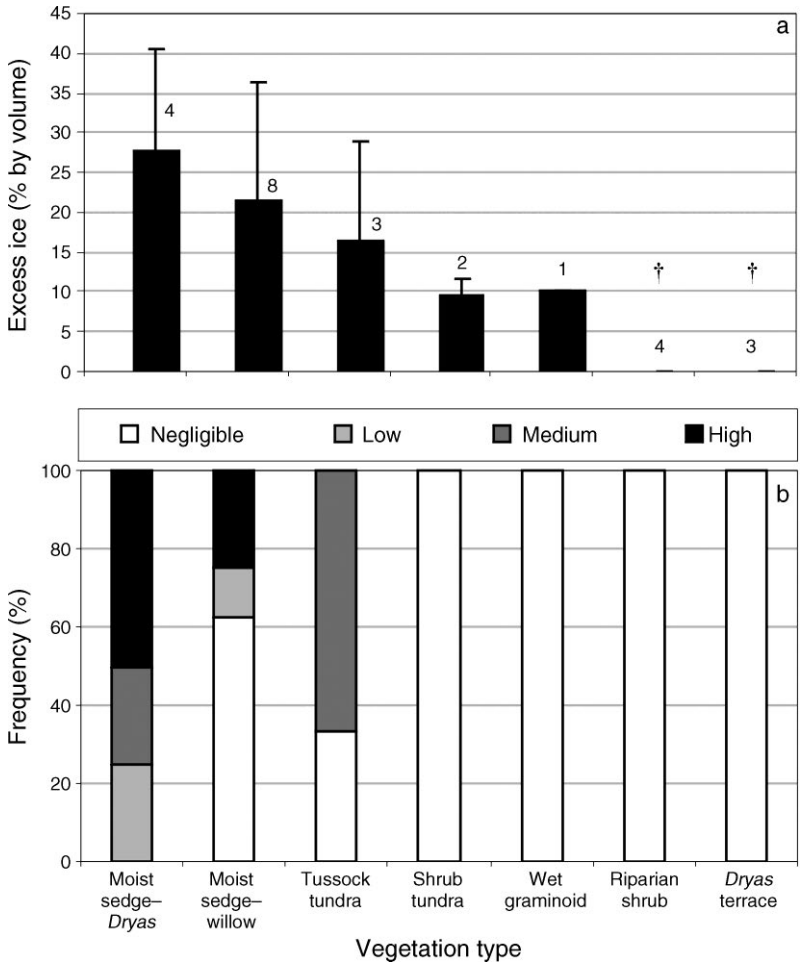


FIG. 7. (a) Excess ice contents (mean and upper portion of 95% CI) in the top 30 cm of permafrost in undisturbed tundra in 1985 (number of plots sampled is given above bars). Daggers indicate vegetation types that were not sampled due to gravel, where excess ice was assumed to be 0%. (b) Frequency of four levels of soil subsidence (negligible through high) 18 years after disturbance on an adjacent trail.

Deciduous shrubs included shrub birch (*Betula nana* L. ssp. *exilis* (Sukatsch.) Hulten) and 13 species of willow (*Salix* L.). They recovered well within 10 years after disturbance, but did not increase above reference levels. Many deciduous shrubs, particularly willows, are well adapted to disturbance, such as river flooding and grazing, and quickly resprout from buds or roots. Dwarf willows that grew on drier sites, such as *Salix phlebophylla* Anderss., recovered more slowly than erect, moist site willows such as *S. pulchra* Cham. Kemper and Macdonald (2009*a*) reported that winter seismic trails 20 30 years old had shrubbier vegetation than sur rounding tundra on the partially forested Mackenzie Delta, Canada, mainly due to increases of the boreal forest species of shrub birch, *Betula glandulosa* Michx. They suggested that a warming climate could have favored shrub regrowth over other plants. In artificial tundra fertilization and warming experiments, the arctic shrub birch *Betula nana* L. ssp. exilis (Sukatsch.) Hulten increased in dominance over willows and all other plants (Bret Harte et al. 2001). In our study, the willow *Salix pulchra* and, to a lesser extent, *Betula nana*, increased annual twig productivity and tissue nutrient content on trails for the first three or four years after disturbance, but the effect was negligible by eight years (Emers et al. 1995).

In contrast to deciduous shrubs, evergreen shrubs showed poor recovery 18 years after disturbance. The dwarf ericaceous shrubs *Vaccinium vitis idaea* L. and *Ledum decumbens* (Aiton) Lodd. Ex Steud. showed less post disturbance increase in productivity and leaf nutrient content on these trails than deciduous shrubs (Emers et al. 1995), indicating a more conservative response to change. Starr et al. (2008) reported that these two ericaceous shrub species had the lowest maximum photosynthetic capacity of all the tundra plant species that they tested. They also store more of their nutritional reserves above ground than deciduous

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FIG. 8. Aerial views of a highly disturbed camp move trail made in winter of 1985 on moist sedge willow tundra, photographed in July 1985 (above) and July 2007 (below). An undisturbed reference plot to the left of the trail had a soil excess ice content of 28% in 1985. Thawing of soil ice and ice wedges led to trail subsidence. The trail remained wetter and greener than surrounding tundra in 2007, with more rhizomatous sedge cover and less feathermoss cover. Photos are courtesy of the U.S. Fish and Wildlife Service.

shrubs, so they may take longer to recover after stem breakage. Poor evergreen shrub recovery was often associated with wetter soil conditions on trails (Fig. 9), but recovery was also poor on drier sites. Riparian shrublands and *Dryas* terrace sites had *Dryas integrifolia* M. Vahl. of the rose family, which recovered better than ericaceous shrubs. Poor recovery of ericaceous shrubs, coupled with increased sedge (*Eriophorum angustifolium*), caused some trails on tussock tundra to remain visible for at least 23 years, even as the tussocks recovered (Fig. 10).

Many forb species successfully recolonized trails in the early years (Emers et al. 1995), but were not more abundant than in the surrounding tundra. Forb species diversity was greatly reduced on trails through 1991, but was similar to references in 2002.

Lichen cover changed little and recovered rapidly, mainly due to early colonization of exposed mineral soil and peat by crustose lichens such as *Ochrolechia frigida* (Sw.) Lynge and *Lecanora epibryon* (Ach.) Ach. Other lichens usually recovered slowly, but nearly completely, by 2002.

Bryophytes have greater cover in the study area than all other plant growth forms combined and are important ecologically for insulating the underlying permafrost from summer air temperatures. They initially suffered large reductions in cover on the trails, perhaps because they lack roots and are more weakly anchored to the substrate than vascular plants. At non riparian sites there was little recovery, even after 18 years. In contrast, at riparian sites bryophytes recovered to near reference levels after 18 years, even after large initial reductions. Mosses, such as *Distichium capillaceum* (Hedw.) Bruch & Schimp. and *Ditrichum flexicaule* (Schwagr.) Hampe, recolonized bare mineral soil, which was common at riparian sites. The longest lasting damage was the destruction of mats of pleurocarpous feathermosses, which exhibit the "perennial stayer" life strategy (During 1979) and are evidently slow growing, late successional species. The common feathermosses *Tomenthypnum nitens* (Hedw.) Loeske and *Hylocomium splendens* (Hedw.) Schimp. seldom recovered in sedge willow tundra and sedge *Dryas* tundra, but did show some recovery in about one half of the other plots. The common liverwort *Ptilidium ciliare* (L.) Hampe and *Sphagnum* L. mosses were greatly reduced on trails and showed no recovery. These four bryophyte taxa had the largest persistent decreases of any plant species. Most other bryophyte taxa showed more recovery, although regrowth was slow and often not complete by 2002.

The inability of bryophytes to recover two decades after disturbance may be explained by low growth rates; disadvantage in competition for light and moisture against faster growing and taller stature vascular plants, especially rhizomatous sedges; and difficulty recolonizing peat substrates that can dry out rapidly during dry weather. Bryophytes generally lack a vascular system, are dependent on a transient external water supply, and must be well hydrated to maintain active metabolism (Longton 1988). Individual bryophyte species also have narrow moisture tolerances for optimal growth and many species reproduce only vegetatively in the Arctic (Callaghan and Collins 1981). This may limit recolonization by new species if site conditions change after disturbance.

The results from these plots showing good recovery for most growth forms and vegetation types under low

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FIG. 9. Repeat photographs of a seismic trail across a raised area with dwarf shrubs and moss, with a natural trough on the right. The 1989 photograph (above) shows collapse of the edge of the raised area into the adjacent trough after vehicle traffic during 1985 exploration. The 1993 photograph (below) shows the same location after sedges had replaced the shrubs and mosses due to the altered moisture regime. Photos are courtesy of the U.S. Fish and Wildlife Service.

to moderately disturbed conditions, and poor recovery under highly disturbed conditions, are consistent with a companion study of rapidly assessed random systematic plots on these trails (Appendix C). That study, which involved rating of disturbance at a sample of 200 points on the trails, revealed that the percentage of plots that remained disturbed decreased from 79% in 1985 to 48% in 1989, 11% in 1993, 6% in 1998, and 5% in 2009. For points that initially had low level disturbance, recovery was rapid. About one quarter of all points had medium to high level disturbance in 1985 and these recovered more slowly. Medium and high level disturbance did not persist until 2009 unless trail subsidence occurred.

Permafrost

The presence of permafrost greatly increases the complexity of ecological responses to disturbance in the Arctic, due to feedbacks between soil topography, hydrology, and ground ice. Initial minor thaw settlement caused by disturbance can lead to water impoundment, decreased albedo, and increased heat flux, which in turn causes more thaw settlement (Lawson 1986). This thaw settlement and changing hydrology causes shifting recovery patterns away from the original site conditions toward new plant communities that make some trails remain visible for many years.

The amount of ground ice was an important factor determining the long term effects of seismic trails. There

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FIG. 10. Trail on sedge tussock tundra, made by camp move vehicles in 1984 and photographed in 2005. The trail was still visible after 21 years because it had fewer evergreen shrubs and more sedges than surrounding tundra. The photo is courtesy of the U.S. Fish and Wildlife Service.

is a substantial risk of thaw subsidence on the coastal plain of northern Alaska because of the high volume of ice at the top of the permafrost (Nelson et al. 2001). Ground ice varies widely across the landscape in association with landscape age, soil texture, soil organic matter accumulation, and drainage (Jorgenson et al. 1998, Pullman et al. 2007). Active floodplains with relatively young sediments and sandy textures have little excess ice. Our riparian sites (riparian shrublands and *Dryas* terraces) had good vegetation recovery, even after extreme initial damage, because the ice poor gravel substrate did not subside and conditions for plant growth did not change. Relatively old coastal plain deposits with loamy soils can have high excess ice contents. Trails on upland sites with low initial disturbance usually recovered well, but those with medium or high disturbance often caused subsidence and long term changes in plant community composition.

Much of the persistent disturbance on seismic trails was associated with degrading ice wedges. In addition to excess ice in the soil matrix, ice wedges form massive ice just below the thawed soil layer and are particularly sensitive to disturbance and climate change (Jorgenson et al. 2006). We did not quantify ice wedges in our study plots, but their presence could be ascertained by ground surface patterns. One third of our study area has ground surface patterns indicative of subsurface polygonal networks of ice wedges (Jorgenson et al. 1994). Ice wedge induced troughs frequently became larger after medium and high level disturbance, especially in sedge *Dryas* tundra and sedge willow tundra. Thermokarst ponds gradually developed over ice wedge troughs on some trails. These observations indicate that damage can increase gradually over long periods, thaw settlement can occur even at moderate levels of disturbance, and that stabilization will take much more than two decades at the more damaged sites on ice rich substrates.

Implications for management

Seismic exploration has been conducted every winter on the North Slope of Alaska since at least 1976, and trails in various stages of recovery are visible from the air during the summer in many areas. Current "3 D" seismic exploration, which produces three dimensional images of subsurface structures, creates a much denser grid of seismic lines (0.2 0.5 km apart) than the "2 D" exploration in the Arctic NWR during the 1980s (5 20 km apart). The National Research Council (NRC 2003) estimated that 51 500 km of trails were made on the North Slope between 1990 and 2001, and that another 43 450 km would be surveyed in the following 10 years. Precise estimates cannot be made because locations of the trail networks are not available to the public.

There are numerous factors that affect disturbance and recovery, such as vehicle type, traffic patterns and number of passes, vegetation, soil, and snow depth. We will summarize recommendations for managing many of these factors to reduce impacts.

Sensitive vegetation should be avoided to help reduce damage. Identifying and avoiding sensitive areas will require detailed vegetation maps and a management strategy to implement appropriate trail routing. Vegetation types dominated by sedges and deciduous shrubs recover relatively well, whereas vegetation types dominated by evergreen shrubs are much slower to recover (Appendix D). Sensitive vegetation types, such as sedge *Dryas* tundra and tussock tundra, should be avoided. Routing of vehicles around riparian shrublands is not necessary, given the rapid recovery rates.

Areas of high ground ice, especially terrain with abundant ice wedges, should be avoided. Such areas are prone to thaw settlement, which creates long term changes in topography and surface hydrology, such as channeling flow on slopes and drying of adjacent areas. This will require improved surficial geology maps and a much better knowledge of the nature and volume of ground ice associated with varying terrain types.

Climate change is likely to make permafrost even more sensitive to seismic exploration activity in the future. We speculate that warming in the past two decades has exacerbated some of the thawing on trails reported in this paper. The trail disturbances in 1984 and 1985 had the unfortunate timing of occurring only a few years before the unusually warm summer in 1989, which probably initiated the widespread degradation of ice wedges observed elsewhere on the North Slope of Alaska (Jorgenson et al. 2006). With climate predicted to get much warmer in the Arctic, enhanced efforts will be needed to avoid medium to high level disturbances that we found led to permafrost degradation.

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Sufficient snow cover is important to minimize vehicle damage to tundra. An earlier study of factors affecting seismic impacts in the Arctic NWR reported that snow depths of at least 25 cm were required to reduce impacts (Felix and Raynolds 1989*b*). Snow had to be deep enough to cover tussocks in tussock tundra and provide a slab depth of at least 20 cm over basal hoar frost in sedge willow tundra. Since 2004, regulations for winter activity on State of Alaska Lands require a mean snow depth of 15 cm on the flatter coastal plain and 23 cm in the foothills, which are mainly tussock tundra.

Vehicle weight and track configuration are important determinants of degree of disturbance. Camp trailers pulled by tractors caused more long term damage in 1984 1985 than seismic survey vehicles. By 2009, 9% of camp trail plots in a random sample were still disturbed, whereas no seismic line plots showed signs of distur bance. Recent studies in northern Alaska indicate that camp move vehicles still cause most of the damage that is likely to persist. A survey of impacts from a 1996 seismic exploration program on Alaska's North Slope found that 6% of seismic lines and 29% of camp trails had at least medium level disturbance initially (Jorgen son et al. 2003). A study of disturbance from 1998 seismic exploration by the Bureau of Land Management (BLM, *unpublished data*) found that 4% of seismic lines and 63% of camp move trails were still disturbed after six years. The third summer after 2006 seismic explora tion in the Teshepuk Lake Special Area in northern Alaska, camp move trails were more visible from the air than seismic trails (Jones et al. 2008; B. M. Jones, *personal communication*).

Multiple vehicles travelling in the same narrow track caused more initial damage than when vehicles spread out (Raynolds and Felix 1989). High level disturbance and trail subsidence persisted until 2009 only on narrow camp move trails. Only slight damage persisted on camp move trails where vehicles spread out.

Industry has made a concerted effort to change to less damaging vehicles since the mid 1980s. Metal tracked survey vehicles have been replaced with less damaging rubber tracked vehicles. Survey vehicles cause less damage and have been easier to upgrade because they are relatively light and propel only themselves. The most damaging camp support vehicles are still in use, however, because camp tractors need weight and traction to pull strings of five or more ski mounted trailers. In addition to mass, the shearing action of skis can cut the vegetative mat and increase damage. Steel tracked D 7 Caterpillar tractors, which were the highest ground pressure and most damaging vehicles used in 1984 1985 (psi 10.5 [=72.4 kPa]), are still preferentially used for current seismic exploration. Lighter, less damaging rubber tracked tractors (Case brand agricul tural tractors, psi 4 [=27.6 kPa]) are also used for pulling camp trains, but they are expensive and less reliable because they tend to lose traction on ice, soft snow, and slopes. Loss of traction can increase damage as spinning tracks attempt to regain traction. Thus, efforts to find newer, less damaging vehicles should continue, particu larly a replacement for D 7 tractors and strings of camp trailers.

Monitoring of seismic exploration impacts should become routine. Currently, fly by inspections for fuel contamination, garbage, and trail damage soon after exploration are done to assess impacts, but little documentation is available to the public. A more quantitative and transparent assessment is needed. Monitoring recovery in areas with medium to high level impacts is needed to learn from mistakes and improve management strategies to further reduce impacts.

Although some types of vehicles have been replaced since exploration done in the mid 1980s, the results of our study of impacts associated with exploration during that period are still relevant to exploration with current technology. First, our study provides most of the information available on long term damage; no new studies with this amount of detail have been initiated (NRC 2003). Second, medium to high levels of damage from seismic exploration are still occurring. Kemper and Macdonald (2009*b*) report that initial impacts to upland tundra from current exploration on the MacKenzie River Delta, Canada, are similar to, or somewhat greater than, initial impacts reported for trails created during the earliest winter seismic exploration programs in the same area 30 years previously (Bliss and Wein 1972, Hernandez 1973). A recent Environmental As sessment for seismic surveys in northern Alaska stated that "seismic exploration may vary from having no observable effects in some situations to damaging vegetation to the extent that it may take years or even decades to heal. These impacts occur despite existing stipulations on operations, and cannot be further mitigated, given the types of equipment currently used" (BLM 2008).

Conclusions

Monitoring the recovery of winter seismic trails for up to 25 years showed that vehicle traffic over snow covered tundra can cause long term changes to plant communities and permafrost stability (Appendix E). Short term studies of winter vehicle disturbance had predicted only short term impacts. Early reports pre dicted that the impacts from the exploration program in the Arctic NWR would be mainly aesthetic and there was not likely to be long lasting damage. The results of our follow up study contradict these predictions and highlight the importance of long term studies.

The amount of ice in the upper permafrost affected the rate of recovery. Trails on ice poor gravel substrates recovered well even after extreme initial disturbance because the substrate was stable and soil conditions for plant growth did not change. Some trails on ice rich, fine grained soils remained disturbed after 25 years because changes in hydrology caused by ground subsi

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dence led to shifts in vegetation composition. Those trails are unlikely to recover to pre disturbance conditions.

Given the extent of seismic exploration in the Arctic, cumulative impacts of even small percentages of trails with high disturbance can be significant (NRC 2003). These impacts may not be fully evident from short term monitoring. No system exists for tracking the seismic trails made every year in Alaska, so large areas of the North Slope have an unknown amount of direct human disturbance. Given the magnitude of ongoing seismic exploration programs and the likelihood that some medium to high level damage will occur, industry and regulatory agencies should redouble their efforts to avoid the long term impacts that we have documented.

Acknowledgments

We thank those who worked on this project, especially Martha Raynolds, Mike Emers, Colette Buchholtz, Kris DuBois, Rob Lipkin, Bev Reitz, and Laura Welp. We thank Nancy Felix, who established the study in 1984, and Jerry Stroebele and Glen Elison, who were instrumental in securing continuing funding from the U.S. Fish and Wildlife Service.

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APPENDIX A

Fitting the Bayesian hierarchical model (*Ecological Archives* A020 004 A1).

APPENDIX B

Sets of graphs showing fitted models of response to three initial levels of winter vehicle disturbance in five tundra vegetation types in arctic Alaska (*Ecological Archives* A020 004 A2).

APPENDIX C

Figures and discussion of distribution of disturbance levels on winter seismic trails, monitored over a 25 year period at 200 random systematic plots on the trails (*Ecological Archives* A020 004 A3).

APPENDIX D

Disturbance and recovery by vegetation types (*Ecological Archives* A020 004 A4).

APPENDIX E

Collection of photos depicting seismic lines in 1984 and over time (*Ecological Archives* A020 004 A5).

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Ecological Archives **A020-004-A1**

Janet C. Jorgenson, Jay M. Ver Hoef, and M. T. Jorgenson. 2010. Long-term recovery patterns of arctic tundra after winter seismic exploration. *Ecological Applications* 20:205–221.

Appendix A. Fitting the Bayesian hierarchical model.

For the fully Bayesian specification, distributions for all parameters need to be given. To complete the specification given in the main article, we chose broad priors at this level so that they had little influence on the estimates, except to restrict the parameter space:

$$\mu_{\beta 0}, \mu_{\beta 1}, \mu_{\beta 2} \sim N(0, 1000), \;\; \sigma^2_{\beta 0}, \sigma^2_{\beta 1}, \sigma^2_{\beta 2}, \theta_s, \theta_t, \theta_n \sim GAM(0.001, 0.001),$$

$$\mu_{\pi 1}, \mu_{\pi 2} \sim UNIF(0, 2), \;\; \mu_\rho \sim UNIF(0, 200) \text{ , and } \alpha_s, \alpha_t \sim UNIF(0.5, 1000).$$

All parameters were estimated using Markov chain Monte Carlo (MCMC) methods in the statistical package (WinBUGS). For the MCMC, we let the chain "burn in" for 10,000 samples, and then computed the means, standard errors, and percentiles based on the next 100,000 simulations. We started the chain from several different points and obtained very similar results, and examination of the trace of the chain did not reveal any irregularities. Typically, the autocorrelation within the chain for each parameter dropped to near zero well before 30 iterations. For computer storage reasons, we thinned the chain and kept each 100th iteration. We changed prior distributions as a sensitivity analysis and determined that the model was not sensitive to the prior distributions. Besides the parameter estimates, MCMC also allowed us to estimate the uncertainty of functions of the parameters, which we discuss next.

For each plant growth form and for seasonal soil thaw depth, a model was developed that hierarchically nested two factors affecting plant recovery, vegetation type and initial disturbance level. For example, the response curves for soil thaw depths in one vegetation type has only eight plot pairs, but the model 'borrows strength' from the next higher level in the model, which includes all 49 plot pairs (Fig. A1). The model's algorithms allow the response curves for each vegetation type and each initial disturbance level to diverge from the global curve for all 49 plots by amounts that vary depending on sample size and within-type variability. Figure A1 also demonstrates a method to estimate time to recovery. For discussion purposes, we chose to define recovery as a return to an absolute difference of +5 or -5% cover for plant growth forms and +5 or -5 cm for thaw depth. The credibility interval on the estimate is given by the solid black line, which runs horizontally between the lower bound to the upper bound of the curve. Here the credibility interval is shown only for high-level disturbance. The same procedure can be applied to other recovery thresholds.

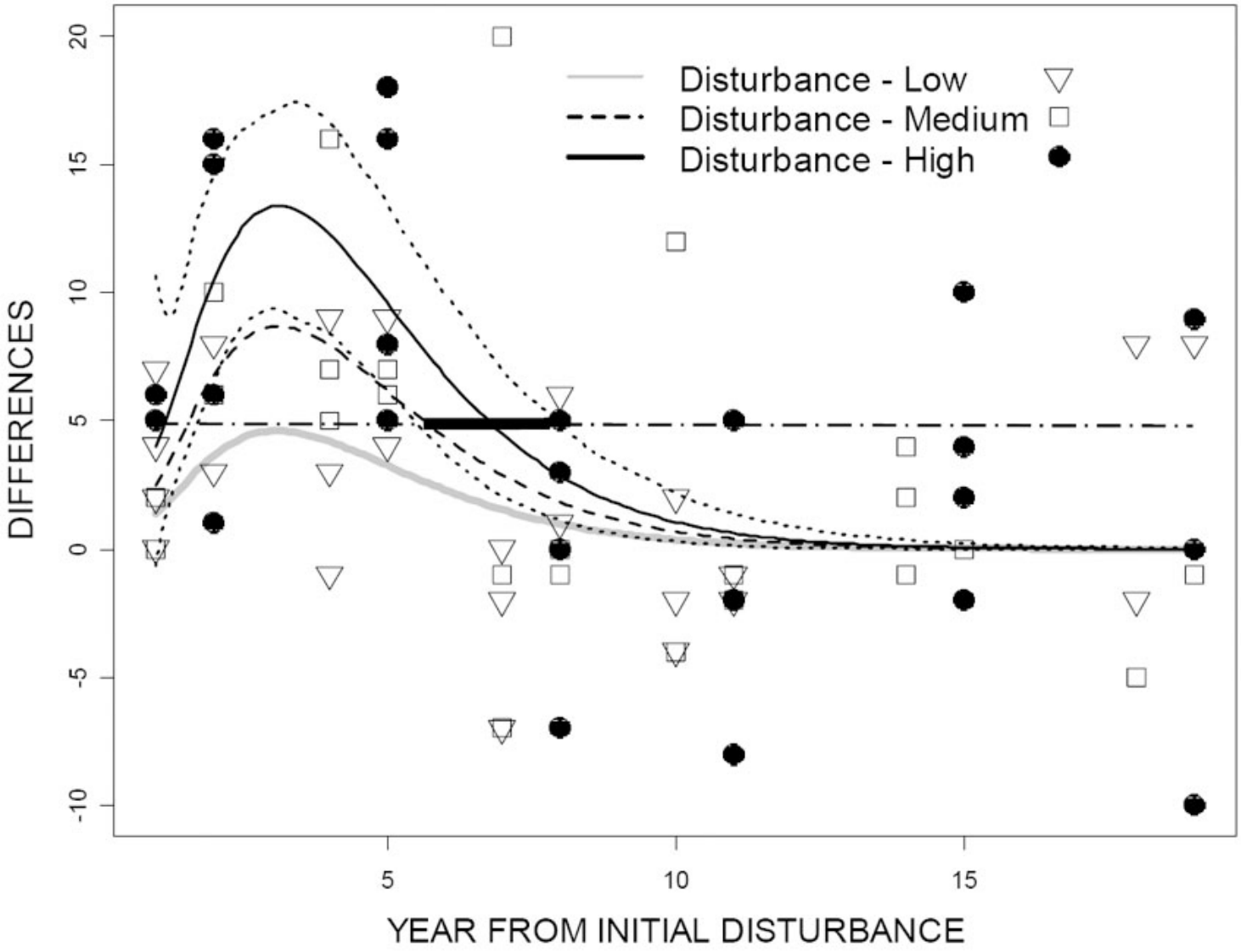


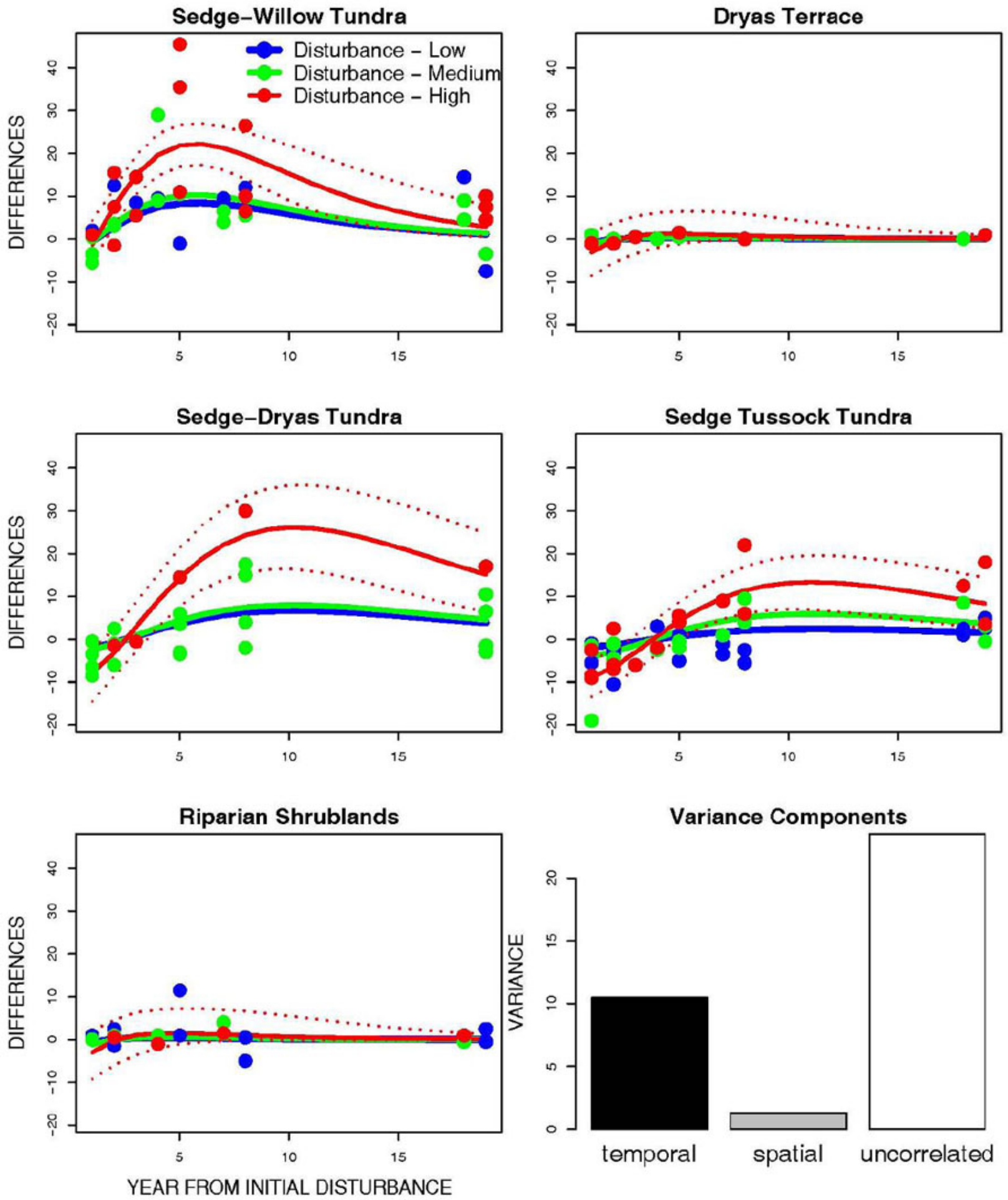
FIG. A1. Example of fitted model for soil thaw depths in Sedge-Willow Tundra only. Each data point is the absolute difference between soil thaw depths (cm) at one plot pair (disturbed, reference). The short-dashed line is the 95% credibility envelope of the fitted model for the highest level of initial disturbance. Credibility envelopes for medium and low level disturbance are not shown. The estimated time to recovery is the time (here, approximately year 7 for high disturbance) where the curve crosses the +5% difference line (dash-dot). The credibility interval on that estimate is given by the thick black line (here, approximately 5.5–8.5 years), which runs horizontally between the lower bound to the upper bound of the curve.

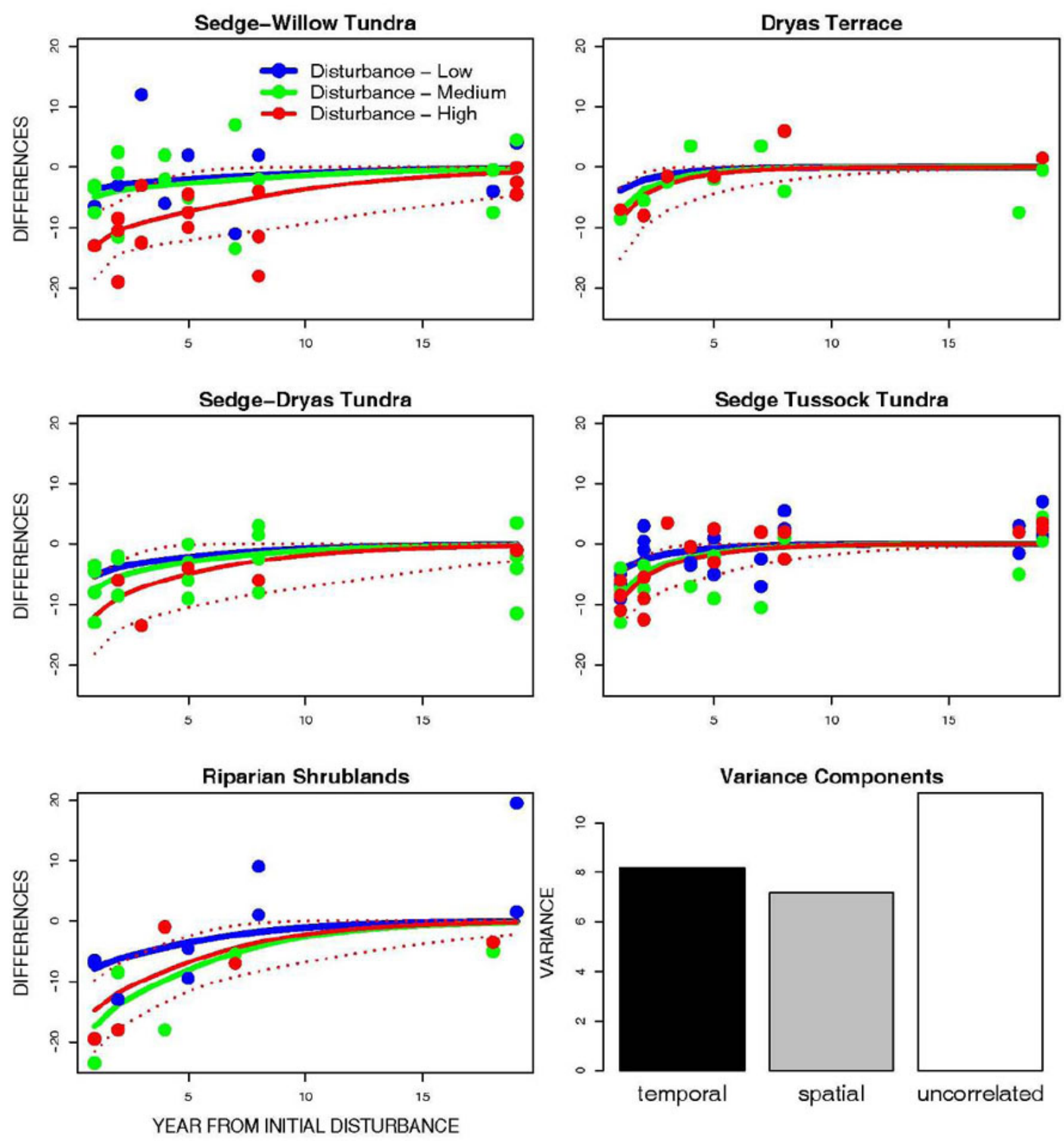
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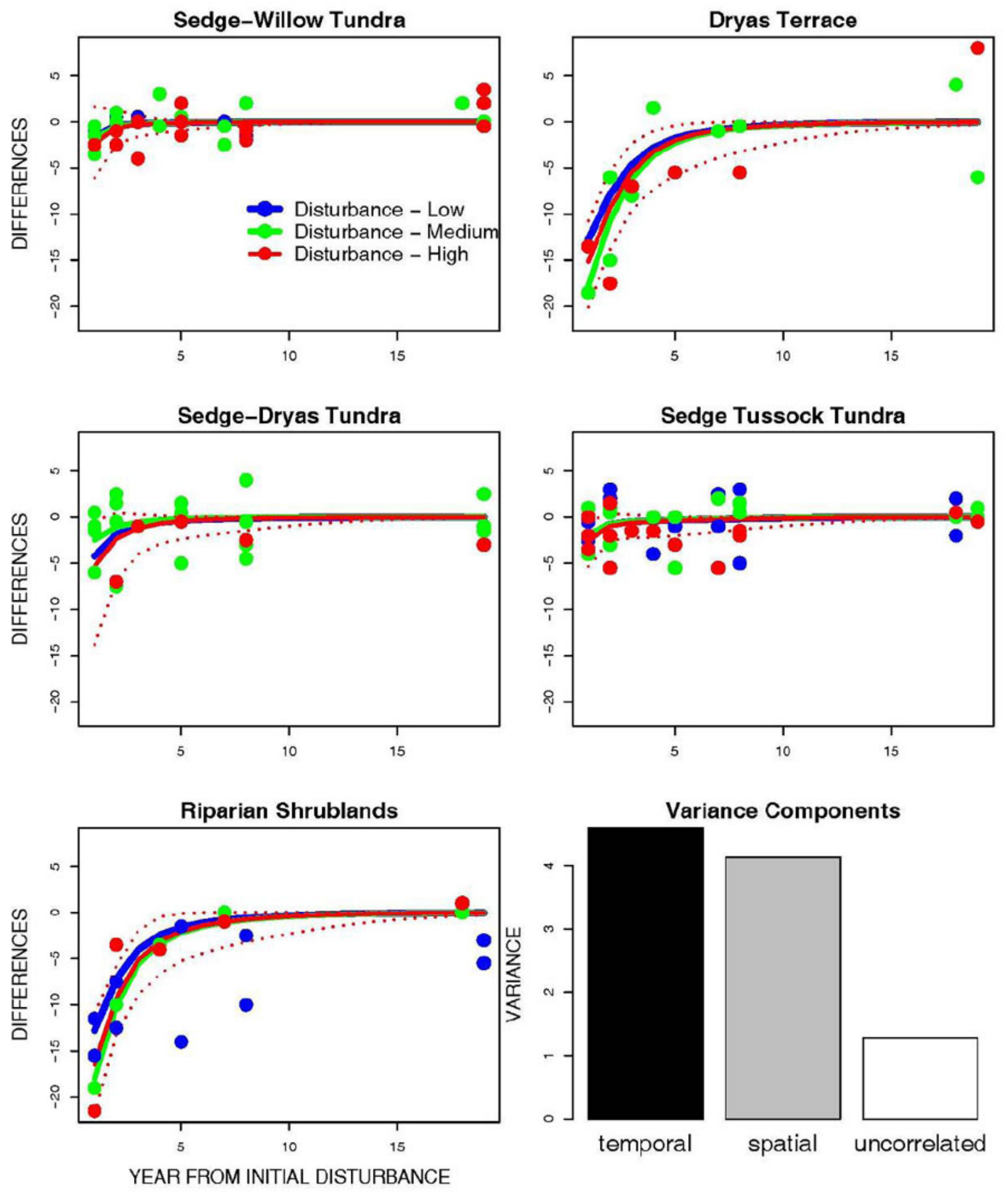
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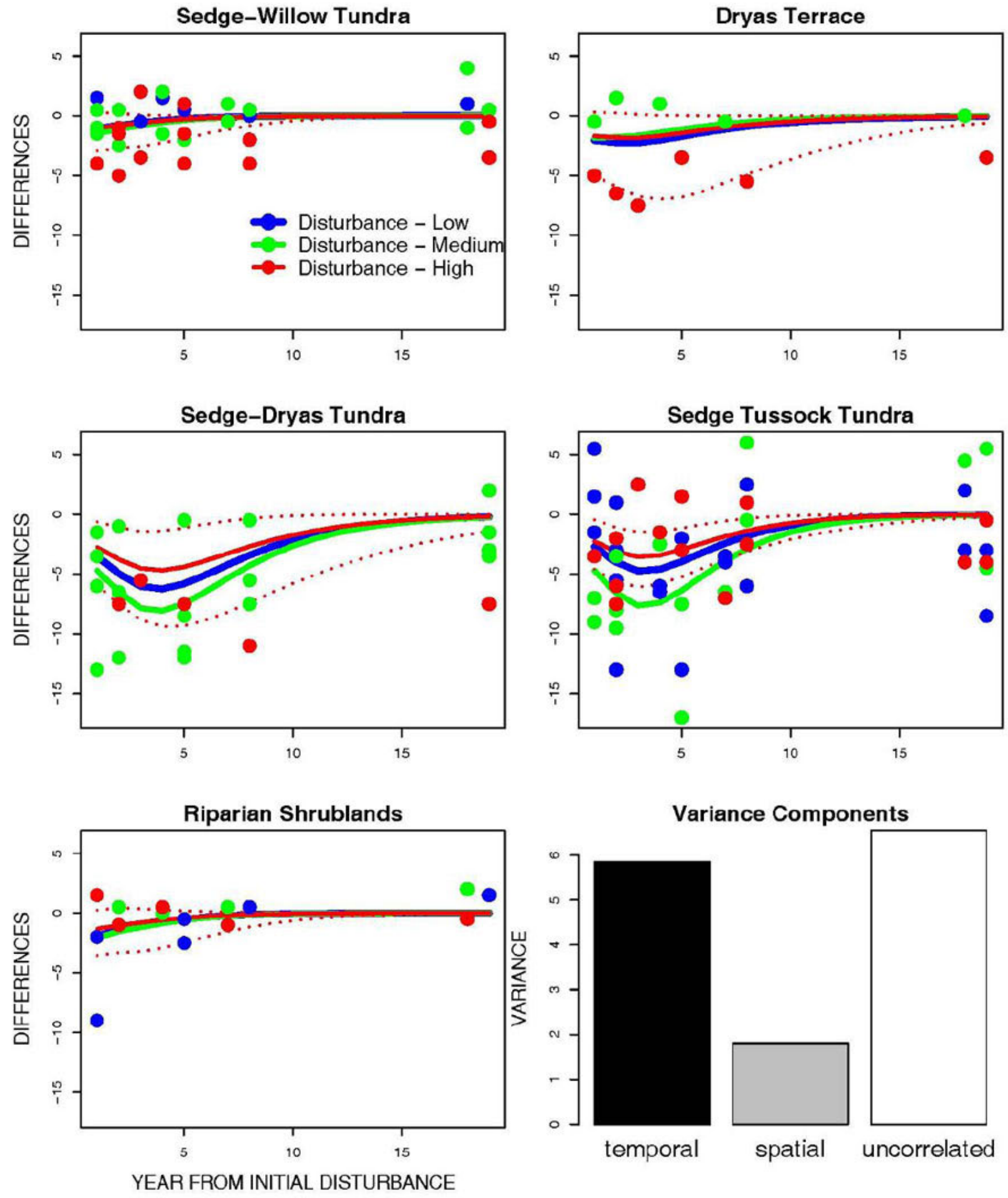
Janet C. Jorgenson, Jay M. Ver Hoef, and M. T. Jorgenson. 2010. Long-term recovery patterns of arctic tundra after winter seismic exploration. *Ecological Applications* 20:205–221.

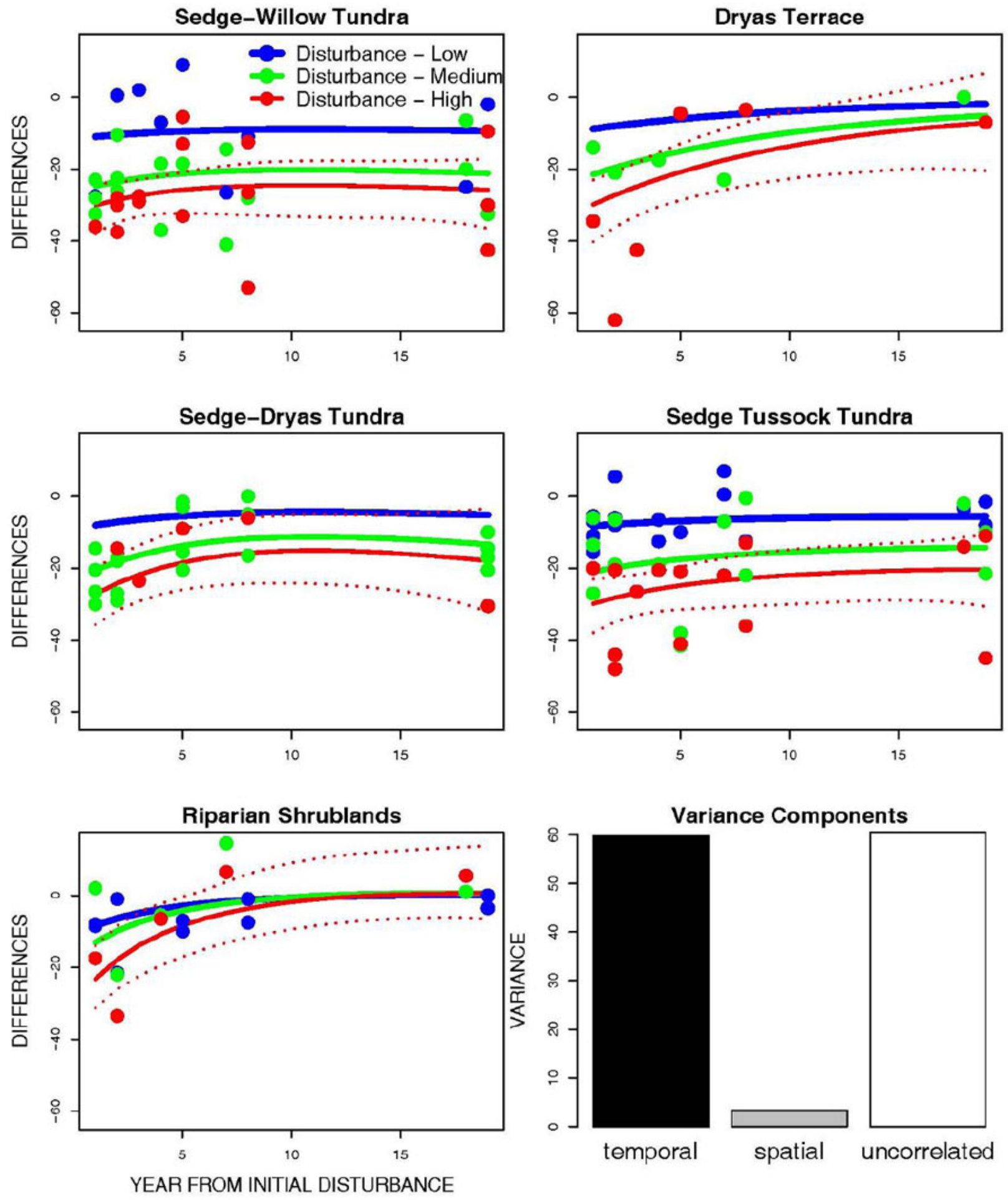
Appendix B. Six sets of graphs show fitted models of response of graminoids, deciduous shrubs, forbs and horsetails, lichens, bryophytes, and evergreen shrubs to three initial levels of winter vehicle disturbance in five tundra vegetation types in arctic Alaska. Differences are percent cover in disturbed plot minus percent cover in adjacent reference plot. The short-dashed line is the 95% credibility envelope of the fitted model for the highest level of initial disturbance. The variance components are θ_t(temporal), θ_s(spatial), and θ_n(nugget).


Sedge–Willow Tundra
Disturbance – Low
Disturbance – Medium
Disturbance – High
DIFFERENCES
Dryas Terrace
Sedge–Dryas Tundra
Sedge Tussock Tundra
Riparian Shrublands
YEAR FROM INITIAL DISTURBANCE
Variance Components
VARIANCE
temporal
spatial
uncorrelated

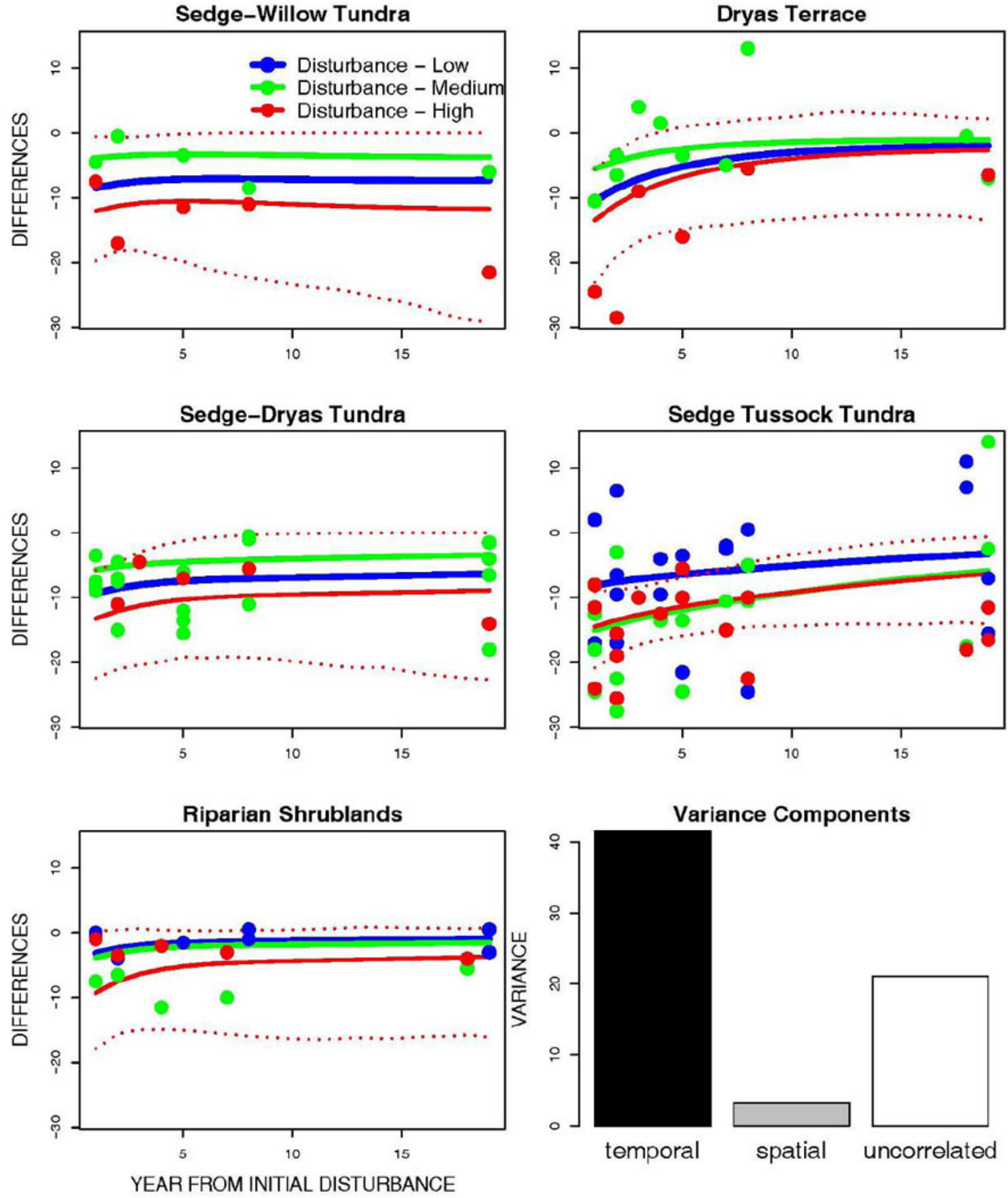

Sedge–Willow Tundra
Disturbance – Low
Disturbance – Medium
Disturbance – High
DIFFERENCES
Dryas Terrace
Sedge–Dryas Tundra
Sedge Tussock Tundra
Riparian Shrublands
YEAR FROM INITIAL DISTURBANCE
Variance Components
VARIANCE
temporal
spatial
uncorrelated


Sedge–Willow Tundra
Dryas Terrace
Sedge–Dryas Tundra
Sedge Tussock Tundra
Riparian Shrublands
Variance Components
DIFFERENCES
VARIANCE
Disturbance – Low
Disturbance – Medium
Disturbance – High
YEAR FROM INITIAL DISTURBANCE
temporal
spatial
uncorrelated


Sedge–Willow Tundra
Dryas Terrace
Sedge–Dryas Tundra
Sedge Tussock Tundra
Riparian Shrublands
Variance Components
DIFFERENCES
Disturbance – Low
Disturbance – Medium
Disturbance – High
YEAR FROM INITIAL DISTURBANCE
VARIANCE
temporal
spatial
uncorrelated


Sedge–Willow Tundra
Disturbance – Low
Disturbance – Medium
Disturbance – High
Dryas Terrace
Sedge–Dryas Tundra
Sedge Tussock Tundra
Riparian Shrublands
Variance Components
DIFFERENCES
VARIANCE
YEAR FROM INITIAL DISTURBANCE
temporal
spatial
uncorrelated

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Sedge–Willow Tundra
Disturbance – Low
Disturbance – Medium
Disturbance – High
Dryas Terrace
Sedge–Dryas Tundra
Sedge Tussock Tundra
Riparian Shrublands
Variance Components
DIFFERENCES
VARIANCE
YEAR FROM INITIAL DISTURBANCE
temporal
spatial
uncorrelated

Ecological Archives **A020-004-A3**

Janet C. Jorgenson, Jay M. Ver Hoef, and M. T. Jorgenson. 2010. Long-term recovery patterns of arctic tundra after winter seismic exploration. *Ecological Applications* 20:205–221.

Appendix C. Figures and discussion of distribution of disturbance levels on winter seismic trails, monitored over a 25 year period at 200 random–systematic plots on the trails.

Introduction

Seismic exploration was conducted on the coastal plain of the Arctic National Wildlife Refuge, Alaska, during the winters of 1984 and 1985. U.S. Fish and Wildlife Service initiated a monitoring program in 1984 to document vegetation and soil disturbance and natural recovery. This appendix presents results from one part of the monitoring program, a sample of 200 random–systematic plots on the trails that were visited over a 25 year period and rated for amount of disturbance.

Methods

Color-infrared aerial photographs (1:6000-scale) were taken of 20% of the trails in 1985 and 1988 and disturbance levels were photo-interpreted at 4914 systematic plots (Raynolds and Felix 1989). Next, a two-stage cluster sample was used to randomly choose 200 of the plots to monitor in the field. Twenty 3-km transects, each consisting of ten 18-m diameter circular plots spaced 300-m apart, were randomly selected. A four-level system for rating vehicle disturbance based on vegetation and soil changes was used (Table 2 in main paper). Ratings were assigned initially in 1985 by photo-interpretation and subsequently by field evaluations in 1989, 1993, 1998, 2002, 2005, and 2009. All plots were visited in 1989. From 1993 to 2009, plots rated as undisturbed in a previous year were assumed to remain undisturbed thereafter and were not revisited.

Disturbance and recovery were summarized by trail type (seismic line or camp move trail) and vegetation types, which included Wet Sedge Tundra, Moist Sedge-Willow Tundra, Moist Sedge-Dryas Tundra, Moist Sedge-Tussock tundra, Shrub Tundra on high-centered polygons, Riparian Shrublands, and Partially Vegetated (Table 1 in main paper). The vegetation type Dryas Terrace was not represented in the 200 plot sample, but data were available from the larger photo-interpreted sample. Ten randomly selected Dryas Terrace plots were photo-interpreted in 1985 and visited in 1988 and 2007 to assess recovery.

Results and Discussion

Snow was usually less than 30 cm deep and did not provide complete protection from vehicle damage. The following summer most trails had at least some scuffing of vegetation and deeper summer-thawed soil. The greatest damage was destruction of shrubs and sedge tussocks, scraping of ground cover to bare soil, and standing water on trails. Tussock Tundra, Shrub Tundra, and Dryas Terrace were the vegetation types with the highest initial disturbance (Fig. C1). About one half of these plots had medium and high-level disturbance in 1985. Sedge-Dryas Tundra and Sedge-Willow Tundra were intermediate in disturbance levels, with medium- and high-level disturbance found at about one third of the plots. Medium- and high-level disturbance was absent in Riparian Shrublands, which collect deep snow, and occurred in <10% of plots in Wet Sedge Tundra. Partially Vegetated areas had negligible damage.

Recovery was rapid in the first decade as the percentage of disturbed plots decreased from 79%

in 1985, to 48% in 1989, and to 11% in 1993. Recovery was slower after 1993. Five percent of plots were still disturbed in 2009. For points that initially had low level disturbance, recovery was rapid. Twenty-three percent of all points had medium to high levels of disturbance in 1985 and these recovered more slowly.

Tussock Tundra and Sedge-Willow Tundra plots recovered well except for a few that remained wetter or subsided into troughs, causing a change in vegetation type. Sedge-Dryas Tundra frequently subsided after medium to highly initial disturbance, with 19% of plots still disturbed after 25 years. These sites had changed vegetation due to wetter conditions. Shrub Tundra and Dryas Terrace had some low level disturbance remaining in 2007–2009, mainly patchy subsidence and vehicle ruts that did not subside. Plant community composition changes at these sites were subtle, mainly decreased cover of shrubs.

Camp-move trails were made by vehicles with higher ground pressure than seismic lines and had more initial damage and slower recovery (Fig. C2). By 1989, 32% of seismic trails were still disturbed compared to 64% of camp trails, including 41% at medium- and high-level disturbance. By 2009, all seismic trail plots had recovered to a negligible disturbance level, whereas 9% of the camp trail plots were still disturbed and one half of those had medium and high-level disturbance. Overall, 5% of plots were still disturbed in 2005. This translates to 200 km of disturbed trail, out of the original 4000 km of trails.

Previous studies of winter seismic vehicle disturbance in the Arctic predicted only short-term and mostly aesthetic impacts. Long-term monitoring showed that most of the disturbance disappeared gradually, but that impacts to tundra vegetation persisted on a small percentage of the trails up to 25 years after disturbance.

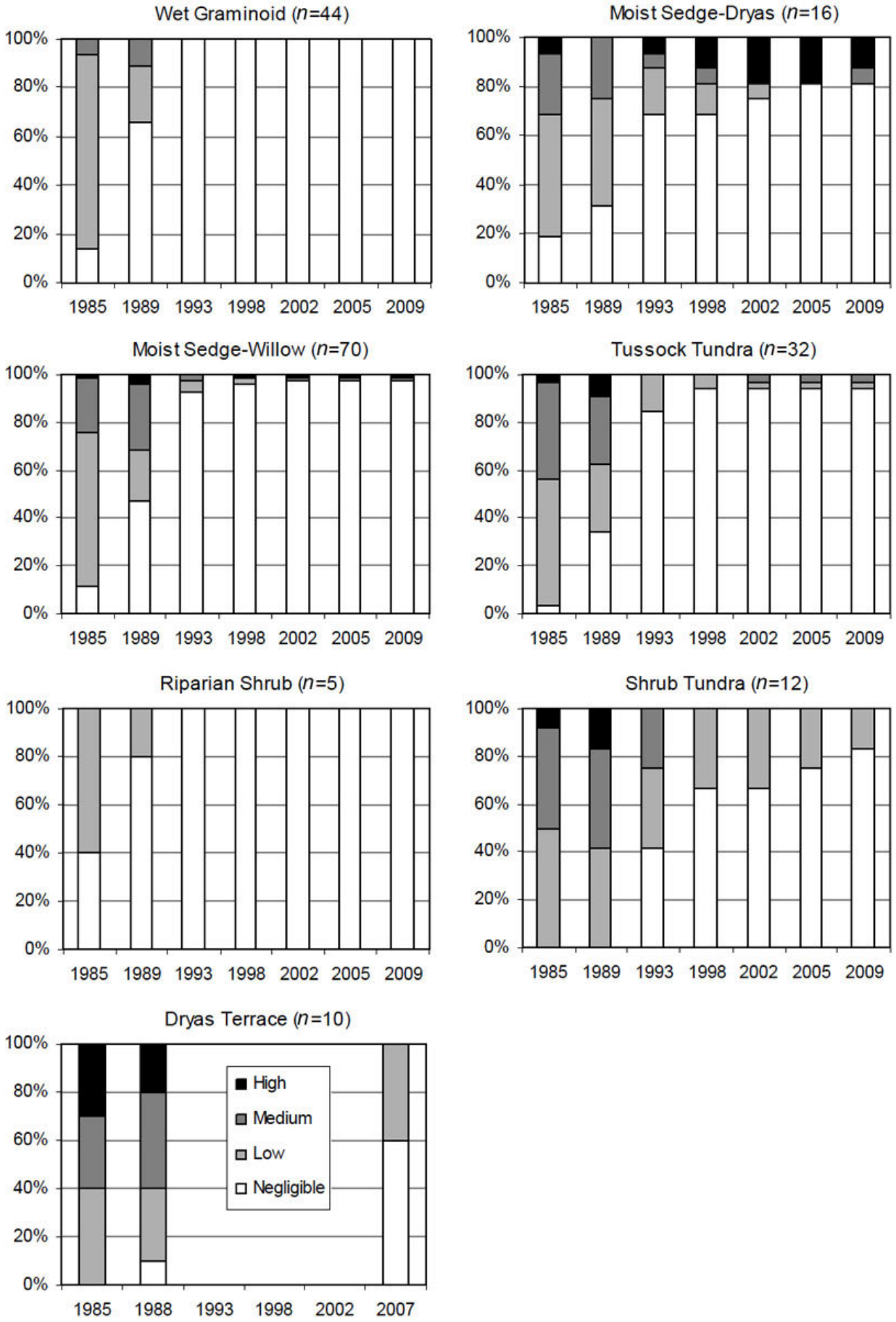


FIG. C1. Recovery of vehicle trails on different tundra vegetation types after winter seismic exploration in 1984 and 1985. Ratings were photo-interpreted on color-infrared aerial photographs in 1985. All other years were rated in the field. Twenty-one plots on unvegetated areas or partially vegetated gravel bars had negligible disturbance in all years and are not shown.

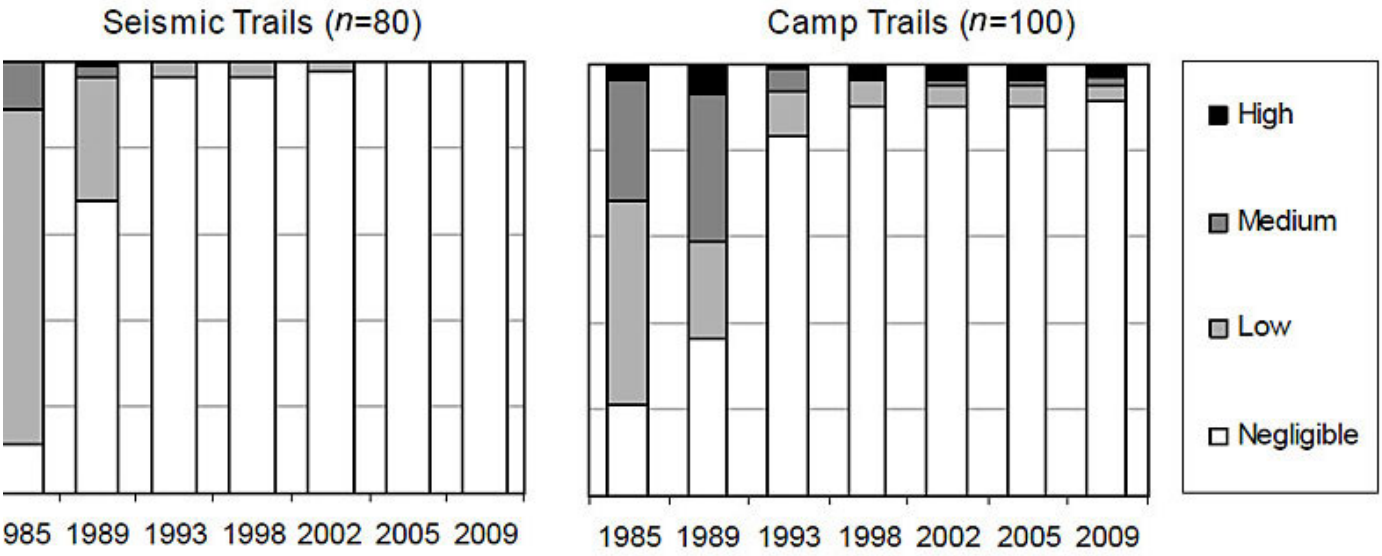


FIG. C2. Recovery on seismic line trails vs. camp move trails. Ratings were photo-interpreted on color-infrared aerial photographs in 1985. All other years were rated in the field. Twenty plots with overlapping seismic lines and camp move trails are not shown.

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Ecological Archives **A020-004-A4**

Janet C. Jorgenson, Jay M. Ver Hoef, and M. T. Jorgenson. 2010. Long-term recovery patterns of arctic tundra after winter seismic exploration. *Ecological Applications* 20:205–221.

Appendix D. Disturbance and recovery by vegetation types.

Evaluating the recovery among differing vegetation types provides useful information for managing seismic exploration programs to minimize long-term damage. In this Appendix we summarize study results for each of the seven major vegetation types in the study area.

Wet Sedge Tundra incurred little vegetation damage from traffic and recovered rapidly because of the dominance of the sedge growth form. Trails were very visible the first summer after exploration because dead sedge leaves were compressed to the soil surface, making green leaves more visible (the 'green trail' effect), and because leaf production and nutrient status increased (Emers et al. 1994). Recovery was aided by the lack of evident thaw settlement, probably due to the low excess segregated ice contents associated with thick peat horizons of Wet Sedge Tundra. Also, the saturated soil in wet sites freezes solid in winter, so winter vehicle traffic does not cause soil displacement. Although we had insufficient samples to analyze the recovery of Wet Sedge Tundra separately, a companion study that tracked disturbance at random plots found that 93% of Wet Sedge plots had low or no initial disturbance (Appendix C). Wet Sedge Tundra and Riparian Shrublands were the only types in which all plots recovered to level zero disturbance rating in the first decade.

Most trails in Sedge-Willow Tundra exhibited the transient green trail effect, but had low initial disturbance and recovered well by 2002. However, medium or high levels of initial disturbance often caused soil subsidence and vegetation on the trails converted to Wet Sedge Tundra. Some of these trails remained highly visible viewed from the air up to 24 years after disturbance and cannot be expected to return to the original vegetation for many more decades. Without subsidence, the dominant sedges and deciduous shrubs recovered to near reference levels within the first decade, although the bryophyte understory showed little recovery.

Trails on Tussock Tundra had greater initial impacts to graminoid cover than other vegetation types, because of damage to raised tussocks of *Eriophorum vaginatum*. Trails recovered well if initial disturbance was low, with good vegetative regrowth of damaged tussocks. On trails with higher levels of disturbance, most tussocks were smashed and some trails subsided. Sedge cover increased above reference levels, mainly due to an increase for *Eriophorum angustifolium*, causing some trails to remain visible from the air after two decades. Deciduous shrubs generally recovered to pre-disturbance conditions in the first decade. Evergreen shrubs and bryophytes were highly impacted initially and usually did not recover.

Trails on Shrub Tundra commonly had ruts, bare ground, and severe shrub damage. Evergreen shrubs were very slow to recover. Some had not recovered after two decades, although trail subsidence was less visible than in the other types, due to many natural troughs. Sections of shrub-dominated high centered polygons, tundra areas raised by accumulation of ground ice,

sometimes subsided into adjacent troughs as the ice melted and were converted to sedge-dominated trough vegetation.

At many Sedge-Dryas Tundra plots disturbance increased over time, because of surface subsidence of 20–50 cm. Subsidence of up to 1 m was occasionally seen where trails crossed hill slopes, intercepting down-slope flow of water. Vegetation recovery was poorer than in other types even where subsidence was not detectible. Graminoid cover increased above reference levels and other plant growth forms did not recover after 18 years. Sedge-Dryas Tundra plots recovered less than Tussock Tundra, Shrub Tundra, and Dryas Terrace, even though those types had higher initial disturbance levels. Few other studies have documented the poor resilience of this vegetation type to damage, perhaps because impacts are seldom monitored longer than 2–3 years. BLM (unpublished data) found that Dwarf Shrub Tundra, which includes this type and Dryas Terrace, recovered the least of any type and was the only type with high-level disturbance remaining six years after exploration. One quarter of their Dwarf Shrub plots had medium or high level disturbance after six years. Moskalenko (1984) reported that vegetation recovery up to 10 years after very high level disturbances in Siberian gas fields was poorer in this type than all other vegetation types studied and concluded that "total restoration of the vegetation can never be expected". She cited several attributes of this type of site that make recovery difficult, including poor anchoring of soil by a naturally discontinuous vegetative mat, naturally mixed soil horizons due to frost action, and abrupt changes in soil moisture after disturbance.

Riparian sites had good vegetation recovery, even at plots with extreme initial damage, because the ice-poor gravel substrate did not subside. Dryas terraces normally have thin snow cover and were usually severely damaged by winter vehicle traffic. They have a thin layer of organic soil over well-drained fluvial gravels which allow the organic mat and plant roots to be easily damaged. This and other studies predicted long-term damage. The prostrate shrubs, mosses, and lichens were easily damaged but recovered better than in most other vegetation types, because there was no subsidence when thawed and conditions for plant growth did not change. The dominant plant, the evergreen shrub *Dryas integrifolia*, is considered highly sensitive to disturbance and was initially the most impacted shrub in this study. Recovery after 18 years was not complete, but better than predicted by early reports from this study and other shorter-term studies.

Riparian shrublands had less initial damage than Dryas terraces because the taller willows collected wind-blown snow that usually protected the ground cover. Willows were badly broken but they grew vigorously after disturbance, as would be expected of plants adapted to herbivory. Riparian areas are considered sensitive to vehicle disturbance and are frequently avoided by seismic crews, because the smashed willows are unsightly the following summer. BLM (unpublished data) reported that Riparian Shrublands were the most disturbed type after winter seismic exploration and remained more disturbed after six years than most non-riparian types. This study shows that non-riparian types are actually more susceptible to long-term damage.

LITERATURE CITED

Emers, M., J. C. Jorgenson, and M. K. Raynolds. 1995. Response of Arctic plant communities to winter vehicle disturbance. Canadian Journal of Botany. 73:905–919.

Moskalenko, N. G. 1984. Predictions as to the recovery of the vegetation cover destroyed by human activities in the north of western Siberia. Polar Geography and Geology 4:147–154.

[Back to A020-004]

Ecological Archives **A020-004-A5**

Janet C. Jorgenson, Jay M. Ver Hoef, and M. T. Jorgenson. 2010. Long-term recovery patterns of arctic tundra after winter seismic exploration. *Ecological Applications* 20:205–221.

Appendix E. Collection of photos depicting seismic lines in 1984 and over time.



PHOTO E1. D-7 caterpillar tractor pulling ski-mounted camp trailers during seismic exploration in February 1984.



PHOTO E2. Seismic vibrator units in winter of 1985.



PHOTO E3. Seismic line in April 1984.



PHOTO E4. Camp–move trail made on Sedge-Dryas Tundra in March 1984. The adjacent reference plot had 13% excess soil ice in 1985 and trail had become a shallow trough by 2002.



PHOTO E5. Camp–move trail on Tussock Tundra in April 1984.



PHOTO E6. Trail photographed in March 1984 shows deep snow in swale in foreground and thin snow cover on higher area in background.



PHOTO E7. Aerial photograph of seismic line made in winter of 1985 on Sedge-Willow Tundra and photographed the following summer. The center of the trail is the survey line, the heavy tracks to either side are from vibrator units and recording vehicles, and the side trails are from single passes of smaller personnel vehicles.



PHOTO E8. Aerial photograph of seismic line and overlapping camp–move trail made in winter of 1984, photographed in July 1984. Ruts in tussock tundra subsided into a trough. In 2002, tussocks were growing back, but trail still had only 5% cover of evergreen shrubs, compared to 30% in the surrounding tundra.



PHOTO E9. Aerial photograph in summer 1984 of tracks made by vehicles the previous winter. Scraped soil hummocks are visible in foreground and prominent, but shorter-lived "green trail effect" in background. Polygonal pattern is natural and is due to vertical ice wedges under the troughs between polygons.

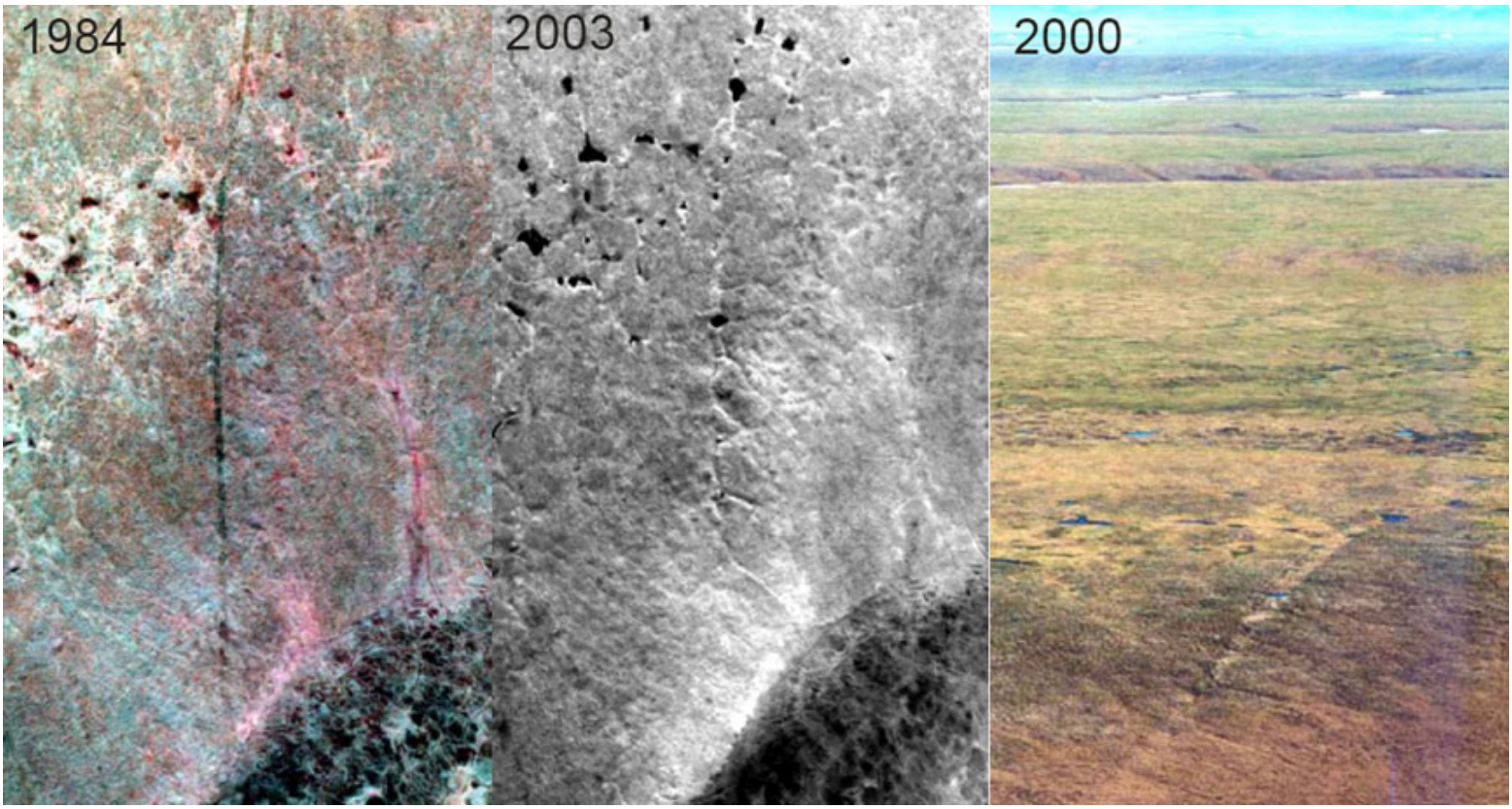


PHOTO E10. Highly disturbed trail on Sedge-Dryas Tundra, created by camp move vehicles in January 1984. Color-infrared aerial photograph taken in August 1984 (above) shows trail as dark line, due to increased bare soil on trail. Photo spans 250 meters east–west. Quickbird satellite image from August 2003 (middle, same scale) and photograph from airplane from July 2000 (below) show troughs and two ponds that formed on trail when buried ice-wedges melted. Note general increase in patterned ground and amount of water in ponds between 1984 and 2003, probably due to warming climate. However, zig-zag shaped troughs in foreground were up to 1 m deep and no similar feature was seen off the trail



PHOTO E11. Repeat photographs of seismic trail across a raised area with dwarf shrubs and moss, with natural trough on right. 1989 photograph (top) shows collapse of the edge of the raised area into the adjacent trough after vehicle traffic during 1985 exploration. 1993 photograph (bottom) shows the same location after sedges had replaced the shrubs and mosses due to the altered moisture regime.

From: Head, Melissa M (DNR)
To: Paul Leonard
Subject: RE: Invitation
Date: Thursday, November 16, 2017 1:31:26 PM

Hi Paul,

I apologize in the delay in getting back to you. It was good (and quite the surprise) to see you too!

I would be more than happy to participate in any conversations regarding ice roads and water use. While I have a good deal of experience with tundra travel and ice road construction, I am not the water use expert. If you would like a state DNR representative to speak directly to water use on the North Slope for ice road construction and other uses, I would suggest Henry Brooks (269-8641). He handles all of the temporary water use authorizations for industry and also processes water rights applications.

On a broader note, DNR has been dealing with industrial activities for many years now (albeit with a different mandate) and we have acquired a lot of experience working with industry, ice road construction contractors, tundra rehabilitation specialists, spill responders, etc. I would like to be able to pass along as much of this knowledge we have gained to the FWS and BLM as projects and political interest moves west and east from state land. Simply, I would like to assist in any way that I can so that federal agencies can build on our experience before new exploration and development occurs.

Kind Regards,

Melissa

Melissa Head
DNR/DMLW/Northern Oil & Gas Team
907-451-2719

-----Original Message-----
From: Paul Leonard [mailto:paul_leonard@fws.gov]
Sent: Monday, November 13, 2017 6:06 AM
To: Head, Melissa M (DNR) <melissa head@alaska.gov>
Subject: Invitation

Hey Melissa,

It was great seeing you in ANC a while back! I'd love to catch up more at some point.

I'm still learning a lot about the history, personalities, and sensitivities emanating from and directed towards the LCC. After many conversations I think it safe to say that my opinions have been changing a bit since we spoke. I hope the LCC (as long as it continues to exist) will build a stronger relationship with the state in general, while recognizing the need to provide relevant information.

Now for business: I'm writing to ask about your interest in participating in a conversation/coalition we are attempting to pull together to discuss decision-making issues and impact assessment needs of several agencies in regards to water use and ice roads that could help guide science planning by refuges, USGS, and other researchers. The conversation is still in its infancy but I thought you might be a great person to bring to the table.

Cheers,
Paul

Paul Leonard, PhD
Science Coordinator
Arctic Landscape Conservation Cooperative
101 12th Ave. Room 216
Fairbanks, AK 99709
(907) 456-0445

From: Gieryic, Michael
To: Stephanie Brady; Tracy Fischbach
Subject: 1002 EA - Sections b5-AC - CONTAINS SOLICITOR ADVICE
Date: Thursday, November 16, 2017 1:32:18 PM

In the EA I have just edited sections b5-AC

With regard to section b5-AC

With regard to section b5-AC

Mike Gieryic
Attorney-Adviser
Office of the Regional Solicitor
U.S. Department of the Interior
4230 University Drive, Suite 300
Anchorage, AK 99508
Phone: (907) 271-1420; Fax: (907) 271-4143
mike.gieryic@sol.doi.gov

From: Burkart, Greta
To: Arthur, Stephen
Subject: Re: Update of 1002 report
Date: Thursday, November 16, 2017 1:44:38 PM

Hi Steve,

I am working on revisions and will send you something by tomorrow.

I am at NCTC. The National Assembly of Aquatic Scientists and Hydrologists meeting was good and the presentation went well. People are interested and willing to help, but I kind of missed out on the last day networking because I skipped out
on the last day of presentations and a field trip to work on the draft water resource section for the seismic EA that was due to the Regional Office today. Later today I hope to review the fisheries section if I get a draft from John Martin in time.

Hope all is well in Colorado.

Greta

Greta Burkart, PhD
Aquatic Ecologist
US Fish and Wildlife Service
Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
101 12 th Ave Rm 236
Fairbanks, AK 99701
ph: (907) 456-0519
fax: (907) 456-0428
email: greta_burkart@fws.gov
www.facebook.com/arcticnationalwildliferefuge

On Wed, Nov 15, 2017 at 8:47 AM, Arthur, Stephen <stephen_arthur@fws.gov> wrote:

> Biology team:
>
> Attached is a draft of the update of the summary report on the biological studies of the 1002 Area (2002). Some of you have already provided input on an earlier draft of this, but I'd like to ask each of you to look this over, especially the sections that deal with your area of expertise. The purpose of this report is to provide a brief overview of significant work that has occurred since 2002, but by necessity this coverage cannot be in too much detail. So, please look this over and let me know if there are any significant omissions or topics that are not accurately or adequately addressed. The time frame for this is short, so I'd appreciate your comments by the end of this week. Note: the 2002 report dealt exclusively with biological studies (including veg. work), and the current update focuses on those, but also includes a very brief description of some biogeophysical studies that are pertinent. If we have missed anything significant along these lines, please indicate those.
>
> The plan is to issue this as a USGS open file report (gray literature with some peer review.)
>
> I know several of you have already provided input, and John Pearce would be happy to add authorship to anyone who feels that their input would justify that. Just let me know and we

will add your name to the list.

Stephen M. Arthur, Ph.D.
Supervisory Wildlife Biologist
Arctic National Wildlife Refuge
101 12th Ave., Room 236
Fairbanks, AK 99701
(907)455-1830

From:	Brady, Stephanie
To:	Mitch Ellis
Subject:	Fwd: Part 37 Proposed Revision Package
Date:	Thursday, November 16, 2017 1:53:33 PM
Attachments:	ANWR - 1 Tracing pkg with RD briefing memo.pdf ANWR - 2 Drft Reg.pdf ANWR - 3 EA.pdf Arctic NWR permit application NPRM 10.12.17_AK edits clean copy with comments (1).docx

---

here is what Joe sent me (2nd pdf) - I am not sure if this is latest version - I have also attached our edits (word document) - dated 10.12 that were not accepted. thanks. stephanie

stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |
U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska |
907.306.7448

---------- Forwarded message ----------
From: **Darnell, Joseph** <joe.darnell@sol.doi.gov>
Date: Thu, Nov 16, 2017 at 10:52 AM
Subject: Part 37 Proposed Revision Package
To: Stephanie Brady <stephanie_brady@fws.gov>
Cc: "Gieryic, Michael" <mike.gieryic@sol.doi.gov>

Stephanie -

Here are the three parts of the package that was sent to me on October 17 by my front office.

Joe

Joseph Darnell
Regional Solicitor
Alaska Region - Dept. of the Interior
Anchorage, Alaska
Direct Phone (907) 271-4118 / Main Office Phone (907) 271-4131
Fax (907) 271-4143 / Mobile (907) 301-6687
joe.darnell@sol.doi.gov

FISH AND WILDLIFE SERVICE
DOCUMENT TRACKING CONTROL SLIP

FWS Form 3-2180
Attach to front of folder

Date: 10/10/2017

DCN: SEN006553	**ES No:**

Orig Office: R7-ARD-NWR	**Input Date:** 09/21/2017	**Addressee:** Federal Register
Due Date:	**Signature Level:** D	

Subject:
Arctic NWR - Region 7 - Proposed Rule and EA to Amend Regulations

Comments:

Task Codes:

0 - Prepare Draft Reply
1 - Prepare Reply
2 - Appropriate Action
3 - Surname
4 - Signature
5 - Review/Comment
6 - Revise
7 - Obtain Additional Comments
8 - Other - See Comments
9 - Mail/Distribute
10 - Finalize
11 - Simultaneous Surnames
12 - Email Draft Reply
13 - Advance Read
14 - File
15 - For Your Information
16 - Surname through DTS
17 - Required ES Review

Routing:

Assigned To	Task	Assigned Date	Due Date	Completed Date
R7-ARD-NWR	15 - For Your Information	09/21/2017		09/21/2017
ABHC-PPM	10 - Finalize	09/22/2017		10/10/2017
CCU	2 - Appropriate Action	10/10/2017		10/10/2017
D	3 - Surname	10/10/2017		10/10/2017
Package Under Review	5 - Review/Comment	10/10/2017		
CCU	2 - Appropriate Action			
FW	3 - Surname			
CCU	2 - Appropriate Action			
SIO-REGS	5 - Review/Comment			
CCU	2 - Appropriate Action			
ABHC-PPM	19 - Cleared for Publication			

SOL - Goetken ——— 10/9/17 ———
SOL - Jorgensi ——— ——— ———

FISH AND WILDLIFE SERVICE
DOCUMENT TRACKING CONTROL SLIP

FWS Form 3-2180
Attach to front of folder

Date: 10/10/2017

DCN: FR00003115	ES No:

Orig Office: R7-ARD-NWR	Input Date: 09/21/2017	Addressee: Federal Register
Due Date:	Signature Level: D	

Subject:
Arctic NWR - Region 7 - Proposed Rule and EA to Amend Regulations

Comments:

Task Codes:

0 - Prepare Draft Reply
1 - Prepare Reply
2 - Appropriate Action
3 - Surname
4 - Signature
5 - Review/Comment
6 - Revise
7 - Obtain Additional Comments
8 - Other - See Comments
9 - Mail/Distribute
10 - Finalize
11 - Simultaneous Surnames
12 - Email Draft Reply
13 - Advance Read
14 - File
15 - For Your Information
16 - Surname through DTS
17 - Required ES Review

Routing:

Assigned To	Task	Assigned Date	Due Date	Completed Date
R7-ARD-NWR	15 - For Your Information	09/21/2017		09/21/2017
ABHC-PPM	10 - Finalize	09/22/2017		10/10/2017
CCU	2 - Appropriate Action	10/10/2017		10/10/2017
D	3 - Surname	10/10/2017		
Package Under Review	5 - Review/Comment			
CCU	2 - Appropriate Action			
FW	3 - Surname			
CCU	2 - Appropriate Action			
SIO-REGS	5 - Review/Comment			
CCU	2 - Appropriate Action			
ABHC-PPM	19 - Cleared for Publication			

Briefing Paper for Departmental Clearance of Federal Register Documents

I. Title of document: Coastal Plain of the Arctic National Wildlife Refuge, Alaska; Geological and Geophysical Exploration Plans; Application Requirements

II. Popular short name, if applicable: N/A

III. DCN: FR00003115

IV. RIN (for rules) or notice tracking number (for notices): 1018-BC92

V. Summary: The U.S. Fish and Wildlife Service (Service) proposes to amend the regulation that restricts the dates when an application for an exploration plan for the Arctic National Wildlife Refuge (Refuge) lands described in the Alaska National Interest Lands Conservation Act (ANILCA) section 1002 may be submitted.

VI. Is timing critical? ☒ Yes ☐ No

a. What is the target date, and (if applicable) "no later than" (NLT) date, for the FR document to clear DOI? Unknown

b. What is driving the timing? Secretarial Order 3352

c. What happens if the deadline is missed? Unknown

VII. Background: In April 1983, DOI published the final regulation: 50 CFR part 37 (DOI 1983; FWS 1983). This regulation defines the general provisions for geological and geophysical exploration within the coastal plain of Arctic Refuge. The Service is amending these regulations to allow applications for an exploration plan for Arctic Refuge.

VIII. Is this a **high-profile** or **controversial** action? ☒ Yes ☐ No

a. What are the **significant issues**? Allowing for oil exploration on Arctic Refuge is a significant issue. The Service received over 600,000 comments on the revised comprehensive conservation plan and environmental impact statement for this Refuge. The majority of comments were about this area of the Refuge.

b. **Who will care**, and **how strongly** will they care? Environmental organizations such as the Wilderness Society, Wilderness Watch, the Defenders of Wildlife, the National Wildlife Refuge Association, and oil & gas companies among others strongly care that there is an effort to amend regulations on Arctic Refuge for exploration of oil.

IX. Communications: The Department of the Interior will play a key role in communications. Congressional contacts, the State of Alaska, oil and gas companies, tribal governments and corporations, environmental organizations, as well as other constituents will need to be contacted to let them know that an amendment to the regulation for exploration on Arctic Refuge is to be published. A link to the notice will be posted to the Alaska NWRS and Arctic Refuge website.

X. Is there an information collection associated with this document? ☐ Yes ☒ No

a. Does the document have any approved OMB control number? ☐ Yes ☐ No

If yes, the OMB control number is:

b. Does the document require ☐ a new OMB control number or ☐ renewal of an existing approval?

If a new number or renewal is required, what is the current status?

XI. For rulemaking actions only: Has this action, in its current stage, been on a 90-day List? ☐ Yes ☒ No

If yes, on which 90-day List did it first appear in its current stage?

Did OIRA provide comments or change the significance? ☐ Yes ☐ No

If yes, summarize comments and resolution:

XII. Approval is requested to send the document to:

☒ The Office of the Federal Register for publication, or

☐ OIRA for review.

XIII. Primary contact:

Name: Stephanie Brady, Branch Chief, Conservation Planning and Policy, Alaska

Phone: 907-306-7448

Email: Stephanie_brady@fws.gov

Information Memorandum for the Director

Date: September 17, 2017

From: Gregory Siekaniec, Regional Director, Alaska

Telephone #: 907-786-3542

Subject: Proposed Rule and Environmental Assessment to Amend Regulations pertaining to the Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska

I. Introduction

The U.S. Fish & Wildlife Service (Service) proposes amending the existing regulations at 50 CFR §§ 37 - *Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska*, to remove language that restricts the period in which exploration plans may be submitted and exploration work may be completed.

II. Background

Arctic Refuge was first established in 1960 as the Arctic National Wildlife Range through Public Land Order 2214, for the purpose of preserving unique wildlife, wilderness, and recreational values. The original 8.9-million acre Range was withdrawn from all forms of appropriation under public land laws, including mining but not from mineral leasing. The Refuge was expanded to 19 million acres with the enactment of the Alaska National Interest Lands Conservation Act (ANILCA). Under ANILCA § 303(2) the purposes for which the Arctic National Wildlife Refuge was established and shall be managed were expanded. The "old" Refuge lands are managed for the purposes outlined both in the public land order and ANILCA.

With the passage of ANILCA, three primary actions were required of the Service and Department of the Interior (DOI) in relation to administration of the Arctic Refuge; 1) a CCP for the Arctic Refuge was to be written, 2) the Secretary was to assess wildlife values and oil reserves in the area designated in Section 1002, and 3) the Secretary was to authorize exploratory activity within the coastal plain "in a manner that avoids significant adverse effects on the fish and wildlife and other resources."

An initial CCP and related Environmental Impact Statement (EIS) were prepared for Arctic Refuge. The Record of Decision (ROD) implemented the minimal management alternative which emphasized managing for natural, unaltered landscapes and natural processes. This decision was re-iterated in 2015 when the CCP was revised. In this updated CCP and EIS, recommendations for Congressionally-designated Wilderness and four additional Wild and Scenic River designations were also included.

Second, under ANILCA § 1002 the Secretary of the Interior was required to assess the petroleum and wildlife values for a 1.5 million-acre portion of Arctic Refuge coastal plain referred to as the "1002" area. Biological studies and geological exploration coordinated by the Service, U.S. Geological Survey (USGS), and Bureau of Land Management (BLM) over a 2-year period on the coastal plain were initiated shortly after the enactment of the Act. The baseline assessment period ended in 1987 with the submittal of the *Arctic National Wildlife Refuge, Alaska, Coastal Plain Resources Assessment: Report and Recommendation to the Congress of the United States and Final legislative Environmental Impact Statement* (hereafter, *Coastal Plain Report*). The recommendation to Congress at the time was to open the entire 1002 area to an orderly oil and gas leasing program and in such circumstances as warranted, avoid unnecessary adverse effects on the environment.

Finally, in order to conserve the wildlife resources of the area Congress outlined guidance in Section 1002(d) for the Department to authorize exploration plans and to develop regulation for these geological exploratory activities to ensure these activities do not significantly adversely affect fish and wildlife and their habitats, or the environment. Based on this guidance, DOI published the final 50 CFR §§ 37 in April 1983. This regulation defines the general provisions for geological and geophysical exploration within the coastal plain of Arctic Refuge.

III. Positions of Interested Parties

State Position: Support the amendment of regulations.

Congressional Interest: Alaska Delegation – support amendment of regulations.

Gwich'in Nation: We assume that they will disagree with the amendment of the regulations based on their comments to the 2011 draft CCP/EIS.

Inupiat Nation: We assume that they will agree with the amendment of regulations based on their comments to the 2011 draft CCP/EIS.

Environmental organizations: Disagree with the amendment of the regulations.

IV. Potential Issues/Conflicts

For many, Arctic Refuge exemplifies the idea of wilderness – to leave some remnants of this nation's natural heritage intact, wild, and free from human intent to control, alter, or manipulate the natural orders. The distinguishing ecological aspect of Arctic Refuge is that this single protected area encompasses a wide range of arctic and subarctic ecosystems, their unaltered landforms, and native flora and fauna.

V. Communications and Outreach

Outreach Lead:	Our understanding is that the Department will handle outreach through Heather Swift: interior_press@ios.doi.gov
Affected States:	Alaska
Media POC:	Andrea Medeiros 907-786-3695
Congressional:	We will contact the Alaska congressional delegation regarding the initiation of this amendment.
State Contacts:	We will notify the State of Alaska when the notice is published.
Tribal Governments and Corporations:	We will conduct government to government consultation with tribal governments and Corporations prior to and during the amendment process.
Other Outreach:	We will notify other constituents and will post a link to the amendment on our website.

U.S. Department of the Interior
Fish and Wildlife Service

Federal Register Notice Cover Sheet

Date submitted to Headquarters: September 19, 2017

Name of document: Proposed Rule to Amend Current Regulations: Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska; Exploration Plans; Application Requirements.

Descriptive paragraph of purpose/role of document: This advises the Secretary of the Interior and the Director of the U.S. Fish and Wildlife Service (Service) that we are publishing an amendment to the regulation that restricts the dates when an application of an exploration plan for the Arctic National Wildlife Refuge (Refuge), described in the Alaska National Interest Lands Conservation Act (ANILCA) section 1002, may be submitted. In this document, we propose to change the regulation found at 50 CFR 37 by removing language that restricts when any person wanting to conduct exploratory activities may apply for a special use permit.

The following senior management officials have reviewed and approved the federal register notice prior to public release:

Name	Title	Office
Greg Siekaniec	Regional Director	FWS Alaska Regional Office (Region 7)
Karen Clark	Deputy Regional Director	FWS Alaska Regional Office (Region 7)
Sara Boario	Assistant Regional Director, External Affairs	FWS Alaska Regional Office (Region 7)
Mitch Ellis	Chief of Refuges	FWS Alaska Regional Office (Region 7)
Socheato Lor	Deputy Chief of Refuges	FWS Alaska Regional Office (Region 7)
Ryan Mollnow	Division Chief of Natural Resources, Alaska Refuges	FWS Alaska Regional Office (Region 7)
Stephanie Brady	Branch Chief of Conservation Planning, Alaska Refuges	FWS Alaska Regional Office (Region 7)

NOTE TO REVIEWER

Document must be signed/returned by this date (if applicable): COB Tues 9/19/2017

Background Information on Package/Request: Attached is a proposed rule to amend regulations that restrict the dates when an application of an exploration plan for Arctic National Wildlife Refuge may be submitted as described in the Alaska National Interest Lands Conservation Act (ANILCA) section 1002. This notice has not been reviewed by the Solicitors office. The notice will have final editorial and formatting completed by the Division of Policy, Performance and Management Programs, also known as PPM.

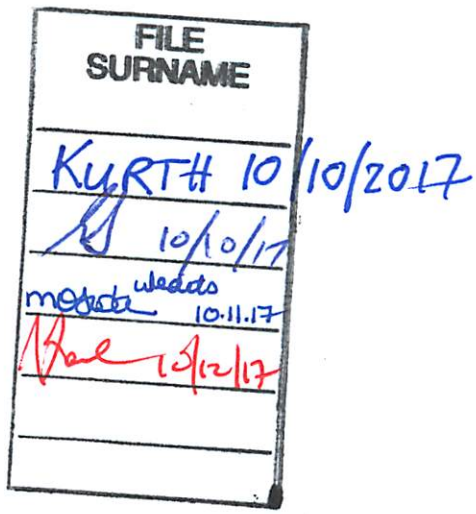
As an item of note, in section 50 CFR 37.52 it states the following: "The permittee shall keep accurate and complete records relating to its exploratory activities and to all data and information, including, but not limited to, raw, processed, reprocessed, analyzed and interpreted data and information, obtained as a result thereof. Until September 2, 1989, the Secretary shall have access to and the right to examine and reproduce any records, papers, or other documents relating to such activities, data and information in order to ascertain the permittee's compliance with this part, ability to perform under any special use permit, and reliability and accuracy of all data, information and reports submitted to the Regional Director." We did not address this date change because it was not part of the direction given in DTS # 066321.

Please be aware that sections of the EA and rule incomplete as well. HQ, in coop. with Region will need to follow up and insert this info later.
Mitch 9/18

POC/Contact Number: Stephanie Brady / 907-306-7448

TITLE	NAME	SIGNATURE	DATE
Regional Director	Greg Siekaniec		20 Sept 2017
Deputy Regional Director	Karen Clark		9/19/17
Assistant Regional Director, External Affairs	Sara Boario		
Chief, NWRS	Mitch Ellis		9/18/2017
Deputy Chief, NWRS	Socheata Lor		9.18.17
Division Chief of Natural Resources, Alaska Refuges	Ryan Mollnow		9/18/2017
Branch Chief of Conservation Planning, Alaska Refuges	Stephanie Brady		9/18/2017
Natural Resource Planner	Tracy Fischbach		9/18/2017

Updated 8/8/17



Billing Code: 4333-15

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 37

[Docket No. FWS–R7–NWRS–2017–0072; FF07R00000 1XX FXRS12610700000]

RIN 1018–BC92

Coastal Plain of the Arctic National Wildlife Refuge, Alaska; Geological and Geophysical Exploration Plans; Application Requirements

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule; availability of draft environmental assessment.

SUMMARY: We, the U.S. Fish and Wildlife Service, propose to amend the regulations regarding the dates when an application may be submitted for a permit for a geological and geophysical exploration plan on the Arctic National Wildlife Refuge lands described in the Alaska National Interest Lands Conservation Act. This action is a necessary update to our

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regulations as the dates in the regulations are long past. We are taking this action in support of Executive Order 13783, Promoting Energy Independence and Economic Growth.

DATES: Electronic comments on this proposed rule via http://www.regulations.gov must be submitted by 11:59 p.m. Eastern time on [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]. Comments submitted by mail must be postmarked no later than [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

ADDRESSES: *Document availability:* The draft environmental assessment prepared in support of this proposed rule may be found at http://www.regulations.gov in Docket No. FWS–R7–NWRS–2017–0072. Information and supporting documentation that we receive in response to this proposed rule will be available to you for review at *http://www.regulations.gov*, or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, Alaska Regional Office, 1011 E. Tudor Rd., Mail Stop 211, Anchorage, AK 99503; telephone (907) 306–7448.

Comment submission: You may submit comments on this proposed rule or the draft environmental assessment by one of the following methods:

(1) Electronically: Go to the Federal eRulemaking Portal: *http://www.regulations.gov*. Search for FWS–R7–NWRS–2017–0072, which is the docket number for this rulemaking. You may submit a comment by clicking on "Comment Now!" Please ensure that you have found the correct rulemaking before submitting your comment.

0000003412

(2) By hard copy: Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R7–NWRS–2017–0072, U.S. Fish and Wildlife Service, MS: BPHC, 5275 Leesburg Pike, Falls Church, VA 22041–3803.

We will not accept email or faxes. We will post all comments on *http://www.regulations.gov*. This generally means that we will post any personal information you provide us. For additional information, see **Request for Comments**, below.

FOR FURTHER INFORMATION CONTACT: Stephanie Brady, National Wildlife Refuge System, Alaska Regional Office, 1011 E. Tudor Rd., Mail Stop 211, Anchorage, AK 99503; telephone (907) 306–7448; fax (907) 786–3976; stephanie_brady@fws.gov.

SUPPLEMENTARY INFORMATION:

Background

The Arctic National Wildlife Refuge (hereafter, Arctic Refuge), located in northeastern Alaska, is administered by the U.S. Fish and Wildlife Service (Service). The Arctic Refuge was first established in 1960 as the Arctic National Wildlife Range through Public Land Order 2214, for the purpose of preserving unique wildlife, wilderness, and recreational values. The original 8.9-million-acre Range was withdrawn from all forms of appropriation under public land laws, including mining, but not from mineral leasing.

The Arctic Refuge was expanded to 19 million acres with the enactment of the Alaska National Interest Lands Conservation Act (ANILCA) (Public Law 96–487; 16 U.S.C. 410hh–3233, 43 U.S.C. 1602–1784). Section 303(2) of Public Law 96–487 set forth that the purposes for which the Arctic Refuge was established and should be managed include:

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(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including participation in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge.

Under ANILCA, the Service was to provide for a comprehensive and continuing inventory and assessment of the fish and wildlife resources of the coastal plain of the Arctic National Wildlife Refuge. This effort was to include an analysis of the impacts of oil and gas exploration, development, and production, and the Service was directed to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources (16 U.S.C. 1342). The "coastal plain" was defined in section 1002 of Public Law 96–487 by a map entitled "Arctic National Wildlife Refuge," dated August 1980 (Figure 1). Biological studies and geological exploration coordinated by the Service, U.S. Geological Survey (USGS), and Bureau of Land Management (BLM) were initiated shortly after enactment of the Act. In April 1982, the Service completed the initial report summarizing known information about fish and wildlife and their habitats occurring on the Arctic Refuge coastal plain (hereafter referred to as "the section 1002 area").

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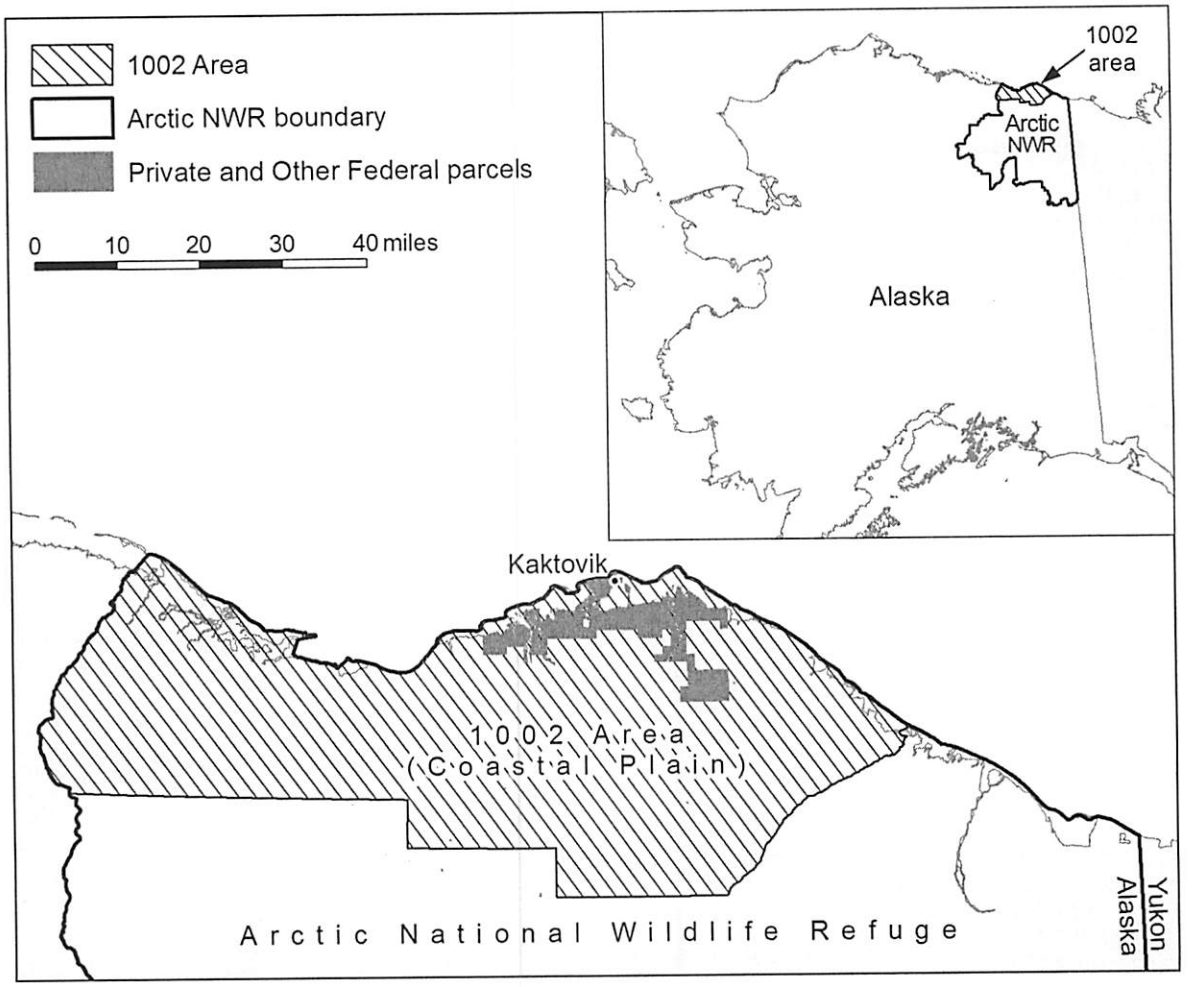


Figure 1. Arctic National Wildlife Refuge showing the coastal plain and section 1002 area.

Section 1002(d) of Public law 96–487 directed the Secretary of the Interior to establish guidelines for exploration through regulations within 2 years after enactment of the Act. In 1982, the Service published a proposed rule to establish guidelines for carrying out exploratory activities on the coastal plain of the Arctic Refuge (47 FR 41060, September 16, 1982). Publication of the proposed regulations had been delayed as a result of the litigation over the decision in March 1981 to transfer responsibility for developing the guidelines from the Service to USGS. *See Trustees for Alaska* v. *Watt*, 524 F. Supp. 1303 (D. Alaska 1981), *aff'd per curium*, 690 F.2d 1279 (9th Cir. 1982). The final rule with the regulations along with the

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"Record of Decision for Oil and Gas Exploration Within the Coastal Plain of the Arctic National Wildlife Refuge, Alaska" (ROD) was published April 19, 1983 (48 FR 16858) with the regulations being codified as 50 CFR part 37. The ROD was based upon the Final Environmental Impact Statement, which had been filed with the Environmental Protection Agency on February 23, 1983, and made available to the public on March 4, 1983. The guidelines were subsequently revised to change the deadlines for submission of exploration plans to the Department for consideration. *See* 49 FR 7569 (March 1, 1984).

Plans were submitted to the Service in accordance with the regulations with plans for summer access by helicopter during 1983–85 being then approved. *See* U.S. Dept. of the Interior, Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment: Report and Recommendation to the Congress of the United States and Final Legislative Environmental Impact Statement, Vol. 1 at 3 (April 1987) ("Section 1002 Report"). The summer exploratory activities were limited to field observations, surface measurements, mapping, and collection of rock samples. One helicopter-supported gravity survey permit was issued for the summer of 1983. Winter exploration plans involving mechanized surface transportation to conduct seismic surveys were approved for the winters of 1983–84 and 1984–85. Section 1002 Report. One permittee, representing an industry group of over 20 companies, was issued a permit to collect the seismic data. More than 1,300 line miles of seismic data were acquired as a result of the winter exploratory activities during the two winters. No exploratory activities of this type have occurred in the Arctic Refuge Coastal Plain since 1985.

The Section 1002 Report was submitted to Congress in April 1987. The report recommended that the entire Arctic Refuge coastal plain be made available for oil and gas leasing. Section 1002(h) Report. The submittal was delayed 7 months past the statutory

deadline by a court ruling requiring the Secretary to seek public participation in preparation of the legislative environmental impact statement accompanying the report. *See Trustees for Alaska* v. *Hodel*, 806 F.2d 1378 (9th Cir. 1986).

The Service has historically interpreted the authorization to conduct exploratory activities under section 1002 to have expired with the submittal of the section 1002(h) report to Congress. The legal underpinnings for this position were set out in a January 18, 2001, memorandum to Secretary Bruce Babbitt from Solicitor John Leshy (2001 Memorandum) responding to a letter from Congressman Edward Markey asking what oil and gas related activities are currently allowed or prohibited on the coastal plain of the Arctic Refuge. While opining that the authority expired with submittal of the April 1987 report to Congress, the 2001 Memorandum noted that there were two possible answers to the question because of the wording of section 1002.

The legal interpretation, that the authority to authorize further exploration activities under section 1002 expired in 1987, was tested when the State of Alaska sued the Department of the Interior in 2015. *State of Alaska* v. *Sally Jewell, et al.*, No. 3:14-cv-00048-SLG (D. Alaska). In that suit, the State of Alaska appealed the Service denial of the State's permit request to conduct exploratory work on the Coastal Plain arguing that there was no cutoff of authority in section 1002. In affirming the Service's rejection of the application based upon the interpretation of section 1002 articulated in the 2001 Memorandum, the Court applied the two-step process established by the U.S. Supreme Court in *Chevron U.S.A.* v. *Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984). Applying the first step, the Court concluded that section 1002 was ambiguous as to whether additional exploration work was authorized under section 1002, a position advanced by the United States in its briefing. The Court then considered the Service's interpretation of section 1002 and concluded it was a permissible construction. In so finding, the

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court noted that the Service's construction is not the only permissible interpretation or necessarily the Court's.

It is well established that a department is not bound by prior interpretations of statutes and that it may make changes. While the prior interpretations of ANILCA section 1002 focused on the deadline for a report to Congress, with the passage of time we find it increasingly significant that section 1002 did not include a deadline for when exploration plans must be submitted. We interpret the absence of a deadline to mean that the authority of the Service to collect new and more detailed scientific information about all of the resources on the Coastal Plain has not expired.

This continuing authority recognizes that new and better technology is likely to be developed that can and should be put to use to expand human knowledge and understanding of the many natural resources of the Coastal Plain. The ability to collect new scientific information about the Coastal Plain, including its oil and gas resources, will better inform public policy decisions on use and management of the natural resources of the Plain. Without the authority to do further exploration work, the scientific knowledge about the subsurface resources of the Coastal Plain will be limited to what was learned over 30 years ago. Decisions on management and best use of all of the resources on the Coastal Plain will therefore not be informed by the latest and best scientific information.

The long-term national defense and security of the Nation is dependent upon reliable and secure sources of domestic energy resources. President Trump in his March 28, 2017, Executive Order, Promoting Energy Independence and Economic Growth, placed specific emphasis on the need to develop energy resources when he stated:

include SO#.

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Section 1. *Policy.* (a) It is in the national interest to promote clean and safe development of our Nation's vast energy resources, while at the same time avoiding regulatory burdens that unnecessarily encumber energy production, constrain economic growth, and prevent job creation. Moreover, the prudent development of these natural resources is essential to ensuring the Nation's geopolitical security.

Central to meeting the goal of developing the country's natural resources in a responsible manner to ensure the Nation's geopolitical security is having and considering the best and latest information about the oil and gas resources of the Coastal Plain that science and technology can provide. There have been many advances in geophysical sciences since the 1980's that can today be utilized to further advance the level of knowledge about the oil and gas resources of the Coastal Plain beyond what was learned from exploration work done over 30 years ago. It would be imprudent to make important decisions for development and implementation of plans for securing oil and gas resources and maintaining energy infrastructure such as the Trans Alaska Pipeline System over the long term without securing and utilizing the knowledge that can be gleaned from new modern exploration work on the Coastal Plain. In addition to informing long-term energy security planning, the availability of this new data will further the Service's resource management of the Coastal Plain.

Proposed Changes

In this document, we propose to change the regulations found at 50 CFR part 37 by removing language that restricts the timeframe in which a special use permit to conduct exploratory activities may be issued.

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Request for Comments

You may submit information concerning this proposed rule or the draft environmental assessment by one of the methods listed in **ADDRESSES**. We will not accept comments sent by e-mail or fax or to an address not listed in **ADDRESSES**. If you submit a comment via *http://www.regulations.gov*, your entire submission—including any personal identifying information, such as your address, phone number, or e-mail address—will be posted on the Web site. If your submission is made via a hardcopy comment that includes personal identifying information, you may request at the top of your document that we withhold this personal identifying information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on *http://www.regulations.gov*.

Endangered Species Act Consideration

Section 7 of the Endangered Species Act (16 U.S.C. 1536) requires the Secretary of the Interior to "review other programs administered by him (or her) and utilize such programs in furtherance of the purposes of the Act" and to "insure that any action authorized, funded, or carried out * * * is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat . . . ." Prior to issuance of these regulations, we would consult under section 7 of the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 et seq.), to ensure that any applications for exploration in the section 1002 area of the Arctic Refuge are not likely to jeopardize the continued existence of any species designated as endangered or threatened, or modify or destroy its critical habitat, and that the regulations are consistent with conservation programs for those species. Consultation under section 7 of the Act for the regulations may cause us to change these

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proposed regulations. Our biological opinion resulting from the section 7 consultation will be a public document available from the person listed under **FOR FURTHER INFORMATION CONTACT** or via *http://www.regulations.gov* in Docket No. FWS–R7–NWRS–2017–0072.

Required Determinations

Executive Order 13771—Reducing Regulation and Controlling Regulatory Costs

This proposed rule is considered to be an Executive Order (E.O.) 13771 deregulatory action (82 FR 9339, February 3, 2017) because it would amend regulations that currently restrict the dates when a permit application for an exploration plan for the Arctic Refuge would be allowed.

Regulatory Planning and Review (Executive Orders 12866 and 13563)

The Office of Management and Budget (OMB) has determined that this rule is not significant. OMB bases its determination upon the following four criteria:

(a) Whether the rule will have an annual effect of $100 million or more on the economy or adversely affect an economic sector, productivity, jobs, the environment, or other units of the government.

(b) Whether the rule will create inconsistencies with other agencies' actions.

(c) Whether the rule will materially affect entitlements, grants, user fees, loan programs, or the rights and obligations of their recipients.

(d) Whether the rule raises novel legal or policy issues.

The proposed rule would remove the regulations that restrict the dates when a permit application may be submitted for a geophysical exploration plan on the section 1002 area in the

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Arctic Refuge. Thus, this rule would open the process to accept oil exploration applications for the section 1002 area. Under the proposed rule as an administrative action, potential costs would be limited to application costs incurred by companies choosing to submit applications and by the Service to process the applications.

This analysis is limited in scope and addresses only the administrative action by the Service to accept and review new exploration plans in the Arctic Refuge. Therefore, this analysis does not evaluate costs and benefits related to the issuance of special use permits for specific exploration plans as the details of those plans are currently unknown, and the analysis would be speculative in regards to methods, location, and timing of the exploration activities. Furthermore, the review and approval process for a special use permit in the Arctic Refuge must undergo a separate process under the National Environmental Policy Act (NEPA). Geological exploration and assessment undertakings under the NEPA process could include a number of activities such as seismic testing, aerial surveying, road construction, and more. These exploratory activities have potential impacts including, but not limited to: polar bear viewing tourism, subsistence hunting (especially caribou) by nonnative and native Alaskans, and cultural use by native Alaskans. Furthermore, "available information indicates that any ANWR oil would be scattered among multiple smaller fields rather than concentrated in a single large field, which would make development more expensive and potentially expand the area in which any environmental effects might occur" (Congressional Research Service 2015).

Measures such as Secretarial Order No. 3352 have occurred to move forward toward energy development in the Arctic Refuge (Department of the Interior May 2017). However, Section 1003 of ANILCA states "production of oil and gas from the Arctic National Wildlife Refuge is prohibited and no leasing or other development leading to production of oil and gas

from the [Refuge] shall be undertaken until authorized by an act of Congress." Therefore, this analysis does not estimate the potential costs and benefits of oil drilling and extraction.

With this proposed rule, we solicit public input on potential economic impacts and the number of businesses affected to help quantify costs and benefits. Please see the **Request for Comments** section at the end of **SUPPLEMENTARY INFORMATION** for further information about submitting comments.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions) (5 U.S.C. 601 et seq.). However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule would not have a significant economic impact on a substantial number of small entities. Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for "significant impact" and a threshold for a "substantial number of small entities." See 5 U.S.C. 605(b). SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule would not have a significant economic impact on a substantial number of small entities.

The U.S. Small Business Administration (SBA) defines a small business as one with annual revenue or employment that meets or is below an established size standard. To assess the effects of the proposed rule on small entities, we focus on businesses that operate and/or develop

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oil gas field properties (North American Industry Classification System (NAICS) 211) that have fewer than 500 employees. According to the U.S. Census Bureau, there are 8,064 businesses under NAICS 211, of which over 99 percent qualify as small businesses (2012). Thus, we expect that most entities that may apply for a special use permit would be considered small as defined by the SBA.

Under the proposed rule, individual businesses would have the opportunity to submit applications for a geological and geophysical exploration plan on the section 1002 area in the Arctic Refuge. Although estimating the number of potential future applicants would be speculative, the last seismic survey (completed in 1985) was conducted by 27 companies under 1 permit. If 27 individual companies applied for separate special use permits under the proposed rule, this would represent less than 1 percent of small businesses.

We therefore certify that this proposed rule would not have a significant economic effect on a substantial number of small entities as defined under the Regulatory Flexibility Act (5 U.S.C. 601 et seq.). A Regulatory Flexibility Analysis is not required. Accordingly, a Small Entity Compliance Guide is not required.

Small Business Regulatory Enforcement Fairness Act

This proposed rule is not a major rule under 5 U.S.C. 804(2), the Small Business Regulatory Enforcement Fairness Act. This rule:

a. Would not have an annual effect on the economy of $100 million or more.

b. Would not cause a major increase in costs or prices for consumers; individual industries; Federal, State, tribal, or local government agencies; or geographic regions.

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c. Would not have significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of U.S.-based enterprises to compete with foreign-based enterprises.

Unfunded Mandates Reform Act

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.), we have determined the following:

a. This rule would not ''significantly or uniquely'' affect small governments. A small government agency plan is not required. Actions under the proposed rule would not affect small government activities in any significant way.

b. This rule would not produce a Federal mandate of $100 million or greater in any year. It would not be a ''significant regulatory action'' under the Unfunded Mandates Reform Act.

Takings (Executive Order 12630)

In accordance with E.O. 12630, this proposed rule would not have significant takings implications. A takings implication assessment is not required. This proposed rule does not contain a provision for taking of private property.

Federalism (Executive Order 13132)

This proposed rule does not have sufficient Federalism effects to warrant preparation of a federalism summary impact assessment under E.O. 13132. It would not interfere with the ability of States to manage themselves or their funds. This proposed rule, if adopted, would affect the

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geological exploration of the coastal plain of the Arctic Refuge, which is managed by the Service in Alaska, and would not have a substantial direct effect on State or local governments in Alaska.

Civil Justice Reform (Executive Order 12988)

In accordance with E.O. 12988, the Office of the Solicitor has determined that this proposed rule does not unduly burden the judicial system and meets the requirements of sections 3(a) and 3(b)(2) of E.O. 12988.

Paperwork Reduction Act

This rule does not contain any new collection of information that requires approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). OMB has previously approved the information collection requirements associated with Service Special Use Permit Applications (FWS Form 3–2469) and assigned OMB Control Number 1018–0162 (expires December 31, 2019). An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act

Our draft environmental assessment is part of the administrative record for this proposed rule. In accordance with the National Environmental Policy Act (NEPA, 42 U.S.C. 4321 et seq.) and part 516 of the U.S. Department of the Interior Manual (516 DM), the Service proposes amending the existing language in 50 CFR Part 37—Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska, related to exploration plans [50 CFR

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37.21(b) and (c)], to remove the date restrictions now in place for those plans. Our draft environmental assessment sets forth that the proposed action to change the regulatory language as described in the rule portion of this document will have no significant impacts on the environment.

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we have evaluated potential effects on federally recognized Indian Tribes and have determined that there are no potential effects. This rule would not interfere with the ability of Tribes to manage themselves or their funds or to regulate exploration activities on Tribal lands. However, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis, and we are seeking their input to evaluate this proposed rule. In addition, we have evaluated this proposed rule under Alaska Native Claims Settlement Act corporation policies. We are consulting with Alaska Native tribes and Alaska Native corporations regarding the proposed changes in this rule for the Arctic Refuge.

Energy Supply, Distribution, or Use (Executive Order 13211)

Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking actions that could have significant adverse effects on energy supply, distribution, or use. We believe that the rule could have positive effects on energy supplies, distribution, or use.

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Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.

Clarity of This Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

(a) Be logically organized;

(b) Use the active voice to address readers directly;

(c) Use common, everyday words and clear language rather than jargon;

(d) Be divided into short sections and sentences; and

(e) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in **ADDRESSES**, above. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that you find unclear, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

List of Subjects in 50 CFR Part 37

Administrative practice and procedure, Alaska, Environmental protection, Historic preservation, Oil and gas exploration, Penalties, Reporting and recordkeeping requirements, Surety bonds, and Wildlife refuges.

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Proposed Regulation Promulgation

Accordingly, we propose to amend part 37 of title 50 of the Code of Federal Regulations as set forth below:

PART 37—GEOLOGICAL AND GEOPHYSICAL EXPLORATION OF THE COASTAL PLAIN, ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

1. The authority citation for part 37 is revised to read as follows:

AUTHORITY: 5 U.S.C. 301; 16 U.S.C. 715s and 3142; and 31 U.S.C. 9701.

2. Amend § 37.21 by revising paragraphs (b) and (c) to read as follows:

§ 37.21 Application requirements.

* * * * *

(b) Any person wanting to conduct exploratory activities may apply for a special use permit by submitting for review and processing one or more written exploration plans, in triplicate, to the Regional Director, Region 7, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503.

(c) In addition to containing the information required in paragraph (d) of this section, any exploration plan submitted shall describe the applicant's plan for carrying out an integrated program of exploratory activities in such a manner as will satisfy the objective and limitations stated in § 37.1. If an applicant submits an exploration plan in any given year, with the intention of submitting another exploration plan the following year, the applicant shall describe in its initial plan how its future exploratory activities will be integrated with those proposed under its initial plan. Each exploration plan submitted must be published and be the subject of a public hearing in accordance with requirements of § 37.22(b).

* * * * *

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§ 37.52 [Amended]

3. Amend § 37.52 by:

a. In the first sentence, removing the period and adding in its place a comma and the words "for 3 years from the date the permittee submits the data and information to the Regional Director pursuant to § 37.53."; and

b. In the second sentence, removing the words "Until September 2, 1989, the" and adding in their place the word "The".

Dated: _____.

_____

Acting Assistant Secretary for Fish and Wildlife and Parks.

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§ 37.52 [Amended]

3. Amend § 37.52 by:

a. In the first sentence, removing the period and adding in its place a comma and the words "for 3 years from the date the permittee submits the data and information to the Regional Director pursuant to § 37.53."; and

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Dated: _____.

_____

Acting Assistant Secretary for Fish and Wildlife and Parks.

§ 37.52 [Amended]

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a. In the first sentence, removing the period and adding in its place a comma and the words "for 3 years from the date the permittee submits the data and information to the Regional Director pursuant to § 37.53."; and

b. In the second sentence, removing the words "Until September 2, 1989, the" and adding in their place the word "The".

Dated: _____.

_____

Acting Assistant Secretary for Fish and Wildlife and Parks.

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U.S. Fish and Wildlife Service
U.S. Department of the Interior

Alaska Regional Office
Anchorage, Alaska

Proposed Amendment to Regulations for Geological Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska – Exploration Plans: Environmental Assessment

08 September 2017

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Glossary	
1002 area	identified as such in the map entitled *Arctic National Wildlife Refuge*, dated August 1980 [ANILCA § 1002(b)] (See Figure 1).
ANILCA	Alaska National Interest Lands Conservation Act of 1980
BLM	Bureau of Land Management, U.S. Department of the Interior
CCP	Comprehensive Conservation Plan for National Wildlife Refuges, required by ANILCA
coastal plain	defined as that area shown on the map entitled Arctic National Wildlife Refuge dated August 1980 [ANILCA § 1002(b)], and legally described in 50 CFR § 37 Appendix I-Legal Description of the Coastal Plain, Arctic National Wildlife Refuge, Alaska [see also 50 CFR § 37.21.2] (See Figure 1).
cultural resource	defined as any district, site, building, structure, or object significant in American history, architecture, archeology, engineering or culture, as determined in accordance with 36 CFR § 60.6 [see 50 CFR § 37.21.2]
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior; including BLM, USFWS, USGS
EA	Environmental Assessment, as stipulated under NEPA
EIS	Environmental Impact Statement, as stipulated under NEPA
exploratory activity	defined as surface geological exploration or seismic exploration or both of the coastal plain and all related activities and logistics required for either or both, and any other type of geophysical exploration of the coastal plain which involves or is a component of an exploration program for the coastal plain involving surface use of refuge lands and all related activities and logistics required for such exploration [see 50 CFR § 37.21.2]
FONSI	Finding of No Significant Impact; Federal agency decision that concludes an EA
NEPA	National Environmental Policy Act of 1970 [40 CFR §§ 1500-1508]
NRC	National Research Council, National Academy of Sciences
NWR	National Wildlife Refuge
ROD	Record of Decision, Federal agency decision that concludes an EIS
USFWS	Fish and Wildlife Service, U.S. Department of the Interior
USGS	Geological Survey, U.S. Department of the Interior

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1. Introduction

1.1 Purpose

The U.S. Fish & Wildlife Service (Service) proposes amending the existing regulations at 50 CFR §§ 37 - *Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska*, to remove language that restricts the period in which exploration plans may be submitted and exploration work may be done [50 CFR § 37.21(b) and (c)].

1.2 Need

Upon finalizing, the updated regulations will provide applicants the opportunity to submit requests to the Service for new geological exploration plans in the 1002 area of the coastal plain in Arctic National Wildlife Refuge (Arctic Refuge), and thereby reassess the oil and gas potential, under terms and conditions as stipulated under Alaska National Interest Lands Conservation Act of 1980 (ANILCA) § 1002 and 50 CFR §§ 37.

1.3 Key Environmental Requirements & Integration of Other Environmental Statutes & Regulations

The *National Environmental Policy Act of 1969* (NEPA) requires federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions, including a no action alternative. This Environmental Assessment (EA) addresses the administrative action by the Service to permit new exploration plans in the Arctic Refuge. This EA does not evaluate decisions to issue special use permits for specific exploration plans as the details of those plans are at this time unknown. Any analysis by the Service at this time would be speculative in regards to methods, location and timing of the exploration activities.

Section 7 of the *Endangered Species Act* (16 U.S.C. 1536) requires the Secretary of the Interior to "review other programs administered by him (or her) and utilize such programs in furtherance of the purposes of the Act" and to "insure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat . . . ." Prior to issuance of these regulations, we would consult under section 7 of the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 et seq.), to ensure that the any applications for exploration in the 1002 area of Arctic Refuge is not likely to jeopardize the continued existence of any species designated as endangered or threatened, or modify or destroy its critical habitat, and that the regulations are consistent with conservation programs for those species. Similar to the NEPA analysis, plan-specific Section 7 reviews would be completed when explorations plans are submitted for review and processing.

The ANILCA is integral to how this regulation change will be evaluated. When ANILCA was passed in 1980 the Act re-designated Arctic Refuge and required the writing of a comprehensive conservation plan (CCP) for the refuge (Title III), required the identification of federal actions which could have the potential to significantly restrict subsistence users (Title VIII), and required the Department "to provide for a comprehensive and continuing inventory and assessment of the fish and wildlife resources of the coastal plain of the Arctic National Wildlife Refuge; an

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analysis of the impacts of oil and gas exploration, development, and production, and to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources" (Title X). The "coastal plain" was defined by a map entitled "Arctic National Wildlife Refuge", dated August 1980 (Figure 1).

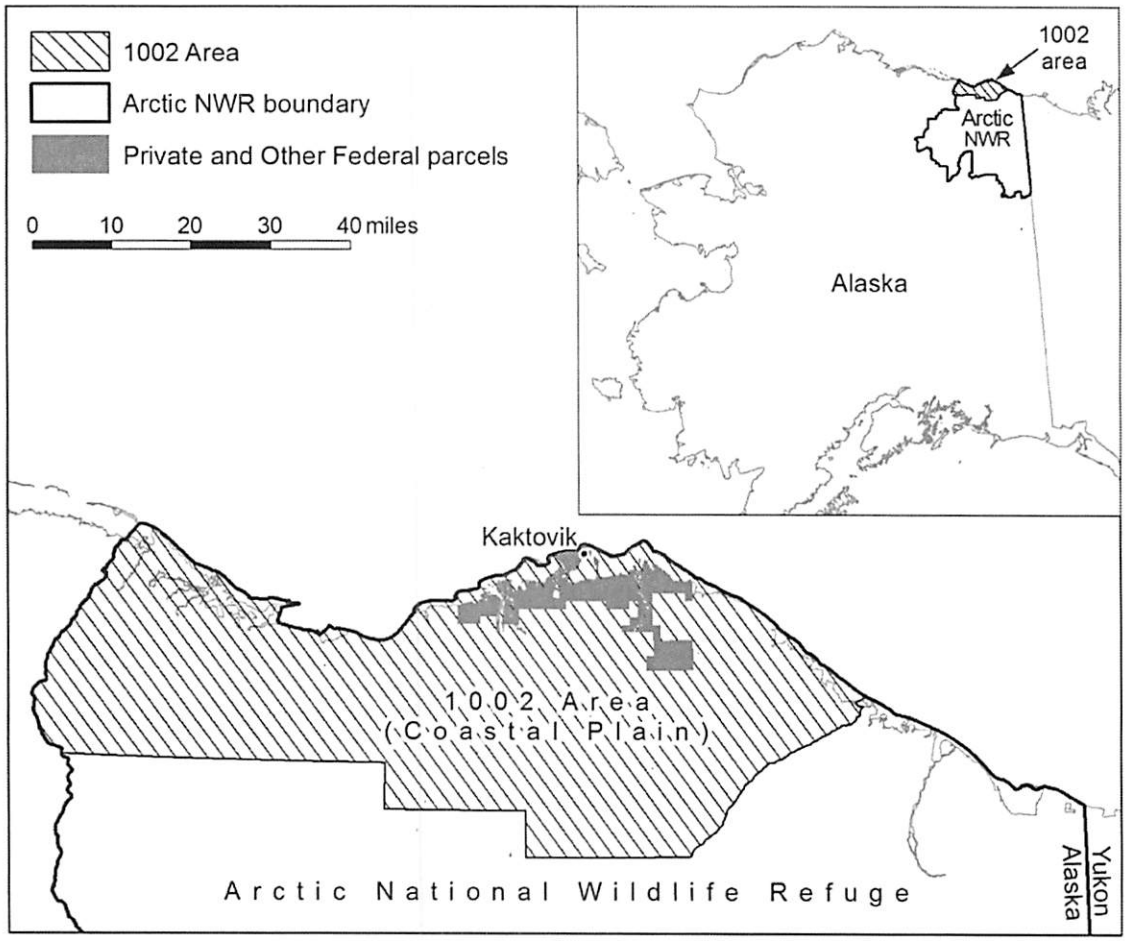


Figure 1. Arctic National Wildlife Refuge showing the coastal plain and 1002 area.

Arctic Refuge was first established in 1960 as the Arctic National Wildlife Range through Public Land Order 2214, for the purpose of preserving unique wildlife, wilderness, and recreational values. The original 8.9-million acre Range was withdrawn from all forms of appropriation under public land laws, including mining but not from mineral leasing.

In ANILCA Title III, Arctic Refuge was expanded to 19-million acres (Figure 1). Under ANILCA § 303(2) the "purposes for which the Arctic National Wildlife Refuge was established and shall be managed include –

(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including participation

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in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge."

In Title VIII, Section 810, Congress recognized the importance of federal lands to local residents of Alaska who had been using those lands to support their subsistence lifestyle for generations. As a result, federal land managers are required to identify whether a proposed land management action has the potential to significantly restrict subsistence opportunities. If so, then the manager is required to consult with local subsistence users and to seek to minimize such restrictions.

In Title X, Section 1002, Congress provided for a "comprehensive and continuing inventory and assessment of the fish and wildlife resource of the coastal plain of the Arctic National Wildlife Refuge; an analysis of the impacts of oil and gas exploration, development, and production, and to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources."

1.4 Background.

With the passage of ANILCA, three primary actions were required of the Service and Department of the Interior in relation to administration of the Arctic Refuge; 1) a CCP for the Arctic Refuge was to be written, 2) the Secretary was to assess wildlife values and oil reserves in the area designated in Section 1002, and 3) the Secretary was to authorize exploratory activity within the coastal plain "in a manner that avoids significant adverse effects on the fish and wildlife and other resources."

First, ANILCA § 304(g) directed the preparation of a CCP for each refuge in Alaska. Each plan is based on an identification and description of resources of the Refuge, including fish and wildlife resources and wilderness values, and must "designate areas within the refuge according to their respective resources and values; specify programs for conserving fish and wildlife and the programs relating to maintaining the identified values proposed to be implemented within each such area; and specify uses within each area which may be compatible with the major purposes of the refuge."

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An initial CCP and related Environmental Impact Statement (EIS) were prepared for Arctic Refuge. The Record of Decision (ROD) implemented the minimal management alternative (FWS 1988a, 1988b) which emphasized managing for natural, unaltered landscapes and natural processes. This decision was re-iterated in 2015 when the CCP was revised. In this updated CCP and EIS, recommendations for Congressionally-designated Wilderness and four additional Wild and Scenic River designations were also included (FWS 2015a).

Second, under ANILCA § 1002 the Secretary of the Interior was required to assess the petroleum and wildlife values for a 1.5 million-acre portion of Arctic Refuge coastal plain referred to as the "1002" area (Figure 1). The assessment of the 1002 area was essential to identifying potential oil and gas reserves and whether development activities would significantly and adversely affect fish, wildlife, habitats or the environment.

Biological studies and geological exploration coordinated by the Service, U.S. Geological Survey (USGS), and Bureau of Land Management (BLM) over a 2-year period on the coastal plain were initiated shortly after the enactment of ANILCA. These studies were to inform the Secretary's final report and recommendation to the Congress required by ANILCA § 1002(h).

In April 1982, the Service completed the initial report summarizing current information regarding fish and wildlife, and their habitats occurring on the Arctic Refuge coastal plain (FWS 1982). Between 1982 and 1987 over 50 separate biological field studies in the 1002 area have documented baseline conditions, most summarized in annual reports (Garner and Reynolds 1983, 1984, 1985, 1986, 1987). The baseline assessment period ended in 1987 with the submittal of the *Arctic National Wildlife Refuge, Alaska, Coastal Plain Resources Assessment: Report and Recommendation to the Congress of the United States and Final legislative Environmental Impact Statement* (hereafter, *Coastal Plain Report*) (Clough and others 1987). The recommendation to Congress at the time was to open the entire 1002 area to an orderly oil and gas leasing program and in such circumstances as warranted, avoid unnecessary adverse effects on the environment (Secretary of the Interior Recommendation pp. 182-192 in Clough and others 1987).

Baseline biological and water resource assessment in or near the 1002 area continued from 1988 through 2002, coordinated among the USFWS, USGS, BLM, Alaska Department of Fish and Game, Canadian Wildlife Service, Yukon Department of Renewable Resources, Northwest Territories Department of Resources, Wildlife, and Economic Development, and academic institutions (Truett 1990; McCabe and others 1992; FWS 1994; Douglas and others 2002). Since 2002, biological studies have become increasingly landscape oriented, focusing on ecosystem processes and functions (Martin and others 2009).

Concurrent with the biological studies, oil and gas resource exploration and assessment were ongoing in the 1002 area but ended with the submission of the 1987 *Coastal Plain Report* (Bird and Magoon 1987; Clough and others 1987; FWS 1990; GAO 1993). The Coastal Plain Report concluded that the 1002 area was potentially rich in oil and gas resources. Based on the findings, there is a 95 percent chance the 1002 area contains more than 4.8 billion barrels of oil and 11.5 trillion cubic feet of gas in-place (Clough and others 1987). There is a 19 percent chance that

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economically recoverable oil occurs on the 1002 area. The average of all estimates of conditional economically recoverable oil resources is 3.2 billion barrels (Clough and others 1987).

Finally, in order to conserve the wildlife resources of the area Congress outlined guidance in Section 1002(d) for the Department to authorize exploration plans and to develop regulation for these geological exploratory activities to ensure these activities do not significantly adversely affect fish and wildlife and their habitats, or the environment. Some of the requirements included a prohibition on the carrying out of exploratory activity during caribou calving and immediate post-calving seasons or during any other period in which human activity may have adverse effects; temporary or permanent closing of appropriate areas to such activity; specification of the support facilities, equipment and related manpower that is appropriate in connection with exploratory activity; and requirements that exploratory activities be coordinated in such a manner as to avoid unnecessary duplication.

In April 1983, DOI published the final 50 CFR §§ 37 (DOI 1983; FWS 1983). This regulation defines the general provisions for geological and geophysical exploration within the coastal plain of Arctic Refuge, including: purpose and definitions [Subpart A]; general requirements for exploratory activities [Subpart B]; exploration plans and the application process [Subpart C]; environmental protection to avoid significant adverse impacts to natural and cultural resources [Subpart D]; general administration [Subpart E]; and, reporting and data management to preclude unnecessary duplication [Subpart F].

In this rule, three permit application openings were established as described in Table 1. Each application opening allowed either continued work from a previous work session or new work to begin in the upcoming work session. All exploration work, regardless of when it was initiated, was to be completed by May 31, 1986.

Table 1. Exploration Work Sessions and Their Respective Application Due Dates as Stipulated in 50 CFR 37.21.

Type of Exploration Work	**Exploration Work Sessions as Allowed in 50 CFR 37.21**	**Applications Due**
Any exploration plans	April 19, 1983 – May 31, 1986	May 20, 1983
Exploration plans other than seismic exploration	June 1, 1984 – May 31, 1986	April 2, 1984
Any exploration plans	October 1, 1984 – May 31, 1986	June 4, 1984

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2. Description of the Alternatives

No Action. Under the no action alternative, the existing regulation would not be amended or updated. Management of the Coastal Plain, Arctic Refuge, would continue as presently and as stipulated in the ROD for the Arctic Refuge CCP (FWS 2015). There would continue to be no oil and gas exploration on Arctic Refuge.

Proposed Action. The Service proposes to amend and update the regulatory language of 50 CFR §§ 37 - *Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska*, specifically § 37.21(b) and (c) as follows:

PART 37 – GEOLOGICAL AND GEOPHYSICAL EXPLORATION OF THE COASTAL PLAIN, ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

Subpart C – Exploration Plans

§ 37.21 Application Requirements.

(a) Prior to submitting an exploration plan, applicants may meet with the Regional Director to discuss their proposed plans and exploratory activities and the requirements of this part.

(b) Any person wanting to conduct exploratory activities may apply for a special use permit by submitting for approval one or more written exploration plans, in triplicate, to the Regional Director, Region 7, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503.

(c) In addition to containing the information required in paragraph (d) of this section, any exploration plan submitted shall describe the applicant's plan for carrying out an integrated program of exploratory activities in such a manner as will satisfy the objective and limitations stated in § 37.1. If an applicant submits an exploration plan in any given year with the intention of submitting another exploration plan the following year, the applicant shall describe in its initial plan how its future exploratory activities will be integrated with those proposed under its initial plan. Each exploration plan submitted must be published and be the subject of a public hearing in accordance with requirements of § 37.22(b).

(d) An exploration plan shall set forth in general terms such information as is required by this part and by the Regional Director in determining whether the plan is consistent with this part, including, but not limited to:

(1) The name and address of any person who will conduct the proposed exploratory activities, i.e., the applicant/permittee, and, if that person is an agency, firm, corporation, organization, or association, the names and addresses of the responsible officials, or, if a partnership, the names and addresses of all partners;

(2) The names and addresses of all persons planning at the time of plan submittal to participate in the proposed exploratory activities or share in

the data and information resulting therefrom through a cost-sharing or any other arrangement;

(3) Evidence of the applicant's technical and financial ability to conduct integrated and well-designed exploratory activities in an arctic or subarctic environment and of the applicant's responsibility in complying with any exploration permits previously held by it;

(4) A map at a scale of 1:250,000 of the geographic areas in which exploratory activities are proposed and of the approximate locations of the applicant's proposed geophysical survey lines, travel routes to and within the refuge, fuel caches, and major support facilities;

(5) A general description of the type of exploratory activities planned, including alternate exploratory methods and techniques if proposed, and the manner and sequence in which such activities will be conducted;

(6) A description of how various exploratory methods and techniques will be utilized in an integrated fashion to avoid unnecessary duplication of the applicant's own work;

(7) A schedule for the exploratory activities proposed, including the approximate dates on which the various types of exploratory activities are proposed to be commenced and completed;

(8) A description of the applicant's proposed communication techniques;

(9) A description of the equipment, support facilities, methods of access and personnel that will be used in carrying out exploratory activities;

(10) A hazardous substances control and contingency plan describing actions to be taken to use, store, control, clean up, and dispose of these materials in the event of a spill or accident;

(11) A general description of the anticipated impacts that the proposed exploratory activities may have on the refuge's wildlife, its habitat, the environment, subsistence uses and needs, and cultural resources, and a description of mitigating measures which will be implemented to minimize or avoid such impacts;

(12) A description of the proposed procedures for monitoring the environmental impacts of its operation and its compliance with all regulatory and permit requirements;

(13) A statement that, if authorized to conduct exploratory activities, the applicant shall comply with this part, its special use permit, its approved exploration plan, plan of operation, and all reasonable stipulations, demands and orders issued by the Regional Director;

(14) A description of the applicant's proposed data quality assurance and control program; and

(15) Such other pertinent information as the Regional Director may reasonably require.

3. Affected Environment

Per ANILCA § 1002(c), resource assessment baseline studies within the 1002 area began shortly after its enactment and, as stipulated, are "continuing." Special emphasis was placed on caribou,

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wolves, wolverines, grizzly bears, migratory waterfowl, muskox, and polar bears of the coastal plain and their habitat. The purpose of the studies was to "assess the size, range, and distribution of the populations of fish and wildlife; determine the extent, location, and carrying capacity of the habitats of the fish and wildlife; assess the impacts of human activities and natural processes on the fish and wildlife and their habitats; analyze the potential impacts of oil and gas exploration, development, and production on such wildlife and habitats; and analyze the potential effects of such activities on the culture and lifestyles (including subsistence) of affected Native and other people."

The environmental setting, flora and fauna, water resources, cultural resources, and rural lifestyles (including subsistence) of the 1002 area of the coastal plain, Arctic Refuge, are generally defined and described in the *Final EIS and Preliminary Final Regulations: Proposed Oil and Gas Exploration within the Coastal Plain of the Arctic NWR* (DOI 1983), and *Coastal Plain Report* (Clough and others 1987).

Additional natural, water and cultural resource data and assessments are provided in the numerous studies conducted under the Arctic Refuge Coastal Plain Resource Assessment over the past 30 years (FWS 1982; Garner and Reynolds 1983, 1984, 1985, 1986, 1987; McCabe and others 1992; Douglas and others 2002; among others). Cumulative effects of oil and gas activities on the Alaska North Slope were reviewed by National Research Council, as these effects were not adequately integrated into ongoing studies up to that point (NRC 2003).

Since 1988, the natural and cultural resources, water resources, and lifestyles (including subsistence) in the Arctic Refuge, including the 1002 area, have been minimally managed by human influence or intrusion, and administered for their wilderness values and natural processes (FWS 1988a, 1988b, 2015a, 2015b).

4. Environmental Consequences

No Action. The proposed amending of regulatory language would not occur and 50 CFR § 37.21 would remain unchanged. Fish and wildlife, their habitats, or the environment of the 1002 area of the coastal plain, Arctic Refuge, would not be affected by new exploration activities. The coastal plain 1002 area would continue to be minimally managed as described in the most recent CCP and ROD (FWS 2015a, 2015b).

Proposed Action. Under the proposed action, the amendment and promulgation of updated regulatory language for 50 CFR § 37.21 would result in the Service accepting and processing new applications of exploration plans. The 1002 area of the coastal plain, Arctic Refuge, would be open to new exploratory activities, although at the time of this analysis it is unclear how many applications would be accepted and for what time frames, methods and areas. In addition, ANILCA § 1002 only allows for exploration activities, not for oil and gas production. ANILCA § 1003 has not been changed and still requires an act of Congress to allow for oil and gas production.

The Service acknowledges that once special use permits allowing exploratory activities are issued, there would be a high probability of creating direct, indirect and cumulative effects to

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natural and cultural resources, water resources, and lifestyles (including subsistence). Therefore, prior to permit issuance, the Service would evaluate its decision to issue a special use permit based on the specific methods, timing, and area of that plan through a NEPA process. In addition, regulatory prohibitions, restrictions, and conditions on the carrying out of exploratory activities to ensure that exploratory activities do not significantly adversely affect the fish and wildlife, their habitats, or the environment are found in 50 §§ 37.31-33. Also, there is flexibility for the Service's Regional Director to include other environmental stipulations to exploratory activities as warranted (50 § 37.41).

Therefore, the proposed action to change the regulatory language in general has no significant impacts to the environment.

5. Consultation and Coordination

In compliance with Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, federal agencies are required to consult with federally recognized tribal governments during the NEPA process. The Service identified tribal governments potentially affected by the project based on the Arctic CCP, where the Service consulted with the Gwich'in Nation, and the communities of Fort Yukon, Kaktovik, and Arctic Village in Alaska.

Section 7 of the ESA requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. The Service will need to conduct both intra-agency and inter-agency (National Marine Fisheries Service) consultation based on listed species and designated critical habitat in the 1002 area.

In Title VIII of ANILCA, Section 810, Congress recognized the importance of federal lands to local residents of Alaska who had been using those lands to support their subsistence lifestyle for generations. As a result, federal land managers are required to identify whether a proposed land management action has the potential to significantly restrict subsistence opportunities. If so, then the manager is required to consult with local subsistence users and to seek to minimize such restrictions.

6. Literature Cited

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Billing Code: 4333-15

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 37

[Docket No. FWS–R7–NWRS–2017–0072; FF07R00000 1XX FXRS12610700000]

RIN 1018–BC92

Coastal Plain of the Arctic National Wildlife Refuge, Alaska; Geological and Geophysical Exploration Plans; Application Requirements

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule; availability of draft environmental assessment.

SUMMARY: We, the U.S. Fish and Wildlife Service, propose to amend the regulations regarding the dates when an application may be submitted for a permit for a geological and geophysical exploration plan on the Arctic National Wildlife Refuge lands described in the Alaska National Interest Lands Conservation Act. This action is an update to our regulations to

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allow opportunities for applications to conduct seismic exploration. Further, the ability to collect new information on oil and gas resources will better inform public policy decisions. We are taking this action in support of Executive Order 13783, Promoting Energy Independence and Economic Growth.

DATES: Electronic comments on this proposed rule via http://www regulations.gov must be submitted by 11:59 p m. Eastern time on [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]. Comments submitted by mail must be postmarked no later than [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

ADDRESSES: *Document availability:* The draft environmental assessment prepared in support of this proposed rule may be found at http://www regulations.gov in Docket No. FWS–R7–NWRS–2017–0072. Information and supporting documentation that we receive in response to this proposed rule will be available to you for review at *http://www.regulations.gov*, or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, Alaska Regional Office, 1011 E. Tudor Rd., Mail Stop 211, Anchorage, AK 99503; telephone (907) 306–7448.

Comment submission: You may submit comments on this proposed rule or the draft environmental assessment by one of the following methods:

(1) Electronically: Go to the Federal eRulemaking Portal: *http://www.regulations.gov*. Search for FWS–R7–NWRS–2017–0072, which is the docket number for this

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Plus the current regs confine the dates by which an applicant can apply to conduct seismic exploration

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rulemaking. You may submit a comment by clicking on "Comment Now!" Please ensure that you have found the correct rulemaking before submitting your comment.

(2) By hard copy: Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R7–NWRS–2017–0072, U.S. Fish and Wildlife Service, MS: BPHC, 5275 Leesburg Pike, Falls Church, VA 22041–3803.

We will not accept email or faxes. We will post all comments on *http://www.regulations.gov*. This generally means that we will post any personal information you provide us. For additional information, see **Request for Comments**, below.

FOR FURTHER INFORMATION CONTACT: Stephanie Brady, National Wildlife Refuge System, Alaska Regional Office, 1011 E. Tudor Rd., Mail Stop 211, Anchorage, AK 99503; telephone (907) 306–7448; fax (907) 786–3976; stephanie_brady@fws.gov.

SUPPLEMENTARY INFORMATION:

Background

The Arctic National Wildlife Refuge (hereafter, Arctic Refuge), located in northeastern Alaska, is administered by the U.S. Fish and Wildlife Service (Service). The Arctic Refuge was first established in 1960 as the Arctic National Wildlife Range through Public Land Order 2214, for the purpose of preserving unique wildlife, wilderness, and recreational values. The original 8.9-million-acre Range was withdrawn from all forms of appropriation under public land laws, including mining, but not from mineral leasing.

The Arctic Refuge was expanded to 19 million acres with the enactment of the Alaska National Interest Lands Conservation Act (ANILCA) (Public Law 96–487; 16 U.S.C. 410hh–

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3233, 43 U.S.C. 1602–1784). Section 303(2) of Public Law 96–487 set forth that the purposes for which the Arctic Refuge was established and should be managed include:

(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including participation in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge.

Under ANILCA, the Service was to provide for a comprehensive and continuing inventory and assessment of the fish and wildlife resources of the coastal plain of the Arctic Refuge. This effort was to include an analysis of the impacts of oil and gas exploration, development, and production, and the Service was directed to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources (16 U.S.C. 1342). The "coastal plain" was defined in section 1002 of Public Law 96–487 by a map entitled "Arctic National Wildlife Refuge," dated August 1980 (Figure 1). Biological studies and geological exploration coordinated by the Service, U.S. Geological Survey (USGS), and Bureau of Land Management (BLM) were initiated shortly after enactment of the Act. In April 1982, the Service completed the initial report summarizing

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known information about fish and wildlife and their habitats occurring on the Arctic Refuge coastal plain (hereafter referred to as “the section 1002 area”).

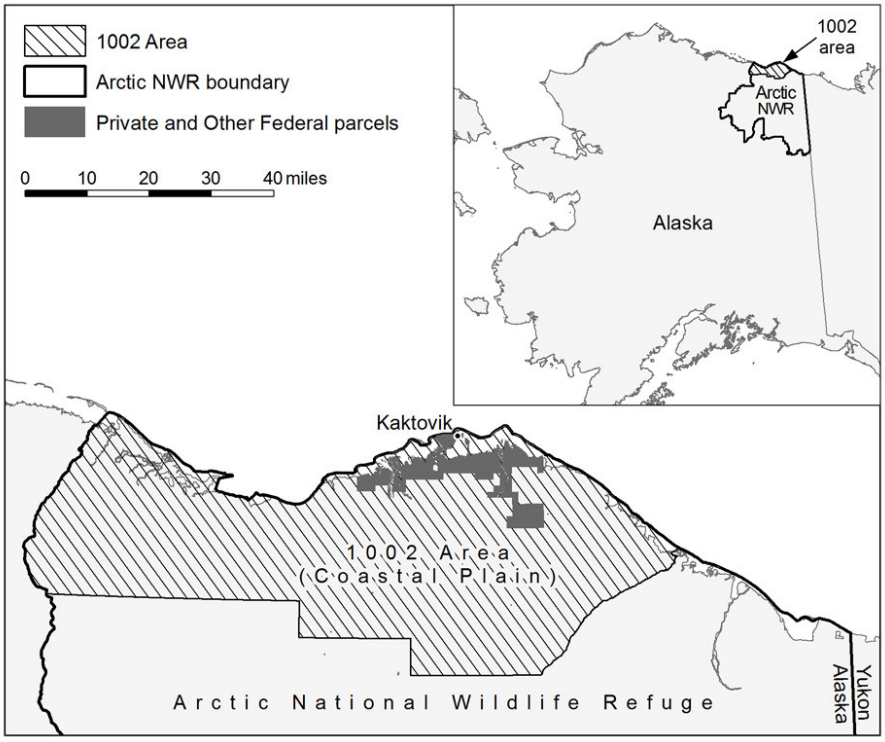


Figure 1. Arctic National Wildlife Refuge showing the coastal plain and section 1002 area.

Section 1002(d) of Public law 96-487 directed the Secretary of the Interior to establish guidelines for exploration through regulations within 2 years after enactment of the Act. In 1982, the Service published a proposed rule to establish guidelines for carrying out exploratory activities on the coastal plain of the Arctic Refuge (47 FR 41060, September 16, 1982). Publication of the proposed regulations had been delayed as a result of the litigation over the decision in March 1981 to transfer responsibility for developing the guidelines from the Service

to the USGS. *See Trustees for Alaska* v. *Watt*, 524 F. Supp. 1303 (D. Alaska 1981), *aff'd per curium*, 690 F.2d 1279 (9th Cir. 1982). The final rule with the regulations along with the "Record of Decision for Oil and Gas Exploration Within the Coastal Plain of the Arctic National Wildlife Refuge, Alaska" (ROD) was published April 19, 1983 (48 FR 16858) with the regulations being codified as 50 CFR part 37. The ROD was based upon the Final Environmental Impact Statement, which had been filed with the Environmental Protection Agency on February 23, 1983, and made available to the public on March 4, 1983. The guidelines were subsequently revised to change the deadlines for submission of exploration plans to the Department for consideration. *See* 49 FR 7569 (March 1, 1984).

Plans were submitted to the Service in accordance with the regulations with plans for summer access by helicopter during 1983–85 being then approved. *See* U.S. Dept. of the Interior, Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment: Report and Recommendation to the Congress of the United States and Final Legislative Environmental Impact Statement, Vol. 1 at 3 (April 1987) ("Section 1002 Report"). The summer exploratory activities were limited to field observations, surface measurements, mapping, and collection of rock samples. One helicopter-supported gravity survey permit was issued for the summer of 1983. Winter exploration plans involving mechanized surface transportation to conduct seismic surveys were approved for the winters of 1983–84 and 1984–85(Section 1002 Report). One permittee, representing an industry group of over 20 companies, was issued a permit to collect the seismic data. More than 1,300 line miles of seismic data were acquired as a result of the winter exploratory activities during the two winters (Section 1002 Report). No exploratory activities of this type have occurred in the Arctic Refuge Coastal Plain since 1985.

The Section 1002 Report was submitted to Congress in April 1987. The report recommended that the entire Arctic Refuge coastal plain be made available for oil and gas leasing (Section 1002(h) Report). The submittal was delayed 7 months past the statutory deadline by a court ruling requiring the Secretary to seek public participation in preparation of the legislative environmental impact statement accompanying the report. *See Trustees for Alaska* v. *Hodel*, 806 F.2d 1378 (9th Cir. 1986).

The Service has historically interpreted the authorization to conduct exploratory activities under section 1002 to have expired with the submittal of the section 1002(h) report to Congress. The legal underpinnings for this position were set out in a January 18, 2001, memorandum to Secretary Bruce Babbitt from Solicitor John Leshy (2001 Memorandum) responding to a letter from Congressman Edward Markey asking what oil and gas related activities are currently allowed or prohibited on the coastal plain of the Arctic Refuge. While opining that the authority expired with submittal of the April 1987 report to Congress, the 2001 Memorandum noted that there were two possible answers to the question because of the wording of section 1002.

The legal interpretation, that the authority to authorize further exploration activities under section 1002 expired in 1987, was tested when the State of Alaska sued the Department of the Interior in 2015. *State of Alaska* v. *Sally Jewell, et al.*, No. 3:14-cv-00048-SLG (D. Alaska). In that suit, the State of Alaska appealed the Service denial of the State's permit request to conduct exploratory work on the Coastal Plain arguing that there was no cutoff of authority in section 1002. In affirming the Service's rejection of the application based upon the interpretation of section 1002 articulated in the 2001 Memorandum, the Court applied the two-step process established by the U.S. Supreme Court in *Chevron U.S.A.* v. *Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984). Applying the first step, the Court concluded that section 1002 was

Commented [BS6]: We do not interpret – SOL interpret Can this be re-worded?

Commented [LS7]: Should these words be capped?

ambiguous as to whether additional exploration work was authorized under section 1002, a position advanced by the United States in its briefing. The Court then considered the Service's interpretation of section 1002 and concluded it was a permissible construction. In so finding, the court noted that the Service's construction is not the only permissible interpretation or necessarily the Court's.

It is well established that a department is not bound by prior interpretations of statutes and that it may make changes. Prior interpretations of ANILCA section 1002 focused on the deadline for a report to Congress

This continuing authority recognizes that new and better technology is likely to be developed that can be put to use to expand human knowledge and understanding of the many natural resources of the Coastal Plain. The ability to collect new scientific information about the Coastal Plain, including its oil and gas resources, will better inform public policy decisions on use and management of the natural resources of the Coastal Plain. Without the authority to do further exploration work, the scientific knowledge about the subsurface resources of the Coastal Plain will be limited to what was learned over 30 years ago. Decisions on management and best use of all of the resources on the Coastal Plain will therefore not be informed by the latest and best scientific information.

Commented [LS8]: Capped? Should it be Coastal Plain?

Commented [BS9]: This applies to the above section regarding why we are doing this

The long-term national defense and security of the nation is dependent upon reliable and secure sources of domestic energy resources. President Trump in his March 28, 2017, Executive Order, Promoting Energy Independence and Economic Growth, placed specific emphasis on the need to develop energy resources when he stated:

Section 1 Policy. (a) It is in the national interest to promote clean and safe development of the Nation's vast energy resources, while at the same time avoiding regulatory burdens that

unnecessarily encumber energy production, constrain economic growth, and prevent job creation. Moreover, the prudent development of these natural resources is essential to ensuring the Nation's geopolitical security.

Central to meeting the goal of developing the country's natural resources in a responsible manner to ensure the Nation's geopolitical security is having and considering the best and latest information about the oil and gas resources of the Coastal Plain that science and technology can provide. There have been many advances in geophysical sciences since the 1980's that can today be utilized to further advance the level of knowledge about the oil and gas resources of the Coastal Plain beyond what was learned from exploration work done over 30 years ago. It would be imprudent to make important decisions for development and implementation of plans for securing oil and gas resources and maintaining energy infrastructure such as the Trans Alaska Pipeline System over the long term without securing and utilizing the knowledge that can be gleaned from new modern exploration work on the Coastal Plain. In addition to informing long-term energy security planning, the availability of this new data will further the Service's resource management of the Coastal Plain.

Proposed Changes

In this document, we propose to change the regulations found at 50 CFR part 37 by removing language that restricts the timeframe in which a special use permit to conduct exploratory activities may be issued.

Request for Comments

You may submit information concerning this proposed rule or the draft environmental assessment by one of the methods listed in **ADDRESSES**. We will not accept comments sent by e-mail or fax or to an address not listed in **ADDRESSES**.

If you submit a comment via *http://www.regulations.gov*, your entire submission — including any personal identifying information, such as your address, phone number, or e-mail address—will be posted on the Web site. If your submission is made via a hardcopy comment that includes personal identifying information, you may request at the top of your document that we withhold this personal identifying information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on *http://www.regulations.gov*.

Endangered Species Act Consideration

Section 7 of the Endangered Species Act (16 U.S.C. 1536) requires the Secretary of the Interior to "review other programs administered by him (or her) and utilize such programs in furtherance of the purposes of the Act" and to "insure that any action authorized, funded, or carried out * * * is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat . . . ." Prior to issuance of these regulations, we would consult under section 7 of the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 et seq.), to ensure that any applications for exploration in the section 1002 area of the Arctic Refuge are not likely to jeopardize the continued existence of any species designated as endangered or threatened, or modify or destroy its critical habitat, and that the regulations are consistent with conservation programs for those species. Consultation under section 7 of the Act for the regulations may cause us to change these proposed regulations. Our biological opinion resulting from the section 7 consultation will be a

public document available from the person listed under **FOR FURTHER INFORMATION CONTACT** or via *http://www.regulations.gov* in Docket No. FWS–R7–NWRS–2017–0072.

Required Determinations

Executive Order 13771—Reducing Regulation and Controlling Regulatory Costs

This proposed rule is considered to be an Executive Order (E.O.) 13771 deregulatory action (82 FR 9339, February 3, 2017) because it would amend regulations that currently restrict the dates when a permit application for an exploration plan for the Arctic Refuge would be allowed.

Regulatory Planning and Review (Executive Order 12866 and 13563)

The Office of Management and Budget (OMB) has determined that this rule is not significant. OMB bases its determination upon the following four criteria:

(a) Whether the rule will have an annual effect of $100 million or more on the economy or adversely affect an economic sector, productivity, jobs, the environment, or other units of the government.

(b) Whether the rule will create inconsistencies with other agencies' actions.

(c) Whether the rule will materially affect entitlements, grants, user fees, loan programs, or the rights and obligations of their recipients.

(d) Whether the rule raises novel legal or policy issues.

The proposed rule would remove the regulations that restrict the dates when a permit application may be submitted for a geophysical exploration plan on the section 1002 area in the Arctic Refuge. Thus, this rule would open the process to accept oil exploration applications for

the section 1002 area. Under the proposed rule as an administrative action, potential costs would be limited to application costs incurred by companies choosing to submit applications and by the Service to process the applications.

This analysis is limited in scope and addresses only the administrative action by the Service to accept and review new exploration plans in the Arctic Refuge. Therefore, this analysis does not evaluate costs and benefits related to the issuance of special use permits for specific exploration plans as the details of those plans are currently unknown, and the analysis would be speculative in regards to methods, location, and timing of the exploration activities. Furthermore, the review and approval process for a special use permit in the Arctic Refuge must undergo a separate process under the National Environmental Policy Act (NEPA). ~~Geological exploration and assessment undertakings under the NEPA process could include a number of activities such as seismic testing, aerial surveying, road construction, and more.~~ These exploratory activities have potential impacts including, but not limited to: polar bear viewing tourism, subsistence hunting (especially caribou) by residents, and cultural use by Alaska Natives. Furthermore, "available information indicates that any ANWR oil would be scattered among multiple smaller fields rather than concentrated in a single large field, which would make development more expensive and potentially expand the area in which any environmental effects might occur" (Congressional Research Service 2015).

Measures such as Secretarial Order No. 3352 have occurred to move forward toward energy development in the Arctic Refuge (Department of the Interior May 2017). However, Section 1003 of ANILCA states "production of oil and gas from the Arctic National Wildlife Refuge is prohibited and no leasing or other development leading to production of oil and gas

Commented [BS10]: We are speculating what activities would be proposed – we think this should be removed

Commented [LS11]: Should we put (Arctic Refuge) behind this? First time ANWR is used in this doc

from the [Refuge] shall be undertaken until authorized by an act of Congress." Therefore, this analysis does not estimate the potential costs and benefits of oil drilling and extraction.

With this proposed rule, we solicit public input on potential economic impacts and the number of businesses affected to help quantify costs and benefits. Please see the **Request for Comments** section at the end of **SUPPLEMENTARY INFORMATION** for further information about submitting comments.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions) (5 U.S.C. 601 et seq.). However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule would not have a significant economic impact on a substantial number of small entities. Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for "significant impact" and a threshold for a "substantial number of small entities." See 5 U.S.C. 605(b). SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule would not have a significant economic impact on a substantial number of small entities.

The U.S. Small Business Administration (SBA) defines a small business as one with annual revenue or employment that meets or is below an established size standard. To assess the effects of the proposed rule on small entities, we focus on businesses that operate and/or develop

oil gas field properties (North American Industry Classification System (NAICS) 211) that have fewer than 500 employees. According to the U.S. Census Bureau, there are 8,064 businesses under NAICS 211, of which over 99 percent qualify as small businesses (2012). Thus, we expect that most entities that may apply for a special use permit would be considered small as defined by the SBA.

Under the proposed rule, individual businesses would have the opportunity to submit applications for a geological and geophysical exploration plan on the section 1002 area in the Arctic Refuge. Although estimating the number of potential future applicants would be speculative, the last seismic survey (completed in 1985) was conducted by 27 companies under 1 permit. If 27 individual companies applied for separate special use permits under the proposed rule, this would represent less than 1 percent of small businesses.

We therefore certify that this proposed rule would not have a significant economic effect on a substantial number of small entities as defined under the Regulatory Flexibility Act (5 U.S.C. 601 et seq.). A Regulatory Flexibility Analysis is not required. Accordingly, a Small Entity Compliance Guide is not required.

Small Business Regulatory Enforcement Fairness Act

This proposed rule is not a major rule under 5 U.S.C. 804(2), the Small Business Regulatory Enforcement Fairness Act. This rule:

a. Would not have an annual effect on the economy of $100 million or more.

b. Would not cause a major increase in costs or prices for consumers; individual industries; Federal, State, tribal, or local government agencies; or geographic regions.

c. Would not have significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of U.S.-based enterprises to compete with foreign-based enterprises.

Unfunded Mandates Reform Act

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.), we have determined the following:

a. This rule would not ''significantly or uniquely'' affect small governments. A small government agency plan is not required. Actions under the proposed rule would not affect small government activities in any significant way.

b. This rule would not produce a Federal mandate of $100 million or greater in any year. It would not be a ''significant regulatory action'' under the Unfunded Mandates Reform Act.

Takings (Executive Order 12630)

In accordance with E.O. 12630, this proposed rule would not have significant takings implications. A takings implication assessment is not required. This proposed rule does not contain a provision for taking of private property.

Federalism (Executive Order 13132)

This proposed rule does not have sufficient Federalism effects to warrant preparation of a federalism summary impact assessment under E.O. 13132. It would not interfere with the ability of States to manage themselves or their funds. This proposed rule, if adopted, would affect the

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geological exploration of the coastal plain of the Arctic Refuge, which is managed by the Service in Alaska, and would not have a substantial direct effect on State or local governments in Alaska.

Civil Justice Reform (Executive Order 12988)

In accordance with E.O. 12988, the Office of the Solicitor has determined that this proposed rule does not unduly burden the judicial system and meets the requirements of sections 3(a) and 3(b)(2) of E.O. 12988.

Paperwork Reduction Act

This rule does not contain any new collection of information that require approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). OMB has previously approved the information collection requirements associated with Service Special Use Permit Applications (FWS Form 3–2469) and assigned OMB Control Number 1018–0162 (expires December 31, 2019). An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act

Our draft environmental assessment is part of the administrative record for this proposed rule. In accordance with the National Environmental Policy Act (NEPA, 42 U.S.C. 4321 et seq.) and part 516 of the U.S. Department of the Interior Manual (516 DM), the Service proposes amending the existing language in 50 CFR Part 37—Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska, related to exploration plans [50 CFR

37.21(b) and (c)], to remove the date restrictions now in place for those plans. Our draft environmental assessment sets forth that the proposed action to change the regulatory language as described in the rule portion of this document will have no significant impacts on the environment.

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we will evaluate the potential effects on federally recognized Alaska Native tribal governments and Alaska Native corporations through a 810 analysis. . This rule would not interfere with the ability of Tribes to manage themselves or their funds or to regulate exploration activities on Tribal lands. However, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis, and we are seeking their input to evaluate this proposed rule. In addition, we have evaluated this proposed rule under Alaska Native Claims Settlement Act corporation policies. We will consult with Alaska Native tribes and Alaska Native corporations regarding the proposed changes in this rule for the Arctic Refuge.

Commented [BS12]: We do not like the wording of this – we have not evaluated the potential effects – we have not completed a 810 analysis -

Commented [BS13]: We have not consulted on this rulemaking -

Energy Supply, Distribution, or Use (Executive Order 13211)

Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking actions that could have significant adverse effects on energy supply, distribution, or use. We believe that the rule could have positive effects on energy supplies, distribution, or use.

Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.

Clarity of This Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

(a) Be logically organized;

(b) Use the active voice to address readers directly;

(c) Use common, everyday words and clear language rather than jargon;

(d) Be divided into short sections and sentences; and

(e) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in **ADDRESSES**, above. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that you find unclear, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

List of Subjects in 50 CFR Part 37

Administrative practice and procedure, Alaska, Environmental protection, Historic preservation, Oil and gas exploration, Penalties, Reporting and recordkeeping requirements, Surety bonds, and Wildlife refuges.

Proposed Regulation Promulgation

Accordingly, we propose to amend part 37 of title 50 of the Code of Federal Regulations as set forth below:

PART 37—GEOLOGICAL AND GEOPHYSICAL EXPLORATION OF THE COASTAL PLAIN, ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

1. The authority citation for part 37 is revised to read as follows:

AUTHORITY: 5 U.S.C. 301; 16 U.S.C. 715s and 3142; and 31 U.S.C. 9701.

2. Amend § 37.21 by revising paragraphs (b) and (c) to read as follows:

§ 37.21 Application requirements.

* * * * *

(b) Any person wanting to conduct exploratory activities may apply for a special use permit by submitting for review and processing one or more written exploration plans, in triplicate, to the Regional Director, Region 7, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503.

(c) In addition to containing the information required in paragraph (d) of this section, any exploration plan submitted shall describe the applicant's plan for carrying out an integrated program of exploratory activities in such a manner as will satisfy the objective and limitations stated in § 37.1. If an applicant submits an exploration plan in any given year, with the intention of submitting another exploration plan the following year, the applicant shall describe in its initial plan how its future exploratory activities will be integrated with those proposed under its initial plan. Each exploration plan submitted must be published and be the subject of a public hearing in accordance with requirements of § 37.22(b).

* * * * *

§ 37.52 [Amended]

3. Amend § 37.52 by:

a. In the first sentence, removing the period and adding in its place a comma and the words “for 3 years from the date the permittee submits the data and information to the Regional Director pursuant to § 37.53.”; and

b. In the second sentence, removing the words “Until September 2, 1989, the” and adding in their place the word “The”.

Dated: _____.

_____

Principal Deputy Assistant Secretary for Fish and Wildlife and Parks.

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From:	Hopper, Katy
To:	Campbell, Douglas; Diana Biesanz; Janet Bruner; A Alvarez
Subject:	Fwd: Final OMB-cleared QFRs on Arctic
Date:	Thursday, November 16, 2017 1:53:41 PM
Attachments:	1002 Area SENR Hearing QFRs 11.15.17 FINAL.pdf

FYI

Katy Hopper
NWRS, Division of Budget, Performance and Workforce
Supporting Division of Realty
U.S. Fish and Wildlife Service
703-358-2515

---------- Forwarded message ----------
From: **Helfrich, Devin** <devin_helfrich@fws.gov>
Date: Thu, Nov 16, 2017 at 3:41 PM
Subject: Final OMB-cleared QFRs on Arctic
To: Amee Howard <amee_howard@fws.gov>, Mitch Ellis <mitch_ellis@fws.gov>, Socheata Lor <socheata_lor@fws.gov>, "Damberg, Doug" <doug_damberg@fws.gov>, Sara Boario <sara_boario@fws.gov>, "Fox, Joanna" <joanna_fox@fws.gov>, Greg Siekaniec <greg_siekaniec@fws.gov>, Karen Clark <karen_clark@fws.gov>
Cc: "Martin Kodis (Marty)" <martin_kodis@fws.gov>, Angela Gustavson <angela_gustavson@fws.gov>, Cynthia Martinez <cynthia_martinez@fws.gov>, Shaun Sanchez <shaun_sanchez@fws.gov>, "Katherine (Ketti) Spomer" <katherine_spomer@fws.gov>, Katy Hopper <katy_hopper@fws.gov>, Vanessa Kauffman <vanessa_kauffman@fws.gov>, Gavin Shire <gavin_shire@fws.gov>, Hillary Harms <hillary_harms@fws.gov>, Edith Thompson <edith_thompson@fws.gov>, Robert Williams <robert_l_williams@fws.gov>

Hello all,

Attached and pasted below are the final OMB-cleared and submitted DOI answers to **QFRs** from the November 2 **Arctic NWR** Senate Energy and Natural Resources hearing.

Thank you all for your hard and stressful work on this one.

As you likely know, yesterday the committee favorably marked-up the Chairman's mark and sent it on to the Senate Budget Committee to (most likely) package with the tax language from the Senate Finance Committee. The SENR final passage vote was party-line except for **Sen. Manchin** (D-WV).

The Senate version of the **entire tax package** is then expected on the Senate floor soon after the Thanksgiving week recess.

Sen. Cantwell will likely offer another amendment on the Senate floor to strip the Arctic NWR language from the tax package (if it is included as expected).

Best,

Devin Helfrich
Congressional Legislative Affairs Specialist
U.S. Fish and Wildlife Service
Office Direct: (703) 358-2130
Mobile: (202) 365-5971

Questions from Ranking Member Maria Cantwell

Question 1: Your testimony states that the Administration supports oil and gas development in the Arctic National Wildlife Refuge. The Fish and Wildlife Service is charged with managing the Arctic refuge "to protect fish and wildlife and their habitat in their natural diversity."

The Arctic refuge Coastal Plain is a critical calving area for the Porcupine Caribou herd —as your testimony notes—and almost the entire area has been designated as critical habitat for polar bears, which are listed as a threatened species under the Endangered Species Act.

What analysis did the Administration undertake in assessing the impact of oil development on its obligation to protect the Arctic refuge and its wildlife, including a polar bear population that is listed under the Endangered Species Act, before deciding to promote oil development in the refuge?

Response: The Alaska National Interest Lands Conservation Act (ANILCA) reserved the decision to develop oil and gas resources in the 1002 area for Congress. The Administration supports legislation to authorize that development. We will follow all applicable laws, including the Endangered Species Act, the Marine Mammal Protection Act, the National Wildlife Refuge System Administration Act, and the National Environmental Policy Act, to analyze potential effects of developing oil and gas resources in the 1002 area and determine compatibility with established purposes for the refuge. Environmental reviews will identify potential measures to avoid or reduce impacts to wildlife and habitat and ensure that development, if authorized, proceeds in a way that is consistent with all applicable laws. In addition, the Department will use the best practices learned from development within the National Petroleum Reserve Alaska (NPRA), which is very similar to the 1002 area, to make sure we are thorough in our reviews and surveys and that we avoid or reduce impacts to the

greatest extent possible.

<u>Question 2</u>: Do you agree that oil development in one of the most pristine and ecologically important national wildlife refuges in the country should be undertaken only if consistent with all environmental laws?

Response: Yes. Only Congress can authorize oil and gas development in the 1002 area. If authorized by Congress, development would only be undertaken in a manner consistent with all applicable environmental laws and Congressional intent.

<u>Question 3</u>: Do you agree that allowing an oil field to be developed inside a national wildlife refuge is a major federal action requiring a full public process and the development of an environmental impact statement in accordance with the National Environmental Policy Act?

Response: Yes.

<u>Question 4:</u> The 2015 Comprehensive Conservation Plan (CCP) for the Arctic Refuge was the result of years of scientific work and public input. As part of the plan, the US Fish and Wildlife Service recommended that the Coastal Plain of the Arctic Refuge be designated as wilderness.

In your testimony, you mentioned the original CCP but did not mention the current CCP, which is the Fish and Wildlife Service's most recent scientific review of the Refuge, management policy for the Refuge, and recommendations to Congress.

Is the Arctic Refuge still being managed according to this plan?

Response: Yes, the refuge is managed according to the current Comprehensive Conservation Plan (CCP). If Congress enacts legislation that authorizes oil and gas development in the 1002 area, we will modify the CCP as needed to continue to minimize impacts and remain consistent with Congressional intent.

<u>Question 5:</u> Is current Department of the Interior leadership committed to the scientific

analysis behind the 2015 Comprehensive Conservation Plan for the Arctic National Wildlife Refuge?

Response: The 2015 CCP is the current management plan for the Arctic National Wildlife Refuge, and the USFWS continues to administer the refuge consistent with this plan and its underlying science. If Congress enacts legislation that authorizes oil and gas development in the 1002 area, we will modify the 2015 CCP as needed.

Questions from Senator Ron Wyden

<u>Question 1</u>: Mr. Sheehan, in your spoken testimony you referred to research and best practices to avoid complications from drilling. But I am still concerned that drilling could seriously damage the pristine nature of the Refuge. We've heard that using ice pads and ice roads can reduce the environmental footprint of drilling, but the Refuge has a hillier terrain and less standing water than other drill sites on the North Slope. That means it could be harder to use ice drilling techniques in the Refuge.

Given the lack of drilling experience in the uniquely-rugged terrain of the Refuge, how can the Administration be certain that oil exploration and production won't damage the Refuge?

Response: ANILCA reserved the decision to develop oil and gas resources in the 1002 area for Congress. The Administration supports legislation to authorize that development. We will follow all applicable laws to analyze potential effects; determine compatibility with established purposes for the refuge; recommend measures to avoid or reduce impacts; and ensure that development proceeds in a way that is consistent with all applicable laws. If development of oil and gas resources in the 1002 area is authorized, the environmental review process would identify potential environmental effects as well as opportunities to avoid or reduce adverse impacts to the greatest extent possible by utilizing best practices and lessons learned from development in similar terrain in Alaska.

<u>Question 2</u>: I am also concerned about the potential for oil spills. We've heard that drilling technology has advanced, but oil spills still happen. In fact, since 2009 tens of thousands of gallons of crude oil and drilling fluids have spilled on the North Slope, damaging waters and local wildlife.

Since oil spills have happened in places where there's a longer history of drilling, how could a spill prevention or disaster recovery plan for the Refuge be credible?

How much access would disaster recovery crews have to respond to a spill in the Refuge?

Response: ANILCA reserved the decision to develop oil and gas resources in the coastal plain of the 1002 area for Congress. The Administration supports legislation to authorize that development. We will follow all applicable environmental laws to analyze potential effects and recommend measures to avoid or reduce impacts.

The USFWS and the Bureau of Land Management (BLM) both play important roles in ensuring involved parties are committed to preventing spills and have a credible disaster recovery plan in place. A credible spill prevention or disaster recovery plan will establish best management practices that will include the deployment of recovery crews, which should reduce the potential for spills and reduce the effects of spills.

The BLM is responsible for ensuring that EPA requirements including the EPA's Spill Prevention, Control, and Countermeasure (SPCC) Plan and the Facility Response Plan (FRP) rules are followed. The intent behind the SPCC rule is to prevent a discharge of oil into navigable waters or adjoining shorelines and to control a spill should one occur. The FRP rule requires operators to submit response plans developed to respond to a worst-case oil discharge or threat of a discharge.

In addition, the BLM will utilize lessons learned and best practices from similar areas such as the NPRA to operate and development in the most safe and least intrusive manner possible. As you mentioned and as was illustrated at the hearing, exploration and development technology has made great progress over the years. The Department is confident that any future development can be done in a safe and mitigated manner that is consistent with the same environmental laws and safeguards that govern every other development and production project. I would also reiterate Secretary Zinke's sentiments from his budget and confirmation hearings that development should happen under reasonable environmental regulations in the United States rather than countries overseas whose regulations are slim to none.

In response to your question on access, if there was an oil pipeline spill in the 1002 area, response personnel would be able to utilize the access roads adjacent to pipelines. If oil and gas development in the 1002 area was authorized by Congress and initiated, roads would be constructed to provide access to the pipeline for routine maintenance, spill prevention, and emergency response. Helicopters can also be used as a reliable source to help determine the initial spill area and quickly bring first responders to the site.

Questions from Senator Bernard Sanders

<u>Question 1</u>: Do you agree with the vast majority of scientists that climate change is real, it is caused by human activity, and that we must aggressively transition away from fossil fuels toward energy efficiency and sustainable energy like wind, solar, and geothermal?

Response: As I stated at the hearing, I believe that climate change is real. I am not an expert or a climate scientist, but I believe it is caused at least in part by human activity. As Principal Deputy Director of the U.S. Fish and Wildlife Service, I am not responsible for developing the Administration's energy policy. However, as I indicated at the hearing, I am aware that the Administration supports securing our energy future by developing an all-of-the above energy strategy.

<u>Question 2</u>: Do you agree with the vast majority of scientists that the combustion of fossil fuels contributes to climate change?

Response: I am not an expert or a climate scientist, but I believe combustion of fossil fuels contributes to climate change.

<u>Question 3</u>: During your testimony, you said that the Trump administration is being "forward looking" with regard to advancing renewable energy technologies. However, the Administration's proposed budget has called for a 70% cut to the Department of Energy Office of Energy Efficiency and Renewable Energy (EERE) and zeroing out of ARPA-E. Additionally, the Administration has announced its intention to leave the Paris Climate Accord and proposed to repeal the Clean Power Plan. Can you please explain how such actions are helping advance renewable energy technology? Can you please provide any examples of ways the Trump Administration has increased support for renewable energy since taking office?

Response: While I cannot speak to the Department of Energy's budget request, the America First Energy Plan is an "all-of-the-above" approach that includes oil and gas, coal, hydropower and renewable resources. The FY 2018 Budget requests funds for onshore and offshore renewable energy development at a level that is expected to address current industry demand. The Department is also taking steps to improve its leasing processes, including implementation of BLM's competitive leasing rule. This will support a competitive leasing process for solar and wind energy development. The rulemaking updates and codifies acreage rent and megawatt capacity fees for wind and solar energy projects, establishes a new rate adjustment method that provides greater certainty and fair return for use of the public lands, provides incentives for leases within designated leasing areas, updates project bonding

requirements, and incorporates sensible solar and wind energy policies into the right-of-way regulations. In March, 2017, the Secretary announced the completion of the nation's seventh competitive lease sale for renewable wind energy in federal waters. BOEM also this year marked the operational launch of the nation's first commercial offshore wind farm – the five-turbine, 30 megawatt Block Island Wind Facility.

Question 4: **Scientists tell us that we must work to keep fossil fuels in the ground if we are to avoid the most dangerous impacts of climate change. The U.S. Geological Survey estimates that more than 10 billion barrels of recoverable oil could be held in the Arctic Refuge. How does extracting this oil from the Arctic Refuge help the U.S. transform its energy system, as quickly as possible, from one based on carbon-intensive fuels to one based on clean, sustainable sources?**

Response: As Principal Deputy Director of the USFWS, I am not responsible for developing the Administration's energy policy. However, as I stated at the hearing, I am aware that the Administration supports developing energy from all sources, including fossil fuel sources. Fossil fuels serve as a major energy source that remains in high demand to meet immediate and shorter term energy needs.

Question 5: **According to the State of Alaska, there have been over 640 oil spills on Alaska's North Slope since 1995, 13 of which were greater than 10,000 gallons. Since 2009, tens of thousands of gallons of crude oil and drilling fluids have spilled on the North Slope.**

In April, a BP oil well leaked crude oil and gas for several days due to damage caused by pressure from thawing permafrost. The Alaska Oil and Gas Conservation Commission issued an emergency order to review all wells on the North Slope of Alaska due to the threat posed by warming permafrost.

Do you agree with the Alaska Oil and Gas Conservation Commission that warming permafrost poses a threat to fossil fuel infrastructure? If not, why not? What specific technology can guarantee no spills in the face of melting permafrost?

Response: According to BLM, warming permafrost does pose a risk to older production wells, such as the example of the BP well referenced in your question. Modern wells, such as what could be developed in the 1002 area, do not carry the same level of risk because the surface casing extends completely below the permafrost zone. Surface casing is the protective pipe that houses the production strings. The surface casing also provides a heat buffer that prevents thaw while producing warm fluids (they are captured in a separate string contained within the surface casing). In the BP example, the surface casing did not extend through the permafrost zone. With the surface casing being a rigid pipe, melting permafrost will not bend

or fracture the casing. It is cemented in place at the surface by specially designed cement specific for permafrost and arctic conditions. Any changes or movement of the pipe will be noticed at the surface where the well integrity can be determined. This issue is alleviated further by having many wellheads contained within a single pad, thus making detection easier as all would be routinely inspected as a group.

All potential impacts on new oil and gas infrastructure—including that from permafrost melt—would be assessed and appropriately addressed by environmental reviews under applicable laws.

Can you provide an example of an oil well on the scale of the $1 billion dollar project proposed in the 1002 area of the Arctic Refuge that has not had a spill?

Response: According to BLM, clarification would need to be provided if the question refers to an incidental spill or a large spill. To prevent spills of any size the operator must maintain a strict inspection and maintenance schedule that meet federal requirements.

<u>Question 6</u>: The Arctic Refuge is home to hundreds of plant and wildlife species, including America's most iconic animals such as polar bears, grizzly bears, musk ox, wolves and caribou.

This area includes more polar bear den sites than any other area on the north coast of Alaska and has been designated as a critical habitat for these threatened animals, which are listed as a threatened species under the Endangered Species Act.

The Arctic Refuge is also the nesting ground for millions of birds, including waterfowl such as Northern Pintail and Tundra Swans, which migrate from all 50 states.

What specific technology can guarantee that the infrastructure and technology used for extraction does not adversely affect this pristine ecosystem?

Response:

If development of oil and gas resources in the 1002 area is authorized, the environmental review process would identify potential environmental effects as well as opportunities to minimize adverse impacts to the greatest extent possible. ANILCA reserved the decision to

develop oil and gas resources in the 1002 area for Congress. The Administration supports legislation to authorize that development and will follow all applicable laws to analyze effects, avoid or reduce effects, including through the evaluation of technology to avoid or reduce effects as much as practicable, so that development would be consistent with all applicable laws.

What specific technology can guarantee that the infrastructure and technology used for extraction does not violate the Endangered Species Act?

Response: ANILCA reserved the decision to develop oil and gas resources in the 1002 area for Congress. The Administration supports legislation to authorize that development. We will follow all applicable laws, including the Endangered Species Act ESA), the Marine Mammal Protection Act, the National Wildlife Refuge System Administration Act, and the National Environmental Policy Act, to analyze potential effects; determine compatibility with established purposes for the refuge; recommend measures to avoid or reduce impacts; and ensure that development proceeds in a way that is consistent with all applicable laws, including Section 7 of the ESA.

Question 7: **Nearly 200,000 Porcupine Caribou, currently the only healthy caribou herd in North America, birth their calves in the Arctic Refuge. Disrupting these calving grounds could have a significant adverse impact on the herd's continued health.**

What specific measures and technology can guarantee that the infrastructure used for extraction does not adversely impact this herd?

Response: ANILCA reserved the decision to develop oil and gas resources in the 1002 area for Congress. The Administration supports legislation to authorize that development. We will follow all applicable laws to analyze potential effects; determine compatibility with established purposes for the refuge; recommend measures to avoid or reduce impacts; and ensure that development proceeds in a way that is consistent with all applicable laws. If Congress enacts legislation to authorize oil and gas development in the 1002 area, environmental review, siting criteria, and recommended measures to avoid or reduce impacts will help avoid or reduce adverse effects to ensure the herd's health. It is worth noting that the caribou herd migrates through areas where development is currently occurring, particularly the NPRA, and the herd has continued to healthily grow while maintaining its migration patterns.

The herd is also an essential part of life for the Gwichyaa Zhee Gwich'in Nation. The Nation has survived off the food from the herd for 20,000 years and the land where the

herd lives is sacred.

What specific measures and technology can guarantee that the infrastructure and equipment used for extraction does not disrupt the Gwich'in Nation and preserves their relationship with the herd?

Response: The USFWS recognizes that Alaska Native people are spiritually, physically, culturally, and historically connected to the land, wildlife, and waters. If Congress enacts legislation to authorize oil and gas development in the 1002 area, we will, through consultation with all affected tribes, identify concerns and establish measures to avoid or reduce impacts to the Porcupine Caribou Herd, along with other impacts of concern to Alaska Natives. Consultation will provide an opportunity to identify and address potential disruptions with respect for the Gwich'in Nation's cultural and spiritual relationship with the coastal plain of the 1002 area and the caribou. This consultation will also include the Iñupiat people who have lived off the land and the wildlife for thousands of years. As I am sure you remember, Mr. Rexford testified on behalf of Kaktovic and the Iñupiat people in support of developing the 1002 area. Should development be authorized, we look forward to a complete and thorough consultation process.

Question 8: **The average lease sale per acre on the neighboring North Slope is $194 per acre. In order to meet the Senate reconciliation instructions to the Senate Committee of Energy and Natural Resources, every single acre in the Coastal Plain would need to be leased at an average rate of $1,333 per acre. What is the likelihood that every acre in the Coastal Plain would be sold at this rate? Describe the specific modeling and methods used to estimate the revenue that would be generated from leases on the Coastal Plain.**

Response: Estimates for how much companies may bid for leases in the 1002 area, should leasing be authorized, involve a number of assumptions, considerations and variables that are inherently uncertain. What we do know is that the 1002 area contains the largest undeveloped oil resources discovered in the United States and state oil and gas lease sales demonstrate industry interest in the region. In its analysis of the Committee's legislation, the Congressional Budget Office concluded that, based on historical information and information from the Department, the Energy Information Administration, and industry, bonus bids alone would result in over $2 billion in Federal revenues over 10 years, with $1 billion in deficit reduction and another $1 billion in revenues that would be shared with the State of Alaska under the bill.

U.S. Senate Committee on Energy and Natural Resources
November 2, 2017 Hearing: ***The Potential for Oil and Gas Exploration and Development in the Non-Wilderness Portion of the Arctic National Wildlife Refuge, Known as the "1002 Area" or Coastal Plain, to Raise Sufficient Revenue Pursuant to the Senate Reconciliation Instructions included in H. Con. Res. 71***
Questions for the Record Submitted to Mr. Greg Sheehan

Questions from Ranking Member Maria Cantwell

Question 1: Your testimony states that the Administration supports oil and gas development in the Arctic National Wildlife Refuge. The Fish and Wildlife Service is charged with managing the Arctic refuge "to protect fish and wildlife and their habitat in their natural diversity."

The Arctic refuge Coastal Plain is a critical calving area for the Porcupine Caribou herd—as your testimony notes—and almost the entire area has been designated as critical habitat for polar bears, which are listed as a threatened species under the Endangered Species Act.

What analysis did the Administration undertake in assessing the impact of oil development on its obligation to protect the Arctic refuge and its wildlife, including a polar bear population that is listed under the Endangered Species Act, before deciding to promote oil development in the refuge?

Response: The Alaska National Interest Lands Conservation Act (ANILCA) reserved the decision to develop oil and gas resources in the 1002 area for Congress. The Administration supports legislation to authorize that development. We will follow all applicable laws, including the Endangered Species Act, the Marine Mammal Protection Act, the National Wildlife Refuge System Administration Act, and the National Environmental Policy Act, to analyze potential effects of developing oil and gas resources in the 1002 area and determine compatibility with established purposes for the refuge. Environmental reviews will identify potential measures to avoid or reduce impacts to wildlife and habitat and ensure that development, if authorized, proceeds in a way that is consistent with all applicable laws. In addition, the Department will use the best practices learned from development within the National Petroleum Reserve Alaska (NPRA), which is very similar to the 1002 area, to make sure we are thorough in our reviews and surveys and that we avoid or reduce impacts to the greatest extent possible.

Question 2: Do you agree that oil development in one of the most pristine and ecologically important national wildlife refuges in the country should be undertaken only if consistent with all environmental laws?

Response: Yes. Only Congress can authorize oil and gas development in the 1002 area. If authorized by Congress, development would only be undertaken in a manner consistent with all applicable environmental laws and Congressional intent.

Question 3: **Do you agree that allowing an oil field to be developed inside a national wildlife refuge is a major federal action requiring a full public process and the development**

of an environmental impact statement in accordance with the National Environmental Policy Act?

Response: Yes.

Question 4: The 2015 Comprehensive Conservation Plan (CCP) for the Arctic Refuge was the result of years of scientific work and public input. As part of the plan, the US Fish and Wildlife Service recommended that the Coastal Plain of the Arctic Refuge be designated as wilderness.
In your testimony, you mentioned the original CCP but did not mention the current CCP, which is the Fish and Wildlife Service's most recent scientific review of the Refuge, management policy for the Refuge, and recommendations to Congress.

Is the Arctic Refuge still being managed according to this plan?

Response: Yes, the refuge is managed according to the current Comprehensive Conservation Plan (CCP). If Congress enacts legislation that authorizes oil and gas development in the 1002 area, we will modify the CCP as needed to continue to minimize impacts and remain consistent with Congressional intent.

Question 5: Is current Department of the Interior leadership committed to the scientific analysis behind the 2015 Comprehensive Conservation Plan for the Arctic National Wildlife Refuge?

Response: The 2015 CCP is the current management plan for the Arctic National Wildlife Refuge, and the USFWS continues to administer the refuge consistent with this plan and its underlying science. If Congress enacts legislation that authorizes oil and gas development in the 1002 area, we will modify the 2015 CCP as needed.

Questions from Senator Ron Wyden

Question 1: Mr. Sheehan, in your spoken testimony you referred to research and best practices to avoid complications from drilling. But I am still concerned that drilling could seriously damage the pristine nature of the Refuge. We've heard that using ice pads and ice roads can reduce the environmental footprint of drilling, but the Refuge has a hillier terrain and less standing water than other drill sites on the North Slope. That means it could be harder to use ice drilling techniques in the Refuge.

Given the lack of drilling experience in the uniquely-rugged terrain of the Refuge, how can the Administration be certain that oil exploration and production won't damage the Refuge?

Response: ANILCA reserved the decision to develop oil and gas resources in the 1002 area for Congress. The Administration supports legislation to authorize that development. We will follow all applicable laws to analyze potential effects; determine compatibility with established purposes for the refuge; recommend measures to avoid or reduce impacts; and ensure that development proceeds in a way that is consistent with all applicable laws. If development of oil and gas resources in the 1002 area is authorized, the environmental review process would identify potential environmental effects as well as opportunities to avoid or reduce adverse impacts to the greatest extent possible by utilizing best practices and lessons learned from development in similar terrain in Alaska.

<u>Question 2</u>: I am also concerned about the potential for oil spills. We've heard that drilling technology has advanced, but oil spills still happen. In fact, since 2009 tens of thousands of gallons of crude oil and drilling fluids have spilled on the North Slope, damaging waters and local wildlife.

Since oil spills have happened in places where there's a longer history of drilling, how could a spill prevention or disaster recovery plan for the Refuge be credible?

How much access would disaster recovery crews have to respond to a spill in the Refuge?

Response: ANILCA reserved the decision to develop oil and gas resources in the coastal plain of the 1002 area for Congress. The Administration supports legislation to authorize that development. We will follow all applicable environmental laws to analyze potential effects and recommend measures to avoid or reduce impacts.

The USFWS and the Bureau of Land Management (BLM) both play important roles in ensuring involved parties are committed to preventing spills and have a credible disaster recovery plan in place. A credible spill prevention or disaster recovery plan will establish best management practices that will include the deployment of recovery crews, which should reduce the potential for spills and reduce the effects of spills.

The BLM is responsible for ensuring that EPA requirements including the EPA's Spill Prevention, Control, and Countermeasure (SPCC) Plan and the Facility Response Plan (FRP) rules are followed. The intent behind the SPCC rule is to prevent a discharge of oil into navigable waters or adjoining shorelines and to control a spill should one occur. The FRP rule requires operators to submit response plans developed to respond to a worst-case oil discharge or threat of a discharge.

In addition, the BLM will utilize lessons learned and best practices from similar areas such as the NPRA to operate and development in the most safe and least intrusive manner possible. As you

mentioned and as was illustrated at the hearing, exploration and development technology has made great progress over the years. The Department is confident that any future development can be done in a safe and mitigated manner that is consistent with the same environmental laws and safeguards that govern every other development and production project. I would also reiterate Secretary Zinke's sentiments from his budget and confirmation hearings that development should happen under reasonable environmental regulations in the United States rather than countries overseas whose regulations are slim to none.

In response to your question on access, if there was an oil pipeline spill in the 1002 area, response personnel would be able to utilize the access roads adjacent to pipelines. If oil and gas development in the 1002 area was authorized by Congress and initiated, roads would be constructed to provide access to the pipeline for routine maintenance, spill prevention, and emergency response. Helicopters can also be used as a reliable source to help determine the initial spill area and quickly bring first responders to the site.

Questions from Senator Bernard Sanders

Question 1: **Do you agree with the vast majority of scientists that climate change is real, it is caused by human activity, and that we must aggressively transition away from fossil fuels toward energy efficiency and sustainable energy like wind, solar, and geothermal?**

Response: As I stated at the hearing, I believe that climate change is real. I am not an expert or a climate scientist, but I believe it is caused at least in part by human activity. As Principal Deputy Director of the U.S. Fish and Wildlife Service, I am not responsible for developing the Administration's energy policy. However, as I indicated at the hearing, I am aware that the Administration supports securing our energy future by developing an all-of-the above energy strategy.

Question 2: **Do you agree with the vast majority of scientists that the combustion of fossil fuels contributes to climate change?**

Response: I am not an expert or a climate scientist, but I believe combustion of fossil fuels contributes to climate change.

Question 3: **During your testimony, you said that the Trump administration is being "forward looking" with regard to advancing renewable energy technologies. However, the Administration's proposed budget has called for a 70% cut to the Department of Energy Office of Energy Efficiency and Renewable Energy (EERE) and zeroing out of ARPA-E. Additionally, the Administration has announced its intention to leave the Paris Climate**

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issued an emergency order to review all wells on the North Slope of Alaska due to the threat posed by warming permafrost.

Do you agree with the Alaska Oil and Gas Conservation Commission that warming permafrost poses a threat to fossil fuel infrastructure? If not, why not? What specific technology can guarantee no spills in the face of melting permafrost?

Response: According to BLM, warming permafrost does pose a risk to older production wells, such as the example of the BP well referenced in your question. Modern wells, such as what could be developed in the 1002 area, do not carry the same level of risk because the surface casing extends completely below the permafrost zone. Surface casing is the protective pipe that houses the production strings. The surface casing also provides a heat buffer that prevents thaw while producing warm fluids (they are captured in a separate string contained within the surface casing). In the BP example, the surface casing did not extend through the permafrost zone. With the surface casing being a rigid pipe, melting permafrost will not bend or fracture the casing. It is cemented in place at the surface by specially designed cement specific for permafrost and arctic conditions. Any changes or movement of the pipe will be noticed at the surface where the well integrity can be determined. This issue is alleviated further by having many wellheads contained within a single pad, thus making detection easier as all would be routinely inspected as a group.

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What specific technology can guarantee that the infrastructure and technology used for extraction does not adversely affect this pristine ecosystem?

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What specific technology can guarantee that the infrastructure and technology used for extraction does not violate the Endangered Species Act?

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What specific measures and technology can guarantee that the infrastructure and equipment used for extraction does not disrupt the Gwich'in Nation and preserves their relationship with the herd?

Response: The USFWS recognizes that Alaska Native people are spiritually, physically, culturally, and historically connected to the land, wildlife, and waters. If Congress enacts legislation to authorize oil and gas development in the 1002 area, we will, through consultation with all affected tribes, identify concerns and establish measures to avoid or reduce impacts to the Porcupine Caribou Herd, along with other impacts of concern to Alaska Natives. Consultation will provide an opportunity to identify and address potential disruptions with respect for the Gwich'in Nation's cultural and spiritual relationship with the coastal plain of the 1002 area and the caribou. This consultation will also include the Iñupiat people who have lived off the land and the wildlife for thousands of years. As I am sure you remember, Mr. Rexford testified on behalf of Kaktovic and the Iñupiat people in support of developing the 1002 area. Should development be authorized, we look forward to a complete and thorough consultation process.

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Response: Estimates for how much companies may bid for leases in the 1002 area, should leasing be authorized, involve a number of assumptions, considerations and variables that are inherently uncertain. What we do know is that the 1002 area contains the largest undeveloped oil resources discovered in the United States and state oil and gas lease sales demonstrate industry interest in the region. In its analysis of the Committee's legislation, the Congressional Budget Office concluded that, based on historical information and information from the Department, the Energy Information Administration, and industry, bonus bids alone would result in over $2 billion in Federal revenues over 10 years, with $1 billion in deficit reduction and another $1 billion in revenues that would be shared with the State of Alaska under the bill.

From: Johnson, Heather
To: Leonard, Paul
Subject: Re: Beginnings of a Caribou Working Group
Date: Thursday, November 16, 2017 1:53:47 PM

Sure - I'm in my office all day so just call when it's convenient.

Thanks! 907.786.7155

On Thu, Nov 16, 2017 at 10:45 AM, Leonard, Paul <paul_leonard@fws.gov> wrote:

> Hey Heather,
>
> Do you have any time this afternoon between 2-4 for a quick chat?
>
> Cheers,
> Paul
>
> On Mon, Nov 13, 2017 at 1:29 PM, Paul Leonard <paul_leonard@fws.gov> wrote:
>
> > Hey Heather,
> >
> > Great news! I'm flying back to FAI tomorrow and will get back with you so we can get something on the calendar to touch base later this week.
> >
> > Cheers,
> > Paul
> >
> > Paul Leonard, PhD
> > Science Coordinator
> > Arctic Landscape Conservation Cooperative
> > 101 12th Ave. Room 216
> > Fairbanks, AK 99709
> > (907) 456-0445
> >
> > On Nov 13, 2017, at 1:46 PM, Johnson, Heather <heatherjohnson@usgs.gov> wrote:
> >
> > > Hi Paul,
> > >
> > > Is there a good time to give you a call? I've also been querying folks about putting together a North Slop caribou workshop/meeting and it's probably easier to talk than email. I'm really flexible this week, so let me know if there is a good time to reach you.
> > >
> > > Cheers, Heather
> > >
> > > On Mon, Nov 13, 2017 at 9:36 AM, Paul Leonard <paul_leonard@fws.gov> wrote:
> > >
> > > > Hey Heather
> > > >
> > > > We briefly met this summer when I was visiting John Pearce but thought I'd

reintroduce myself. I've read some of your work over the last few months since taking the science coordinator job with the Arctic LCC (arcticlcc.org) and heard about new work while discussing some caribou ideas with folks. Regardless, I thought it was time to reach out to you! Wendy Loya (coordinator of the LCC) and myself have been thinking about pulling together a slope-wide caribou working group and was wondering if you might be interested. The rough idea is below.

With the increasing possibility that oil & gas leasing and/or transportation routes will lead to changes across the slope, it seems like a great time for holistic thinking about how those changes might impact caribou and subsistence. At first I would like to get folks together (state, USGS, borough, NGOs, private) for an update on existing projects/ideas/needs that are ongoing. There are some great projects from around the region that other folks might be able to learn from or at least explore for utility - especially in/around NPR-A and 1002.

Ultimately, my vision for the group would be to better share information and science across arctic Alaska to help quantify the potential impacts of multiple development scenarios, changing permafrost regimes, and vegetation changes on caribou movement. I'd like to try and pull this group together sooner than later to begin this discussion (the next couple of weeks). Please let me know if you're interested.

Cheers,
Paul

Paul Leonard, PhD
Science Coordinator
Arctic Landscape Conservation Cooperative
101 12th Ave. Room 216
Fairbanks, AK 99709
(907) 456-0445

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Heather Johnson, Ph.D.
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Phone: 907.786.7155
Email: heatherjohnson@usgs.gov

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Paul Leonard, PhD

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Heather Johnson, Ph.D.
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USGS Alaska Science Center
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Phone: 907.786.7155
Email: heatherjohnson@usgs.gov

From: Decleva, Edward
To: Tracy Fischbach
Subject: 1002 - EA, Environmental Consequences, Cultural Resources
Date: Thursday, November 16, 2017 2:02:17 PM

Hi Tracy,

As promised, here is my quick and dirty suggested language:

Very little cultural resource investigations or inventories have occurred within the 1002 area. Therefore, pursuant to Section 106 of the National Historic Preservation Act, applications for exploration within the 1002 would be required to include sufficient identification and evaluation of cultural resources to ensure that potential adverse effects could be avoided, minimized or mitigated.

Feel free to edit, revise, do whatever you wish with it.

Best of luck, Ed

Edward J. DeCleva
Regional Historic Preservation Officer
U.S. Fish and Wildlife Service, Alaska Region
1011 E Tudor Rd, MS-235
Anchorage, AK 99503

edward_decleva@fws.gov
907-786-3399

From: Burkart, Greta
To: Fischbach, Tracy
Subject: Re: Help with evaluating water resources in the Arctic 1002 Area - Due Noon on Thursday, Nov 16
Date: Thursday, November 16, 2017 2:21:08 PM

Hi Tracy,

Can I get a link to the google document? I understand we can still edit up until 2pm today and John Martin asked me to review the fish section.

Thanks,

Greta

Greta Burkart, PhD
Aquatic Ecologist
US Fish and Wildlife Service
Arctic National Wildlife Refuge and Alaska Refuges Inventory and Monitoring Program
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email: greta_burkart@fws.gov
www.facebook.com/arcticnationalwildliferefuge

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From: Burkart, Greta
To: Perdue, Margaret
Cc: Trawicki, John
Subject: Re: Help with evaluating water resources in the Arctic 1002 Area - Due Noon on Thursday, Nov 16
Date: Thursday, November 16, 2017 2:23:01 PM

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Greta

Greta Burkart, PhD
Aquatic Ecologist
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From: Google Alerts
To: sara_boario@fws.gov
Subject: Google Alert - U.S. Fish and Wildlife Service Alaska
Date: Thursday, November 16, 2017 2:32:12 PM

Google Alerts

U.S. Fish and Wildlife Service Alaska

As-it-happens update · November 16, 2017

NEWS

How the **Alaska** Pipeline Is Fueling the Push to Drill in the Arctic Refuge

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Courthouse News Service

US Drops Import Ban on African Elephant Trophies ... much-needed revenue back into conservation," the **U.S. Fish and Wildlife Service** said in a ...

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Full Coverage

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Send Feedback

From: Howard, Amee
To: Damberg, Doug; Ronnie Sanchez; Lynnda Kahn
Subject: Fwd: Oil and gas leasing in AK
Date: Thursday, November 16, 2017 2:48:46 PM

Hi All,

I gave Devin a call and confirmed that Kenai NWR is the only Alaska refuge with oil and gas leases.

Thanks so much!
Amee

---------- Forwarded message ----------
From: **Helfrich, Devin** <devin_helfrich@fws.gov>
Date: Thu, Nov 16, 2017 at 12:24 PM
Subject: Oil and gas leasing in AK
To: Lynnda Kahn <lynnda_kahn@fws.gov>
Cc: Amee Howard <amee_howard@fws.gov>

Hi Lynnda,

(Hopefully) A quick factual question:

Are there any active (someone is paying rentals at least, don't have to be in production) oil and gas leases in Alaskan Refuges **outside** of Kenai NWR?

If so, could you let me know as soon as possible a "yes" and which refuges.

And when you get more time, break down just a little bit with:
How many acres, are they in production, how old are the leases

I'm hoping to get an answer to the Yes or No part of the question as soon as possible today.

Thank you!

Devin Helfrich
Congressional Legislative Affairs Specialist
U.S. Fish and Wildlife Service
Office Direct: (703) 358-2130
Mobile: (202) 365-5971

--
Amee Howard
Congressional and Legislative Affairs
U.S. Fish & Wildlife Service
Anchorage, Alaska
Office: (907)786-3509
Mobile: (907)229-8575
https://www.fws.gov/alaska/
"Conservation Begins with Hello"

From: Perdue, Margaret
To: Burkart, Greta
Subject: Re: Help with evaluating water resources in the Arctic 1002 Area - Due Noon on Thursday, Nov 16
Date: Thursday, November 16, 2017 3:13:32 PM
Attachments: LatestVersion.docx

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"Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie

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Region 7 GeoPDF Map Portal

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Meg Perdue, Water Quality Specialist
Water Resources Branch - National Wildlife Refuge System
U.S. Fish & Wildlife Service Regional Office MS 235
1011 E. Tudor Rd
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phone: 907-786-3421 fax: 907-786-3976
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--
John Trawicki
Water Resources Branch Chief
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Mobile: (907) 360-1656

"The single biggest problem with communication is the illusion that it has taken place"
George Bernard Shaw

--
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Table 1 -4

In any proposed winter exploration activity on Arctic Refuge, water withdrawals would be necessary to construct ice roads and other infrastructure that would potentially impact hydrology, aquatic habitats, wetlands and species that depend on them. There is also a risk of fuel spills and release of other contaminants that could impact water quality.

Affected Environment:

3.1.2 Hydrology

Water resources on the coastal plain of the Arctic National Wildlife Refuge consist of streams, lakes, and springs. Streams of the Arctic coastal plain flow north, several forming large alluvial fans as they flow into the Beaufort Sea where they contribute substantial volumes of water and sediment to coastal ecosystems (Arctic CCP). Like other areas of the Arctic, the coastal plain is underlain by continuous permafrost limiting infiltration of surface water and limiting groundwater resources (Lyons and Trawicki 1994). Groundwater that may exist below permafrost is thought to be saline or brackish (Williams 1970). While ninety-nine percent of the 1002 area is classified as wetlands freshwater is limited and confined to the shallow zone above permafrost (Clough et al. 1987). Lakes are not evenly distributed across the coastal plain with concentrations occurring near the mouth of the Canning River and in the region of the Sadlerochit and Jago Rivers with very few lakes occupying the central Katakturuk River region (Trawicki et al. 1991). At Barter Island mean annual precipitation which includes the water equivalent of snow averages 6.3 inches per year, in Umiat east of the 1002 area on the North Slope it is 5.7 inches (NOAA 1971) emphasizing that climate and permafrost are dominant factors that limit water availability. The non-frozen water found on the coastal plain during the winter months is located in small isolated pools beneath ice hummocks associated with stream drainages , lakes with depths greater than 7 feet, and flowing surface waters associated with springs (Lyons and Trawicki 1994).

Streams and Rivers

The 1002 area has a relatively high density of streams and rivers compared to other areas of the North Slope (Brackney 2008). These habitats support thirteen species of fish, including Dolly Varden an important subsistence fish. The hydrography of these systems is strongly influenced by the climate which is characterized by extremely low winter temperatures and short, cool summers with low, desert-like levels of precipitation. Streamflow rapidly declines in most systems shortly after freeze up in September and ceases in most streams by December when they are generally frozen to the stream bed resulting in no flow or flow so low as to not be measureable (Lyons and Trawicki 1994). A few exceptions to this occur where springs result in open reaches and aufeis areas that develop providing important fish overwintering habitat (Arcone 1989). Break up on the Arctic coastal plain occurs during a brief period in late May or early June. Snowmelt begins in the mountains and foothills progressing towards the coastal plain. Rapidly melting water runs over the ground as sheetflow with infiltration limited by permafrost (Lyons and Trawicki 1994). Water in drainages rises rapidly, often flowing over ice covered stream channels. More than half of the annual discharge for these streams can occur during a period of several days to a few weeks (Clough et al. 1987, Sloan 1987). Based on origin, hydrologic regime, and chemical

and biological characteristics, Craig and McCart (1975) classified North Slope streams into three categories: mountain, spring-fed, and tundra. Mountain streams are typically fast flowing and fed by varying proportions of snowmelt, glacier meltwater, and spring-fed tributaries. Waters are cold (usually less than 50 °F), occasionally turbid, moderately hard, and support low invertebrate densities. The most common species of fish in mountain streams is Dolly Varden. Mountain streams that receive glacial inputs are unique to the eastern North Slope, in the Jago, Hulahula, and Okpilak watersheds, discharge from glacial sources is the dominant source of flow when precipitation is low and air temperatures are high and transport large volumes of water, sediment and nutrients to downstream ecosystems (Arctic CCP). Spring-fed streams are often tributaries of mountain streams and have relatively stable flows and temperatures throughout the year. Spring-fed waters are characterized by low levels of dissolved solids and very high densities of macroinvertebrates. Many spring-fed streams provide critical spawning and overwintering habitat for Dolly Varden. Tundra streams originate in the Brooks Range Foothills and coastal plain ecoregions, are fed by surface runoff, tend to be meandering systems, and have low to moderate invertebrate densities. Waters are typically warmer and exhibit lower pH and conductivity relative to mountain and spring-fed streams (Arctic CCP). Huryn et al. (2004) found that gradients in freezing probability, nutrient concentrations, and substratum instability control invertebrate communities in these systems. Some projections indicate that glacial inputs could disappear within the next 50 years altering hydrology by reducing instream connectivity and negatively impacting fish migrating to critical overwintering habitat (Nolan et al. 2011). Surface water availability and instream connectivity will potentially be adversely impacted by deepening of the active layer on the coastal plain, increasing duration of the summer season, and increased evapotranspiration rates (Arctic CCP).

Springs and Aufeis Areas

Six springs are located on the Arctic coastal plain identified through reconnaissance investigation by Childers et al. (1977): Sadlerochit Spring, Red Hill Spring, Katakturuk River tributary Spring, Hulahula River Spring, Okerokovik River Spring, and Aichilik River Spring. During the winter months pressurized water discharges from a spring pushing up through the ice to the surface where it spreads out and freezes forming aufeis areas that can become extensive. These formations melt more slowly than snow, generally persist into the summer and may provide a temporary source of freshwater (Kane and Slaughter 1973). Open water associated with springs provides important winter habitat particularly once surface water runoff ceases due to freezing (Lyons and Trawicki 1994). Most springs in Arctic Refuge have survived since the last glacial maximum (Yoshikawa et al. 2007), suggesting that they will continue to flow and be refugia for aquatic biota in a changing climate.

Lakes

The density of lakes in the Arctic coastal plain is low compared to the rest of the North Slope and as noted earlier their distribution is not uniform, nor is their size and depth (Arctic CCP). Jorgenson and Shur (2007) classified the coastal plain into regions based on lake origin: thaw, depression, riverine, and delta. Depression lake basins are formed in undulating sandy, alluvial marine or eolian deposits, and are the majority found on the coastal plain concentrated in the depression lakes region between the Hulahula and Niguanak rivers. Riverine lakes include oxbow and floodplain lakes along sinuous channels

and thaw lakes formed in ice-rich abandoned channels. Riverine lakes are most concentrated along the Jago and Niguanak rivers. Delta lakes include thaw, riverine, and tidal lakes and most are found in deltas of the Hulahula, Jago, Aichilik, and Canning rivers (Arctic CCP). The majority of lakes on the coastal plain are shallow lakes with surface areas ranging from 1,500 acres to less than 10 acres (Trawicki et al. 1991). Recharge of these systems is generally limited to snow melt and direct precipitation in the immediate vicinity of the lake (Lyons and Trawicki 1994). When not connected to larger drainage networks, evaporation has a strong influence on water chemistry and plays an important role in regulating lake water balance (Arctic CCP). Maximum winter ice thickness on lakes in the Arctic is between 6-7 feet (Bilello and Bates 1969, 1971, 1972, and 1975). Clough et al. (1987) reported that most lakes have basins less than 7 feet deep and thus freeze to the substrate. These shallow lakes generally melt from the surface downward in spring. Deeper lakes that do not freeze to substrate may have ice present on the surface well into July. Due to the level of winter freezing, the depth of lakes restricts the presence of fish, Hobbie (1984) found fish present only in lakes with depths greater than 5.6 feet. Shallow lakes generally lack fish because they usually freeze solid but they provide important habitat to emergent vegetation, invertebrates, and migratory birds due to the earlier availability of ice-free areas. Trawicki et al. (1991) identified fish presence in lakes on the coastal plain to be more frequent and widespread than previously suspected. Ninespine stickleback (Pungitius puingitus) were found in 34 of 52 lakes surveyed (65%) in 1989. In the past half a century, the duration of ice cover, thermal regimes, and rates of primary productivity have likely changed. In the future, changes in temperature, active layer depth, fire frequency and severity, and erosion rates could affect lake distribution, water quality, water levels, size, and connectivity to other habitats (Arctic CCP).

Winter Specific Hydrologic Data

Hydrologic data for the 1002 area are limited, the Service collected short-term (less than five years) of data over two decades ago at 11 stream gage sites on five drainage systems across the coastal plain and conducted an inventory of 119 lake basins to create lake contour maps, water volume calculations and estimates of winter water volume beneath ice cover. These lake basins constituted the majority of larger lake basins found in the 1002 area. These data were collected in large part to address questions regarding winter water availability in the 1002 area in the event of exploration activities. The USGS has collected some additional hydrography data on the Canning and Hulahula Rivers. In the Service stream studies winter water was found to occur over a wide area in most of the major river drainages but it was restricted to small isolated pools beneath ice hummocks scattered throughout the braided portions of these rivers. The volume of water available was estimated to be small, 9 million gallons over the 237 miles of inventoried area (Elliot and Lyons 1990). Total estimated volume of water in the study lakes ranged from 55,382 acre-feet (18 billion gallons) when free of ice to a low of 3,366 acre-feet (1.1 billion gallons) beneath a maximum ice thickness of seven feet. Ninety percent of the available water was contained in just nine of the 119 surveyed lakes, the majority of these were found in the Canning River delta area (up to eighty percent of the total volume), and only two of these lakes were located in the region between the Katakturuk and Sadlerochit rivers (Trawicki et al. 1991).

Climate Change Effects

Historically, in the nearby NPR-A the coastal regions have not thawed until after the second week of June (NPR-A EIS, 2012). By mid-century, these areas are projected to thaw the first week of June. By late century these areas are expected to thaw as early as June 1st. Changes in freeze-up date are predicted to be even greater. Historic data indicates NPR-A water bodies freeze by mid-September. Models indicate freeze-up will not occur until late September in southern regions and early October along the coast. By the end of the century, coastal waterbodies may not freeze until the end of October. These changes will result in a six-week increase in the length of the ice-free season.

Landscape drying trends have been observed in northeastern Alaska (ACIA 2004). Increased temperatures and an extended growing season could increase the evapotranspiration rate, increasing the water deficit (defined as the amount by which evapotranspiration exceeds precipitation) and potentially affecting the annual water balance. The annual water balance represents the water available for plants and animals, streamflow, and groundwater recharge. Shallow water systems, including lakes and wetlands, could decrease in number and extent as the annual water balance experiences an ongoing deficit. Permafrost loss on the Refuge could also result in draining of many shallow water systems; the thawing of ice wedges and ice lenses could create more connections between surface water and groundwater systems. If wetlands and lakes continue to dry, an increase in vegetative cover can be expected eventually transitioning to dry meadows and shrublands. This would reduce the amount of habitat available for wetland-dependent species, such as waterfowl.

Environmental Consequences:

4.5.2 Hydrology

It is difficult to fully describe potential environmental consequences when the scope and nature of activities has not been fully outlined. This section is developed to address very general potential activities limited to seismic exploration of unknown scope and attendant infrastructure to accomplish this including development of ice roads. It is clear that because unfrozen water is limited in winter on the Arctic coastal plain, negative effects of water withdrawals on overwintering fish populations, benthic invertebrates, and birds and mammals that feed on those organisms seem likely (West et al. 1992). Water withdrawal and its direct influence on reducing available habitat (wetted space) probably impacts fish populations more than any other winter alteration (Cunjak 1996). Since the distribution of adult and juvenile fish is extremely restricted during the long arctic winter when most of a drainage is frozen solid (Craig and Poulin 1975), water removal , leading to reduced groundwater flow or altering baseflow, ice and temperature regimes has the potential to affect all life stages of some populations. Seismic activity could potentially reduce fish populations, divert fish from their normal locations, or adversely affect fish populations and habitat.

Seismic Exploration and Thermokarst Activity

Seismic exploration can cause thermokarst, especially when snow is insufficient to protect soil and vegetation (WesternGeco 2003). Removal or damage of the organic mat exposes soils to erosion by wind and water, which could deposit sediment into water bodies resulting in higher turbidity and concentrations of suspended sediment. To cause high turbidity, the peat mat must be sufficiently eroded to expose underlying mineral soils, and the mineral soils must be fine grained (BLM 2012).

Effects of seismic exploration on water resources and aquatic habitats

Seismic surveys can be conducted using dynamite (or other explosives), air guns, or Vibroseis to generate acoustical energy pulses necessary to locate subsurface geological formations that might contain oil or gas (BLM 2012). Research has demonstrated that high-intensity acoustic energy can lead to damaged auditory sensory hair cells in fish, effectively reducing the ability to hear (McCauley et al. 2003; Popper 2003; Smith et al. 2004; Popper et al. 2005). The extent of damage and the ability to regenerate these cells is dependent on the intensity and duration of noise and the species of fish. Underwater shock waves can also cause injury to the swim bladder and other organs and tissue (Wright 1982), which could result in a sub-lethal or lethal effects. Fleeing behavior is also a well-documented response by fish to anthropogenic sounds (Popper 2003; Popper et al. 2004). Because of a lack of information regarding the impacts on fish from Vibroseis specifically, winter field tests on the North Slope were conducted in 2000, to measure the sound pressure levels in water that were generated by Vibroseis rigs operating on the ice overhead (Greene 2000; Nyland 2002). The results indicated that these sound pressures were great enough 10 meters from the source to cause avoidance behavior, but no measurements were made directly below the Vibroseis equipment. Fish fleeing behavior was the most obvious effect of Vibroseis during the 2003 Alaska Department of Natural Resources/BLM study (Morris and Winters 2005). Because exploration using Vibroseis occurs in the winter when physiological stress is the greatest for most fish species, a flight response could potentially be detrimental. (BLM 2012)

Use of Explosives

Use of explosives is a major disturbance to fish and wildlife. These are particularly stressful to fish that are captive in overwintering habitats and would likely have a negative impact on terrestrial and aquatic animals that congregate near spring-fed oases during winter.

Effects of Water Withdrawal from Lakes

In other areas of the North Slope the primary source of water during the winter months for exploration activities is unfrozen water that lies beneath the ice cover of both shallow and deep lakes. This water is somewhat saline because of the exclusion of ions during the freezing of the upper part of the lake. Water from lakes may be used for ice roads, pads and airstrips, and potable water for field crews.

Typically the volume of water taken from an individual lake depends on the depth of the lake, volume of unfrozen water in the lake, and the presence and type of fish documented (BLM 2012).

Water withdrawal affects the available habitat for fish species if they are present, macroinvertebrates and can otherwise impact aquatic habitat by further altering water quality and reducing the water available when breakup occurs potentially affecting spring recharge and lake levels.

Figure X. Potential impacts of seismic exploration on lakes and rivers

Removal or compaction of snow can increase the depth of freezing on lakes, sometimes by one foot or more. As a result, the water quantity available in a lake during the winter months can be greatly reduced, and the salinity of the water beneath the ice can be increased further. Maintaining the natural hydrologic regime may not be possible under various pumping scenarios. To reduce impacts to the natural hydrologic regime, regulations typically prohibit snow compaction on fish-bearing lakes, but snow compaction is unavoidable when ice aggregates are removed from lakes (BLM 2012).

There are no studies assessing the effects of permitted withdrawals on lake water chemistry on the North Slope of Alaska. Hinzman et al. (2006) conducted a study to assess the effects of what turned out to be relatively small water withdrawals on water chemistry and lake-recharge. This work was funded by the Department of Energy and oil field companies, did not undergo a standard peer-review process, yet it is widely cited by the BLM and DOE. Unfortunately, only a small fraction of the permitted withdrawal volume was actually pumped from the study lakes, the study design had almost no ability to detect change, and the researchers were unable to get their dissolved oxygen sensors functioning to conduct any relevant measurements in pumped lakes. Thus, we have no information on potential impacts of heavy pumping that is currently allowed by water withdrawal permits on the North Slope of Alaska. Despite the low ability to detect change, Hinzman et al. (2006) did find that one of four pumped lakes did not fully recharge at snow melt. This suggests that water withdrawals far less than permitted volumes can have significant impacts on lake hydrology and the availability of wetted habitat. Canadian studies on ice-covered lakes have found that water withdrawals have a substantial and wide range of negative impacts on aquatic ecosystems (Cott et al. 2008). These include reduction of habitat for fish, waterfowl, and furbearers; reduction in oxygen available to overwintering fish; and dewatering and freezing of littoral habitats which kills plants, invertebrates, and fish eggs. Isolated lakes may be particularly vulnerable as they may not recharge at snowmelt. Organisms in small isolated lakes are

particularly sensitive to water withdrawals. The effects of water withdrawals on wet meadow zones surrounding lakes are unknown, but would likely be great if lakes are not fully recharged at snowmelt. This would result in a reduction in habitat for waterfowl and shorebirds that use these lakes during the summer.

Effects during exploration on water chemistry from water withdrawals could be short term if lakes are fully recharged during spring. Impacts to overwintering fish and littoral zone communities will likely be more substantial and longer-term, especially in isolated lakes.

Effects of Ice Roads, Ice Pads and Ice Bridges

Ice roads and ice pads are used extensively during the winter season for access and for seismic exploration. Ice roads require about 1 million to 1.5 million gallons of water per linear mile and generally can be built at a rate of about 1.5 inches of thickness per day (BLM 1998). Ice pads can require up to 5 million gallons of water to build and range in size from 3 to 10 acres. Floating ice bridges may be necessary to cross large rivers and must be of sufficient thickness to handle heavy truck traffic. Smaller rivers require ice bridges, which are often constructed of aggregate chips and water and placed on grounded ice. Ice roads and bridges can cause additional freeze-down, reducing the already limited overwinter water volume available for fish habitat and affecting water quality. During snow melt ice bridges can create ice dam flooding if not removed properly.

From: Howard, Amee
To: Damberg, Doug; Ronnie Sanchez
Subject: Fwd: Oil and gas leasing in AK
Date: Thursday, November 16, 2017 3:16:31 PM

Just to close the loop!

HQ has all the information they need.

Thanks for the quick conference on this topic!
Amee

---------- Forwarded message ----------
From: **Helfrich, Devin** <devin_helfrich@fws.gov>
Date: Thu, Nov 16, 2017 at 1:10 PM
Subject: Re: Oil and gas leasing in AK
To: "Howard, Amee" <amee_howard@fws.gov>
Cc: "Kahn, Lynnda" <lynnda_kahn@fws.gov>

I think we are good, thank you both!

Devin Helfrich
Congressional Legislative Affairs Specialist
U.S. Fish and Wildlife Service
Office Direct: (703) 358-2130
Mobile: (202) 365-5971

On Thu, Nov 16, 2017 at 5:02 PM, Howard, Amee <amee_howard@fws.gov> wrote:

> A little more info and link to BLM....just in case.
>
> BLM Alaska Oil and Gas
>
> Oil and gas leasing on Alaska's Federal lands is concentrated in two regions: the Cook Inlet Region on both sides of the Cook Inlet and in the National Petroleum Reserve–Alaska (NPR-A). Exploration and production in the Cook Inlet Region began in the 1950s and continues to contribute to Alaska's economy and energy needs. Exploration in the NPR-A has three distinct exploration periods; the first two were government-led efforts from 1945-1952 and 1975-1981 and resulted in several discoveries but no sustainable production. The third period of exploration has followed the 1999-2010 lease sales in the NPR-A. This exploration has resulted in several discoveries.

The BLM administers the Federal onshore oil and gas leasing program and issues permits for geophysical exploration, and permits to drill oil and gas wells, and authorizations to construct pads and install production facilities. Oil companies pay lease rentals and royalties on oil and gas production to the Office of Natural Resource Revenue. The State of Alaska receives 90% of these bonuses, rents, and royalties from the oil and gas leases in the Cook Inlet Region and 50% of the bonuses, rents, and royalties from the NPR-A.

https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/about/alaska

On Thu, Nov 16, 2017 at 12:58 PM, Kahn, Lynnda <lynnda_kahn@fws.gov> wrote:

> Just got back to office and saw your email. Listened to your voicemail as well. Looks like Amee beat me to a response.
> So do you have any other questions?
>
> *Lynnda*
>
> *Lynnda Kahn | Fish & Wildlife Biologist*
>
> *Kenai National Wildlife Refuge*
> *P.O. Box 2139 | Soldotna, AK 99669*
> *(907) 260-2818*
>
> ><((((º>¸..¸¸.·´¯`·.¸><((((º>¸.·´¯`·.¸><((((º>¸.·´¯`·.¸><((((º> ¸.·´¯`·.¸><((((º>
>
> On Thu, Nov 16, 2017 at 12:24 PM, Helfrich, Devin <devin_helfrich@fws.gov> wrote:
>
> > Hi Lynnda,
> >
> > (Hopefully) A quick factual question:
> >
> > Are there any active (someone is paying rentals at least, don't have to be in production) oil and gas leases in Alaskan Refuges **outside** of Kenai NWR?
> >
> > If so, could you let me know as soon as possible a "yes" and which refuges.
> >
> > And when you get more time, break down just a little bit with:
> > How many acres, are they in production, how old are the leases
> >
> > I'm hoping to get an answer to the Yes or No part of the question as soon as possible today.
> >
> > Thank you!
> >
> > **Devin Helfrich**
> > Congressional Legislative Affairs Specialist
> > U.S. Fish and Wildlife Service
> > Office Direct: (703) 358-2130
> > Mobile: (202) 365-5971



--
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https://www.fws.gov/alaska/
"Conservation Begins with Hello"

--
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Mobile: (907)229-8575
https://www.fws.gov/alaska/
"Conservation Begins with Hello"

From:	Dufford, Sheila
To:	Fischbach, Tracy
Cc:	Steve Berendzen; Joanna Fox; Roger Kaye; Brady, Stephanie
Subject:	Re: Arctic NWR map
Date:	Thursday, November 16, 2017 3:33:00 PM
Attachments:	EAMap_1_1Arctic_National_Wildlife_Refuge_17x11.pdf

Here is the first Map. Sorry it took so long. I needed to ditz with it to get Ft. Yukon to show up and some of the data layers did not go that far south.

Sheila J. Dufford
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http://www.fws.gov/refuge/Yukon_Flats/

***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**

On Wed, Nov 15, 2017 at 9:28 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> We'll need the outline of the 1002 area and the label at the bottom covers Venetie and Fort Yukon which the CCP mentions. We haven't talked in the document about Nuiqsut. Do we need to?
>
> Thanks so much for jumping in. -Tracy
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
>
> Hours: Mon - Thurs 9:15 am to 3:15 pm
> "Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie
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> **Need access to Refuge Documents?**
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> ***Need Refuge land status info for Alaska?***
> FWS Region 7 Land Mapper (FWS version)
> FWS Region 7 Land Mapper (Public version)
> Region 7 GeoPDF Map Portal
>
> On Wed, Nov 15, 2017 at 4:55 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:
>
> > 1st Draft
> >
> > **Sheila J. Dufford**
> > **Biologist / GIS Specialist**
> > **Yukon Flats National Wildlife Refuge**
> > **101 12th Avenue, Room 264**

Fairbanks, AK 99701
907-456-0307
sheila_dufford@fws.gov
http://www.fws.gov/refuge/Yukon_Flats/

***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**

On Wed, Nov 15, 2017 at 3:15 PM, Fischbach, Tracy <tracy_fischbach@fws.gov> wrote:

> I'm on my way out, but I will call you first thing tomorrow when I get in. Thanks for being willing to help out!
>
> My big need is a map of the Refuge with villages noted. I'm sure there will be more in the near future. Thanks - Tracy
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
>
> Hours: Mon - Thurs 9:15 am to 3:15 pm
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> FWS Region 7 Land Mapper (Public version)
> Region 7 GeoPDF Map Portal
>
> On Wed, Nov 15, 2017 at 2:37 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:
>
> > Tracy,
> > Please call me this is easier to talk about than sending emails back & forth.
> >
> > Sheila
> >
> > **Sheila J. Dufford**
> > **Biologist / GIS Specialist**
> > **Yukon Flats National Wildlife Refuge**
> > **101 12th Avenue, Room 264**
> > **Fairbanks, AK 99701**
> > **907-456-0307**
> > **sheila_dufford@fws.gov**
> > **http://www.fws.gov/refuge/Yukon_Flats/**
> >
> > ***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**
> >
> > On Wed, Nov 15, 2017 at 2:20 PM, Brady, Stephanie <stephanie_brady@fws.gov>

wrote:

> I am looping in Tracy so she can answer your questions - I sent her and uploaded the map from the CCP to her google drive -so she has that in pdf. Thanks Sheila. Stephanie
>
> stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |
> U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska |
> 907.306.7448
>
> On Wed, Nov 15, 2017 at 2:13 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:
>
> > I pulled a copy of the CCP. Does Tracy have a map in the CCP or Otherwise that she likes that I could try and copy? I need to know what she wants on it. Just NWR boundaries and communities? Land Status? Shaded Relief? Major Rivers?
> >
> > Does she want an ArcGIS Project to manipulate? Or what format is she looking for?
> >
> > Sheila
> >
> > **Sheila J. Dufford**
> > **Biologist / GIS Specialist**
> > **Yukon Flats National Wildlife Refuge**
> > **101 12th Avenue, Room 264**
> > **Fairbanks, AK 99701**
> > **907-456-0307**
> > **sheila_dufford@fws.gov**
> > **http://www.fws.gov/refuge/Yukon_Flats/**
> >
> > ***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**
> >
> > On Wed, Nov 15, 2017 at 1:55 PM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:
> >
> > > yes I can pull the map from the CCP - figure 1-1 - but Tracy wants to manipulate it -so she does not want a pdf - everyone in cartographer in the RO is out - that is why I asked Sheila - but if it does not exist outside of a pdf - then we will have to work with what we have. thanks.
> > >
> > > stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |
> > > U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska |
> > > 907.306.7448
> > >
> > > On Wed, Nov 15, 2017 at 1:51 PM, Fox, Joanna <joanna_fox@fws.gov> wrote:
> > >
> > > > Is there not one in the CCP? I believe Realty would have all of those.
> > > >
> > > > _____

Joanna L. Fox
Deputy Refuge Manager
Arctic National Wildlife Refuge
101 12th Avenue, Room 236
Fairbanks, AK 99701
(907) 456-0549

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www.facebook.com/arcticnationalwildliferefuge

"Do what you can, with what you have, where you are." -- Theodore Roosevelt

On Wed, Nov 15, 2017 at 1:43 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:

> I will check.
> Sheila
>
> **Sheila J. Dufford**
> **Biologist / GIS Specialist**
> **Yukon Flats National Wildlife Refuge**
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> **http://www.fws.gov/refuge/Yukon_Flats/**
>
> ***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**
>
> On Wed, Nov 15, 2017 at 1:32 PM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:
>
> > Hi there Sheila - do you happen to have a map of Arctic refuge with the surrounding communities? We need this for the EA that Tracy is writing for the proposed rule for exploration - unfortunately, we need the map by 10am tomorrow morning - do you have anything that would work? thanks much - Stephanie
> >
> > stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448

Map 1-1

Arctic National Wildlife Refuge

Arctic Refuge Boundary

Area 1002

Roads

U.S.- Canada Border

Miles 0 10 20 30 40 50 60 70 80

Kilometers 0 10 20 30 40 50 60 70 80

Alaska Albers Equal Area Conic Projection, 1983 North American Datum.



156° W 154° W 152° W 150° W 148° W 146° W 144° W 142° W 140° W

70° N 69° N 68° N 67° N

Prudhoe Bay
Kaktovik
Beaufort Sea
Camden Bay
Canning River
Hulahula River
Jago River
Aichilik River
Sagavanirktok River
Dalton Highway
Brooks Range
Canada
Firth River
Kongakut River
Marsh Fork
Itkillik River
Junjik River
Wind River
East Fork Chandalar River
Middle Fork Chandalar River
Chandalar River
Sheenjek River
Coleen River
Porcupine River
Old Crow River
Arctic Village
Old Crow
Wiseman
Coldfoot
Venetie
Chalkyitsik
Fort Yukon

154° W 152° W 150° W 148° W 146° W 144° W 142° W 140° W

0000003524

From: Martin, John
To: Tracy Fischbach; Stephanie Brady; Brian McCaffery; Nicole Gustine
Subject: Cumulative Effects and Foreseeable Future Narrative
Date: Thursday, November 16, 2017 4:03:23 PM
Attachments: Draft EA Cumulative Effects-Foreseeable Future 16Nov2017.docx

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Per your request - references included

Cumulative Effects

Past, Present or Reasonably Foreseeable Actions

Across the larger landscape of the North Slope (North Slope Borough), the coastal plain from Point Barrow to Point Demarcation (approximately the U.S. and Canadian border) is increasingly developed. This is especially true of the western end with the National Petroleum Reserve-Alaska (NPRA), Prudhoe Bay and adjoining oilfield from Tarn and Kuparuk on the western end to Point Thompson on the eastern end at the western-most boundary of the Arctic Refuge and 1002 area. With the discovery of oil in the late 1960s came the first explorations, developments and finally production. Following the international oil crisis of 1973, the Trans-Alaska Pipeline Systems (TAPS) was build and spanned Alaska from north to south, Prudhoe Bay to Valdez. The TAPS has been moving oil from the oilfield to transports for 40 years and likely to continue for the long term. Lateral pipelines are under construction or proposed to connect with the TAPS in the near future. The TAPS is approved to operate via DOE permit through 2032.

To accommodate construction, a road was constructed from Fairbanks to Deadhorse to convey personnel and materiel necessary to build and maintain the oilfields, pipeline and support services and allowed overland access to the North Slope year-round. Initially constructed with private funds and for industrial purposes only, the road was eventually turned over to the State of Alaska to maintain. In addition to still be maintained largely for industrial purposes, it is now a popular for vacationers and sport hunter access.

The oil and gas industry continue to expand with one of the most recent developments, the Liberty Project on the Alaska outer continental shelf (BOEM 2017) and the NPRA being opened for oil and gas lease sales, as announced in September 2017. The development of the North Slope, including the coastal plain environs is likely to continue into the foreseeable future (Clement and others 2013).

Increasing mean annual summer temperatures concurrent with projections for less snow cover during winter months will greatly facilitate development of industry, infrastructure, and public access to the North Slope.

As a means of perspective, the described 1987 *Coastal Plain Report/EIS* full oil and gas production footprint was anticipated to use no more than 12,650 acres among scattered parcels, or 0.84 percent of the total 1.5 million acre 1002 area (Clough and Christiansen 1987). Given advances in the oil and gas state-of-the-industry since the late 1970s through late 1980s: increasing directional drilling capacities; reduced pad sizes; multiple drillings from a single pad; low ground-bearing pressure vehicles; winter site development; buffer zones around critical resources; among other features or best management practices (BMPs), the scope and scape of the exploration, development and production may be expected to be reduced from the initial estimate. All these considerations serve to mitigate direct, indirect and cumulative effects through avoiding, minimizing, rectifying, reducing, and/or compensating the significance of context and intensity for the proposed oil and gas exploration, development, and production activities.

The 29 listed mitigation recommendations of the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987), although now largely dated, provide a basis for updating and augmenting state-of-the-industry advances since (Clough and Christiansen 1987). Specifically, this includes the changes for threatened, endangered and sensitive (TES) species: arctic pennycress (*Noccaea arctica*, formerly *Thlaspi arcticum*), more common than initially determined; the

delisting of the American Peregrine Falcon (*Falco peregrinus anatum*) and Arctic Peregrine Falcon (*F.p. tundrius*); and, listing of the polar bear (Ursus maritimus), among other considerations.

Cumulative effects including some aspects of climate change, not adequately considered in the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987) are addressed at least up to the time of publication in *Cumulative Environmental Effects of Oil and Gas Activities on the Alaska's North Slope* (NRC 2003). Additionally, biological resources in relation to oilfield developments including: vegetation and biotic communities; caribou, grizzly bear; polar bear; Arctic fox; Pacific Loon; Tundra Swan; Lesser Snow Goose; Common Eider (Pacific Eider); shorebirds; freshwater invertebrates; freshwater fish; anadromous fish; and benthic marine communities are discussed in *The Natural History of an Arctic Oil Field: Development and the Biota* (Truett and Johnson 2000). Finally, parallels from exploration, development and production of oil and gas on the North Slope may be National Petroleum Reserve – Alaska EIS (BLM 2012), which are directly comparable to the coastal plain 1002 area.

As examples of advances in state-of-the-industry, oil and gas environmental impacts can be significantly reduced if these activities occur during winter months, when the tundra is frozen and protected by snow cover, and most wildlife are absent (Gliders and Cronin 2000). In summer, the thawing snow and lengthening days bring millions of shorebirds and waterfowl in search of nesting sites along with caribou migrating from wintering locations in the interior. The oil exploration and production process involves multiple stages that may require several years or even decades to complete for each oil field. New technologies involving reduced well spacing, elimination of reserve pits, directional drilling, winter maintenance and construction from ice pads and roads, aerial support, and the use of baseline and ongoing biological monitoring programs to facilitate decision making have reduced the areal impacts of development. The incorporation of baseline biological studies and monitoring of exploration and field development assists in minimizing impacts to high-value habitats and species. In this manner the oil and gas industry reduces encroachment on wildlife habitat and avoids disturbance to wildlife during critical periods (Gliders and Cronin 2000).

As a specific example, denning bears and particularly denning females with young were susceptible to seismic blasting during exploration surveys. Rousing bears, emerging and resettling, required energy reserves that might place individual bears at risk for long-term survival and especially cubs-of-the-year. In part this was because field crews were unaware of denning sites. Bear dens are now more closely monitored due to the threatened status of the polar bear, typically via radiotelemetry. Additionally, traditional blasting has been replaced by vibrators and sensor lines which are far less intrusive to denning bears. As a consequence, the disturbance threat has been greatly reduced through advances in technology (Reynolds and others 1986; McLellan and Shackleton 1988, 1989; Mattson 1990; Blix and Lentfer 1992; Linnell and others 20000.

However, cumulative effects of oil and gas exploration, development and production become problematic for long-term recovery and restoration. Some sites abandoned and rehabilitated to various degrees still show evidence of impacts 40 to 60 years following the activity (Walker and others 1987; Felix and Raynolds 1989; Gliders and Cronin 2000; Kemper and MacDonald 2009; Jorgenson and others 2010; McCarter and others 2017).

As an example of unknowns and uncertainty of climate change in relation to oil and gas exploration, development and production are water resources and their use for industry. While the creation of impoundments for water storage and subsequent use for drilling operations has created habitat and expanded the distribution of such species as the Arctic char (Moulton and

George 2000; NRC 2003), it is only with the provision that pumping capacity is capped so that sufficient overwintering habitat is available below the maximum ice depth and large enough to contain dissolved oxygen for the longest period of ice coverage. This is important in a landscape where overwintering habitat for fish is limited (Reynolds 1997).

Climate projections for the North Slope indicate not only warming but drying through the summer months and less precipitation through the winter (ACIA 2004). This situation may lead to lower minimum depths in natural lakes or artificial impoundments where entrapments may increase that may ultimately affect fish species populations, invertebrate food resources and possibly trophic cascade effects (Ims and Fuglei 2005). As aquatic invertebrates are a primary food resource for migratory shorebirds, and reduction in this energy-rich, seasonal resource could greatly affect the survival of adults and nesting efforts (Bart and others 2012; Hof and others 2017).

Even using the largest footprint estimated for development from 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987), this may be scattered across the landscape of 1.5 million acres of the coastal plain 1002 area. As mean annual summer temperature increase, as they have to the present, migrating caribou will seek out the coolest remaining sites, including patches of snow which are used to avoid or reduce biting insects. Oil and gas developments have been demonstrated to affect movement and foraging behavior previously (Ballard and others 2000; Cameron and others 1979, 1989, 2005; Cronin and others 2000; among others). While behavioral responses may be individually or herd specific, and have not affected the overall health of North Slope caribou to this time, the point is that with future environmental change, a threshold may be crossed at some point in the future where wildlife resource requirements may come in direct conflict with industry.

Climate Change

As noted, increasing mean high summer temperature, increasing mean low winter temperatures, less precipitation and landscape drying are all projected for the larger North Slope environs over the next 100 years (ACIA 2004). This may be translated to less water for drilling operations including the risk of over-pumping water resources in a landscape with relatively limited open water despite the appearance of abundance. Such drying will affect wetland functions and values for wildlife resources and water quality. Less water and higher temperatures will place some species at risk for continued occupation of preferred habitats, such as overwintering habitat for freshwater fish, freshwater invertebrates, waterfowl and shorebird production, and may create conditions conducive for invasive species (vascular and nonvascular plants, invertebrates and vertebrates, and pathogens) to pioneer and establish populations. As an example the red fox is just now entering the Arctic Refuge which will ultimately compete with native Arctic fox and is a far more plastic and effective predator than native fox or equivalent mesocarnivores. Declines in waterfowl production have been demonstrated in multiple locations where red fox were not previous present. Increasing soil disturbances for development and infrastructure may create pathways for invasive plants and the increased movement of personnel and materiel may create human-subsidized transport of seeds or propagules.

Loss of sea ice will create the potential for increased shore zone erosion during storm or tide surge events. Sea level rise is already causing dislocation and relocation of traditional village sites to higher grounds if available elsewhere in Alaska.

As expressed by local residents and subsistence resource users during scoping for numerous development projects is the fear of displacement of those resources due to increasing

fragmentation of the landscape for traditional lifestyles. Equal with this concern is the fear of catastrophic spills that will affect subsistence resources, particularly long-term incidents that may require years (or generations) to restore and rehabilitate to achieve pre-incident conditions.

Uncertainty

The oil and gas industry mitigation and BMPs have evolved based on experience, knowledge and technology. Similarly, understanding and knowledge of biological and water resources has increased over time and with technology. However, foreseeable changes may be acknowledged but uncertainty and lack of knowledge make management of oil and gas exploration, development, and production or natural resources management tenuous in many respects for the long-term (Wilson and others 2013). Only through a collaborative and cooperative effort, particularly through adaptive management, and industry and agency monitoring may positive goals and objectives be explored.

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From: Northern Alaska Environmental Center
To: roger_kaye@fws.gov
Subject: Alaska"s leadership failed us.
Date: Thursday, November 16, 2017 4:20:59 PM

Week of 11/13/17

Our leadership failed us.



You've probably heard: it was a rough week for the Arctic Refuge.

On Wednesday, the Senate Energy and Natural Resources Committee, chaired by our own Senator Lisa Murkowski, voted 13-10 in favor of Senator Murkowski's bill to move forward plans to open the Coastal Plain of the Arctic Refuge to oil and gas development. The proposal will now move to the floor of the Senate to be voted on as part of the budget bill.

Senator Murkowski has repeatedly stated that the area open to development will be limited to 2,000 acres, but as Trustees for Alaska points out, "This language only addresses the surface acres covered by production and support facilities. It does not include roads or mines, and it does not include the actual footprint of the pipelines that could run for hundreds of miles across the coastal plain. It would at most include only the footprint of the posts supporting those pipelines."

You can watch the entire proceeding and vote here.

This vote is a failure of our elected leaders to recognize the human rights of the Gwich'in Nation, who have vowed to continue defending the Coastal Plain as they have for generations, and the desires of a majority of Americans who want to see the entire Refuge protected. In a press statement, the Northern Center's program director Lisa Baraff said, "We are sorely disappointed by the vote in the Senate Energy and National Resource Committee today. Alaska's leadership failed Alaska. In the face of unprecedented climate

change impacts being experienced in Alaska, now is not the time to open new areas to oil and gas development. The Arctic Refuge is home to the Porcupine caribou herd and a way of life that has existed for millennia. We need to be looking to a clean energy economy and a just transition away from extractive resource development."

No matter where you are, we urge you to continue contacting your elected officials, write letters to your local papers, and share with your communities what this vote means for the Refuge. We will continue to stand with the Gwich'in Nation, who issued this statement following last week's meeting of Gwich'in elders, chiefs, youth, and allies in Fairbanks: "[W]e have to stand united to protect our way of life, the threat to the Arctic Refuge is a threat to the Gwich'in Nation; and we will stand strong in unity against any destruction to our way of life."

We will not allow Alaska to be sold to the highest bidder.

TONIGHT: Help protect the Brooks Range



TONIGHT in Fairbanks, the Bureau of Land Management (BLM) will hold a public scoping meeting in the **Borealis Ballroom at the Wedgewood Resort, 6-8:30pm.**

We invite you to join us at the Northern Center office at 830 College Road from 4pm till 5:45 before the meeting to learn more about the proposed project, the reasons to oppose it, and connect with others who are interested in learning more. We will have posterboard and markers available if you or your child would like to make a sign to leave outside the door of the Wedgewood, where the meetings will be held.

The scoping process offers an opportunity to give public testimony and hear others' concerns. The concerns identified during scoping will be included in the environmental impact statement (EIS) compiled by agencies, and more public involvement means the document will more accurately reflect public comments and concerns.

In addition to tonight's meeting in Fairbanks, BLM has scheduled public scoping meetings in communities along the route of the proposed road, as well as Fairbanks and Anchorage. See the full schedule here, and keep an eye on the schedule; **dates are subject to change due to weather or other variables**. Mark your calendars, work on a testimony, and represent your interests.

For more information, contact clean water & mining coordinator Julia Mickley at

mickley@northern.org or 452-5092.

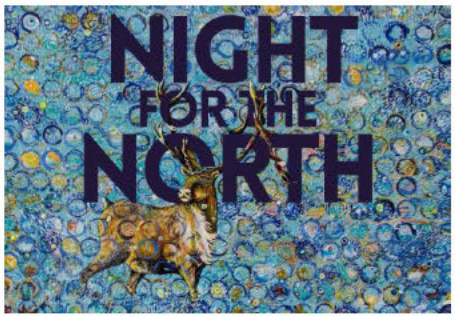
***

The public scoping period is open until January 31, 2018.

The National Park Service is also accepting comments on which route through Gates of the Arctic National Preserve is preferred. The NPS comment period ends January 15, 2018, prior to the BLM comment period on the entire project.

The proposed Ambler Road intersects the migratory route of the 3 arctic caribou herds. It would cross 2900 streams, 11 major rivers and 1700 acres of wetland. This area is spawning ground for 3 species of salmon, sheefish, whitefish and more, and connects parks, wilderness areas, wildlife refuges and a national preserve. Allakaket, Bettles, Galena, Kobuk, Evansville, Evansville Inc., Brooks Range Council, and Tanana Chiefs Conference, and the Northwest Arctic Subsistence Regional Advisory Council have passed statements of opposition.

Thank you to all our members & supporters!



Though last weekend seems like weeks ago, we remain grateful to all those who came to our annual fundraiser auction on Saturday! We had a great time connecting with new and old friends, and it's always inspiring to witness the generosity of our supporters, especially at times like these, when we know a lot of causes have your attention.

A highlight of the evening was listening to Fairbanks youth activist Nathan Baring speak about his experience growing from a shy, introverted kid to the confident climate leader he is today, and how the support of programs like Fund-A-Youth have supported him along the way. Generous donations to the program rolled in, prompted in part by a donated night's stay at Tonglen Lake Lodge in Denali. For another young activist's story, check out this video shared by 2015 summer intern Amanda Mengotto, who remains a dedicated advocate for Alaska. Thanks to everyone who helped make their experience, and the work all of us do, possible.

We'll share more from Saturday's auction soon!

News

:: **FNSB Mayor Karl Kassel signs Climate Mayors Agreement.** Kassel puts Fairbanks on the map by joining mayors around the country in committing to uphold the goals of the Paris Agreement, of which the United States is no longer a member. The agreement states, "As 383 US Mayors representing 68 million Americans, we will adopt, honor, and uphold the commitments to the goals enshrined in the Paris Agreement. We will intensify efforts to meet each of our cities' current climate goals, push for new action to meet the 1.5 degrees Celsius target, and work together to create a 21st century clean energy economy." Thank Mayor Kassel by email at mayor@fnsb.us. Climatemayors.org.

:: **Bonn, Alaska, and the Gwich'in**. Fairbanks climate activist Stephen Arturo Greenlaw said in an interview with Catholic Ecology, "Pope Francis in *Laudato Si'* mentions the

importance of listening and being attentive to indigenous peoples. He mentions when land is turned into resources, we alienate peoples who have been traditionally stewards of land. We displace and threaten their way of life." *Catholic Ecology*.

:: **America's Wildest Place is Open for Business.** "[The National Petroleum Reserve - Alaska] deserves attention, now more than ever. The Trump administration has declared the nation's public lands and waters open for business, particularly to oil and gas companies. In its first six months the administration offered more onshore leases to energy companies to drill on public property than the Obama administration did in all of 2016, the secretary of interior, Ryan Zinke, boasted to the conservative Heritage Foundation in late September. *New York Times.*

Events & Announcements

::November 18: Thanksgiving for the Birds. Drop in, noon-4:00pm. Make simple bird feeders out of recycled materials(pine cones, toilet paper tubes, etc) Fun for all ages. Experts will be on hand for you to learn about winter birds and bird feeding in Fairbanks. At the Creamer's Field Farmhouse,1300 College Road. Call 452-5162 for more information. $5 Donation appreciated.

::December 2: Creamer's Field Luminary Trail & Open House. 6-8pm. Join Friends of Creamer's Field for this annual event. Stop by between 6-8pm and walk a luminary-lit trail, sit by a campfire, and enjoy cookies and music in the warm Farmhouse. Santa might be there too! Call 452-5162 or visit www.creamersfield.org for more information.

::December 7: Deadline to Apply for Arctic Frontiers Student Forum 2018. The five-day interdisciplinary event, taking place alongside the Arctic Frontiers conference in Tromsø, Norway in January 2018, brings together students from across the world with interest in the Arctic. Bachelor and Master students from any field of study are invited to apply.

::Saturdays, December 9, 16, & 23: Drop in Holiday Ornament Making. Noon-4pm. Join Friends of Creamer's Field for our annual holiday ornament making using natural materials. $5 suggested donation.

MISSION

The Northern Alaska Environmental Center promotes conservation of the environment and sustainable resource stewardship in Interior and Arctic Alaska through education and advocacy.

Northern Alaska Environmental Center | 830 College Rd, Fairbanks, AK 99701-1535

Unsubscribe roger_kaye@fws.gov

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From:	Fischbach, Tracy
To:	Greg Siekaniec; Karen Clark; Doug Damberg; Mitch Ellis; Socheata Lor
Subject:	Watermarked version of the EA
Date:	Thursday, November 16, 2017 5:12:31 PM
Attachments:	20171116_EA_ARC 1002 Reg Change_DRAFTwatermarked.docx

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Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

Hours: Mon - Thurs 9:15 am to 3:15 pm
"Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie

Need access to Refuge Documents?
Online Document Database (ServCat)
Need Refuge land status info for Alaska?
FWS Region 7 Land Mapper (FWS version)
FWS Region 7 Land Mapper (Public version)
Region 7 GeoPDF Map Portal

Environmental Assessment for PROPOSED AMENDMENT TO REGULATIONS FOR GEOLOGICAL EXPLORATION OF THE COASTAL PLAIN 1002 AREA

U.S. Fish United States Fish and Wildlife Service
Arctic National Wildlife Refuge, Alaska

DRAFT

16 November 2017

U.S. Fish & Wildlife Service

Environmental Assessment
For the
Proposed Regulation Change for Management of the Coastal Plain 1002 Area of the Arctic National Wildlife Refuge, Alaska

This Environmental Assessment (EA) was prepared in accordance with the U.S. Department of the Interior (DOI) Departmental Manual 516, and is in compliance with the National Environmental Policy Act and the Council on Environmental Quality Regulations (40 CFR 1500-1508).

This EA serves as a public document to briefly provide sufficient evidence and analysis for determining the need to prepare an Environmental Impact Statement (EIS) .

This EA concisely describes the need for the proposed land potential environmental impacts of the proposed action and the alternatives. The EA provides a list of the agencies and persons consulted during EA preparation.

DRAFT

Glossary	
1002 area	identified as such in the map entitled *Arctic National Wildlife Refuge*, dated August 1980 [ANILCA § 1002(b)] (See Figure 1).
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act of 1980
BLM	Bureau of Land Management, U.S. Department of the Interior
CCP	Comprehensive Conservation Plan for National Wildlife Refuges, required by ANILCA
coastal plain	defined as that area shown on the map entitled Arctic National Wildlife Refuge dated August 1980 [ANILCA § 1002(b)], and legally described in 50 CFR Part 37 Appendix I-Legal Description of the Coastal Plain, Arctic National Wildlife Refuge, Alaska [see also 50 CFR § 37.2(d)] (See Figure 1).
cultural resource	defined as any district, site, building, structure, or object significant in American history, architecture, archeology, engineering or culture, as determined in accordance with 36 CFR § 60.6 [see 50 CFR § 37.2(e)]
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior; including BLM, USFWS, USGS
EA	Environmental Assessment, as stipulated under NEPA
EIS	Environmental Impact Statement, as stipulated under NEPA
exploratory activity	defined as surface geological exploration or seismic exploration or both of the coastal plain and all related activities and logistics required for either or both, and any other type of geophysical exploration of the coastal plain which involves or is a component of an exploration program for the coastal plain involving surface use of refuge lands and all related activities and logistics required for such exploration [see 50 CFR § 37.2(i)]
FONSI	Finding of No Significant Impact; Federal agency decision that concludes an EA
NEPA	National Environmental Policy Act of 1970 [40 CFR §§ 1500-1508]
NRC	National Research Council, National Academy of Sciences
NWR	National Wildlife Refuge
ROD	Record of Decision, Federal agency decision that concludes an EIS
USFWS	Fish and Wildlife Service, U.S. Department of the Interior
USGS	Geological Survey, U.S. Department of the Interior

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1 Introduction & Overview

1.1 Purpose and Need

The U.S. Fish and Wildlife Service (Service), proposes to amend the regulations at 50 CFR Part 37 - *Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska*, regarding the dates when an application may be submitted for a permit for a geological and geophysical exploration plan on the Arctic National Wildlife Refuge (Arctic Refuge) lands described in the Alaska National Interest Lands Conservation Act (ANILCA). This action is an update to our regulations to allow opportunities for applications to conduct seismic exploration. Further, the ability to collect new information on oil and gas resources will better inform public policy decisions. We are taking this action in support of Executive Order 13783, Promoting Energy Independence and Economic Growth.

1.2 Key Environmental Requirements & Integration of Other Environmental Statutes & Regulations

The *National Environmental Policy Act of 1969* (NEPA) requires federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions, including a no action alternative. This Environmental Assessment (EA) addresses the administrative action by the Service to permit new exploration plans in the Arctic Refuge. This EA does not evaluate decisions to issue special use permits for specific exploration plans as the details of those plans are unknown at this time. Any analysis by the Service at this time would be speculative in regards to methods, location and timing of specific exploration activities that may occur if the current regulations are amended to provide for additional geological and geophysical exploration.

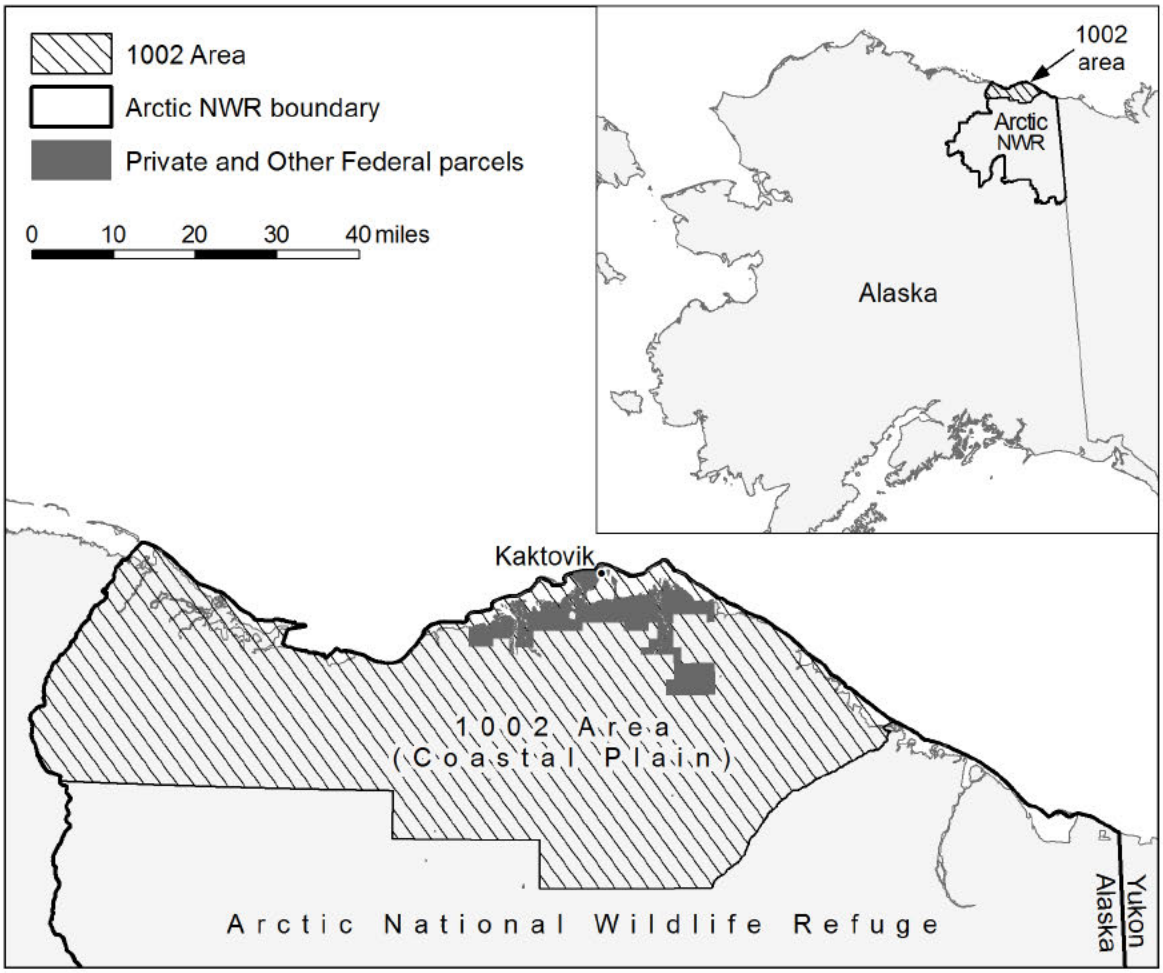
Section 7 of the *Endangered Species Act* (16 U.S.C. 1536) requires the DOI Secretary to ''review other programs administered by him (or her) and utilize such programs in furtherance of the purposes of the Act'' and to ''insure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat . . . .'' Prior to issuance of these regulations, we would consult under section 7 of the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 et seq.), to ensure that any applications for exploration in the coastal plain of the 1002 area of the coastal plain of Arctic Refuge is not likely to jeopardize the continued existence of any species designated as endangered or threatened, or modify or destroy its critical habitat, and that the regulations are consistent with conservation programs for those species. Similar to the NEPA analysis, plan-specific Section 7 reviews would be completed when explorations plans are submitted for review and processing.

The ANILCA is integral to how this proposed regulation change will be evaluated. When ANILCA was passed in 1980 the Act re-designated Arctic Refuge and required the writing of a

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Comprehensive Conservation Plan (CCP) for the Arctic Refuge (Title III), required the identification of federal actions which could have the potential to significantly restrict subsistence users (Title VIII), and required the DOI "to provide for a comprehensive and continuing inventory and assessment of the fish and wildlife resources of the coastal plain of the Arctic Refuge; an analysis of the impacts of oil and gas exploration, development, and production, and to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources" (Title X). The "coastal plain" was defined by a map entitled "Arctic National Wildlife Refuge", dated August 1980 (Figure 1).

Section 106 of the *National Historic Preservation Act of 1966* requires that federal agencies identify and assess the effects its actions may have on historic properties. "Properties" is broadly defined and does not just include built infrastructure. Prior to issuance of any permit given under these regulations, we would ensure that any applications for exploration in the coastal plain of Arctic Refuge are not likely to jeopardize historic properties.



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Figure 1. Arctic National Wildlife Refuge showing the coastal plain 1002 area.

The Arctic Refuge was first established in 1960 through Public Land Order 2214, for the purpose of preserving unique wildlife, wilderness, and recreational values. The original 8.9-million acre Arctic National Wildlife "Range" was withdrawn from all forms of appropriation under public land laws, including mining but not from mineral leasing.

In ANILCA Title III, the Arctic Refuge was expanded to 19-million acres (Figure 1). Under ANILCA § 303(2) the "purposes for which the Arctic National Wildlife Refuge was established and shall be managed include –

(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including participation in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge."

In Title VIII of ANILCA, § 810, Congress recognized the importance of federal lands to local residents of Alaska who had been using those lands to support their subsistence lifestyle for generations. As a result, federal land managers are required to identify whether a proposed land management action has the potential to significantly restrict subsistence opportunities. If so, then the manager is required to consult with local subsistence users and to seek to minimize such restrictions. In Title X of ANILCA, § 1002, Congress provided for a "comprehensive and continuing inventory and assessment of the fish and wildlife resource of the coastal plain of the Arctic Refuge; an analysis of the impacts of oil and gas exploration, development, and production, and to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources."

1.3 BACKGROUND

With the passage of ANILCA, three primary actions were required of the Service and DOI in relation to administration of the Arctic Refuge: (1) a CCP for the Arctic Refuge was to be

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written; (2) the DOI Secretary was to assess wildlife values and oil reserves in an area described in ANILCA § 1002; and, (3) the DOI Secretary was to authorize exploratory activity within the coastal plain "in a manner that avoids significant adverse effects on the fish and wildlife and other resources."

First, ANILCA § 304(g) directed the preparation of a CCP for each refuge in Alaska. Each plan is based on an identification and description of resources of the refuge, including fish and wildlife resources and wilderness values, and must "designate areas within the refuge according to their respective resources and values; specify programs for conserving fish and wildlife and the programs relating to maintaining the identified values proposed to be implemented within each such area; and specify uses within each area which may be compatible with the major purposes of the refuge."

An initial CCP and related EIS were prepared for Arctic Refuge. The Record of Decision (ROD) implemented the minimal management alternative (FWS 1988a, 1988b) which emphasized managing for natural, unaltered landscapes and natural processes. This decision was reiterated in 2015 when the CCP was revised. In this updated CCP and EIS, recommendations for Congressionally-designated Wilderness and four additional Wild and Scenic River designations were also included (FWS 2015a).

Second, under ANILCA § 1002 the DOI Secretary was required to assess the petroleum and wildlife values for a 1.5 million-acre portion of Arctic Refuge coastal plain referred to as the "1002" area (Figure 1). The assessment of the 1002 area of the coastal plain was essential to identifying potential oil and gas reserves and whether development activities would significantly and adversely affect fish, wildlife, habitats or the environment.

Biological studies and geological exploration coordinated by the Service, U.S. Geological Survey (USGS), and Bureau of Land Management (BLM) over a 2-year period on the coastal plain were initiated shortly after the enactment of ANILCA. Studies were to conclude 5 years after enactment of the Act, with final results and recommendations submitted to Congress 9 months later.

In April 1982, the Service completed the initial report summarizing current information regarding fish and wildlife, and their habitats occurring on the Arctic Refuge coastal plain (FWS 1982). Between 1982 and 1987 over 50 separate biological field studies in the 1002 area of the coastal plain have documented baseline conditions, most summarized in annual reports (Garner and Reynolds 1983, 1984, 1985, 1986, 1987). The baseline assessment period ended in 1987 with the submittal of the *Arctic National Wildlife Refuge, Alaska, Coastal Plain Resources Assessment: Report and Recommendation to the Congress of the United States and Final legislative Environmental Impact Statement* (hereafter, *Coastal Plain Report*) (Clough and others 1987). The recommendation to Congress at the time was to open the entire 1002 area of the coastal plain to an orderly oil and gas leasing program and in such circumstances as warranted, avoid unnecessary adverse effects on the environment (DOI Secretary Recommendation pp. 182-192 in Clough and others 1987).

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Baseline biological and water resource assessment in or near the 1002 area of the coastal plain continued from 1988 through 2002, coordinated among the USFWS, USGS, BLM, Alaska Department of Fish and Game, Canadian Wildlife Service, Yukon Department of Renewable Resources, Northwest Territories Department of Resources, Wildlife, and Economic Development, and academic institutions (Truett 1990; McCabe and others 1992; FWS 1994; Douglas and others 2002). Since 2002, biological studies have become increasingly landscape oriented, focusing on ecosystem processes and functions (Martin and others 2009).

Concurrent with the biological studies, oil and gas resource exploration and assessment were ongoing in the 1002 area of the coastal plain but ended with the submission of the 1987 *Coastal Plain Report* (Bird and Magoon 1987; Clough and others 1987; FWS 1990; GAO 1993). The Coastal Plain Report concluded that the 1002 area of the coastal plain was potentially rich in oil and gas resources. Based on the findings, there is a 95 percent chance the 1002 area of the coastal plain contains more than 4.8 billion barrels of oil and 11.5 trillion cubic feet of gas in-place (Clough and others 1987). There is a 19 percent chance that economically recoverable oil occurs on the 1002 area of the coastal plain. The average of all estimates of conditional economically recoverable oil resources is 3.2 billion barrels (Clough and others 1987). Finally, in order to conserve the wildlife resources of the area Congress outlined guidance in § 1002(d) for DOI to authorize exploration plans and to develop regulatory guidelines for these geological exploratory activities to ensure these activities do not significantly adversely affect fish and wildlife and their habitats, or the environment. Some of the requirements included a prohibition on the carrying out of exploratory activity during caribou calving and immediate post-calving seasons or during any other period in which human activity may have adverse effects; temporary or permanent closing of appropriate areas to such activity; specification of the support facilities, equipment and related manpower that is appropriate in connection with exploratory activity; and, requirements that exploratory activities be coordinated in such a manner as to avoid unnecessary duplication.

In April 1983, DOI published the final 50 CFR Part 37 guidelines (DOI 1983; FWS 1983). This regulation defines the general provisions for geological and geophysical exploration within the coastal plain of Arctic Refuge, including: purpose and definitions [Subpart A]; general requirements for exploratory activities [Subpart B]; exploration plans and the application process [Subpart C]; environmental protection to avoid significant adverse impacts to natural and cultural resources [Subpart D]; general administration [Subpart E]; and, reporting and data management to preclude unnecessary duplication [Subpart F].

In that rule, three permit application openings were established as described in Table 1. Each application opening allowed either continued work from a previous work session or new work to begin in the upcoming work session. All exploration work, regardless of when it was initiated, was to be completed by May 31, 1986. No new exploration plans have been accepted since 1984 and no new exploration work has occurred since 1986.

Table 1-1. Exploration Work Sessions and Their Respective Application Due Dates as Stipulated in 50 CFR 37.21.

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Type of Exploration Work	Exploration Work Sessions as Allowed in 50 CFR 37.21	Applications Due
Any exploration plans	April 19, 1983 – May 31, 1986	May 20, 1983
Exploration plans other than seismic exploration	June 1, 1984 – May 31, 1986	April 2, 1984
Any exploration plans	October 1, 1984 – May 31, 1986	June 4, 1984

1.4 Agency and Public Involvement

The USFWS is the lead agency in the development of this EA. For a 60-day period following the publication of the proposed rule in the Federal Register, the public may submit comments on both this draft EA and the proposed rule. After considering the comments received, the USFWS will issue a final EA and if it determines that the proposed action will not result in significant impacts it would issue a Finding of No Significant Impact (FONSI) for the EA, thus completing the NEPA analysis for the proposed action.

1.5 Consultation with Federally-Recognized Tribes and Native Corporations

In compliance with Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, federal agencies are required to consult with federally recognized tribal governments during the NEPA process for certain proposed actions, including the development of regulations, that may have a substantial direct effect on the tribes. Pursuant to Public Law 108-199, the Executive Order also applies to Native corporations established under the Alaska Native Claims Settlement Act. Within the USFWS and DOI the Executive Order is implemented by the Department of the Interior policies on Consultation with Indian Tribes (December 2011) and Consultation with ANCSA Corporations (August 2012). The Service has identified tribal governments and ANCSA Corporations potentially substantially affected by the proposed rule change, who are being invited to consult with USFWS on this proposed regulation change. Additional consultation opportunities will be provided prior to issuance of permits for exploration activities on the refuge.

1.6 Summary of Issues

In order to clarify the issues of greatest concern, the following two tables describe the issues being dismissed and further considered in this EA. If an issue has been considered but dismissed from further evaluation, a reason is given in Table 1-3 and the issue will not be discussed further

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in this EA. Issues being further evaluated are listed in Table 1-4. These issues will be further evaluated in Chapter 3 Affected Environment and Chapter 4 Environmental Consequences.

Table 1 - 3: Issues Dismissed from Further Evaluation

AFFECTED ENVIRONMENT	REASON FOR NOT-EVALUATING FURTHER
Geology	Neither the change in regulation or the resulting exploration activities, which are non-extractive, will change the geology of the area.
Air Quality	With anticipated use of low sulfur fuel it is not expected that emissions concentrations or ice fog from motorized vehicles and equipment would ever reach levels that pose an environmental hazard or cause any significant degradation in air quality.
Steller and spectacled eiders	As migratory birds, neither of these threatened eiders would occupy breeding habitat during the period of winter exploration. Even if there were temporal overlap, only the very NW corner of the 1002 area of the coastal plain is within the breeding range of the spectacled eider, and they only occur there as a rare breeder at very low densities. Steller's eiders do not breed in the 1002 area of the coastal plain and are just a rare visitor along the coast.

Table 1 - 4: Issues Considered for Further Evaluation

AFFECTED ENVIRONMENT	REASON FOR FURTHER EVALUATION
Soils	Although the overall geology of the coastal plain would not be affected, the development of ice roads and ice pads and other associated infrastructure may expose areas to erosion. There is also a risk of fuel spills from equipment being used.
Hydrology	In any proposed winter exploration activity on Arctic Refuge, water withdrawals would be necessary to construct ice roads and other infrastructure that would potentially impact hydrology, aquatic habitats, wetlands and species that depend on them. There is also a risk of fuel spills and release of other contaminants that could impact water quality.
Climate	Although climate will not be affected by either of the alternatives directly, a description of past and present climate is useful in considering cumulative effects of the proposed action to other resources. For this reason a description of climate trends is included in Chapter 3.
Vegetation	In any proposed industrial activity on Arctic Refuge, there is a concern that invasive species will be introduced. We are also concerned about the effects of the development ice roads and ice pads and other associated infrastructure may create.
Wetlands	Depending on the amount of water needed for the development of ice

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	roads and pads, water available for healthy wetlands may be affected.
Fish	Water needed for the development of ice roads and pads, could be withdrawn from aquatic habitat impacting fish populations. Seismic testing over water bodies may also impact fish.
Bald and Golden Eagles	Golden Eagles are rare breeders on the coastal plain, and initiate nesting very early in the spring on the North Slope (earliest of 23 March, with three annual mean initiation dates of 5 April, 14 April, and 22 April); thus, could be affected by "winter" seismic exploration. Bald Eagles are probable, but very rare, breeders on the coastal plain.
Resident Birds	Gyrfalcons are rare breeders on the coastal plain, and initiate nesting very early in the spring; thus, could be affected by seismic exploration. Their primary late winter/early spring prey are rock and willow ptarmigan which are uncommon and common permanent residents, respectively, on the coastal plain.
Migratory Birds	Water needed for the development of ice roads and pads, could be withdrawn from aquatic habitat impacting migrating waterfowl and shorebird populations.
Caribou	The coastal plain is within the territory of the Porcupine Caribou Herd which travels north and south and is a primary subsistence resource for many of the Native people who live in and around the Refuge.
Terrestrial Mammals, Not Including Caribou	Both muskox and moose are now rare on the coastal plain; their populations have declined in recent years. Muskox may be particularly sensitive to late winter disturbance given nutritional challenges and calving beginning in mid-April. Bears, wolves, and wolverines all occur on the coastal plain, although they are more abundant in the foothills and mountains. Brown bears emerge from their dens from late March through May; this period could well overlap seismic exploration periods.
Polar Bears	A majority of female polar bears of the Southern Beaufort Sea population now den on the Refuge coastal plain. As a result much of the area has been designated critical habitat.
Bowhead Whale	Now that there is limited sea ice during much of the year, exploration equipment could be transported to the area via barges through a known bowhead whale migration corridor.
Ringed and Bearded Seals	Now that there is limited sea ice during much of the year, exploration equipment could be transported to the area via barges through known bearded and ringed seal habitat..
Cultural Resources	The reverberation created by seismic exploration is known to damage buried artifacts.
Socioeconomic	Exploration activities do have the potential to create employment opportunities within communities neighboring the Refuge and may also affect subsistence resource availability.
Environmental Justice	Under EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, federal agencies are

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	required to develop strategies to address environmental justice concerns in their approach to operations.
Subsistence	Exploration activities have the potential to affect resource availability by creating disturbances that change caribou and polar bear movements.
Land Use	The development of any semi-permanent developments in the Coastal Plain may require a change to the land management status from "Minimal" to "Moderate" management.
Noise	Noise from vehicles, generators, aircraft, and human presence has the potential to change the natural soundscape during seismic exploration.
Visual	Due to the relatively flat nature of the landscape, equipment associated with seismic exploration will be noticeable to recreationalists and residents in the vicinity.
Wilderness Values	The resulting exploration activities will require a significant level of industrial activity during the exploration work season in limited areas.

2 Proposed Action and Alternatives

2.1 Alternative 1 (No Action Alternative)

Under the no action alternative, the existing regulation would not be amended or updated. Management of the Coastal Plain, Arctic Refuge, would continue as presently and as stipulated in the ROD for the Arctic Refuge CCP (FWS 2015). There would continue to be no oil and gas exploration on Arctic Refuge.

2.2 Alternative 2 - Proposed Action

The Service proposes to allow opportunities for submission of applications to conduct seismic exploration by amending and updating the regulatory language of 50 CFR Part 37 - *Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska*, specifically § 37.21(b) and (c) as follows:

PART 37 – GEOLOGICAL AND GEOPHYSICAL EXPLORATION OF THE COASTAL PLAIN, ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

Subpart C – Exploration Plans

§ 37.21 Application Requirements.

(a) Prior to submitting an exploration plan, applicants may meet with the Regional Director to discuss their proposed plans and exploratory activities and the requirements of this part.

(b) Any person wanting to conduct exploratory activities may apply for a special use permit by submitting for approval one or more written exploration plans, in triplicate, to the Regional

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Director, Region 7, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503.

(c) In addition to containing the information required in paragraph (d) of this section, any exploration plan submitted shall describe the applicant's plan for carrying out an integrated program of exploratory activities in such a manner as will satisfy the objective and limitations stated in § 37.1. If an applicant submits an exploration plan in any given year with the intention of submitting another exploration plan the following year, the applicant shall describe in its initial plan how its future exploratory activities will be integrated with those proposed under its initial plan. Each exploration plan submitted must be published and be the subject of a public hearing in accordance with requirements of § 37.22(b).

(d) An exploration plan shall set forth in general terms such information as is required by this part and by the Regional Director in determining whether the plan is consistent with this part, including, but not limited to:

(1) The name and address of any person who will conduct the proposed exploratory activities, i.e., the applicant/permittee, and, if that person is an agency, firm, corporation, organization, or association, the names and addresses of the responsible officials, or, if a partnership, the names and addresses of all partners;

(2) The names and addresses of all persons planning at the time of plan submittal to participate in the proposed exploratory activities or share in the data and information resulting therefrom through a cost-sharing or any other arrangement;

(3) Evidence of the applicant's technical and financial ability to conduct integrated and well-designed exploratory activities in an arctic or subarctic environment and of the applicant's responsibility in complying with any exploration permits previously held by it;

(4) A map at a scale of 1:250,000 of the geographic areas in which exploratory activities are proposed and of the approximate locations of the applicant's proposed geophysical survey lines, travel routes to and within the refuge, fuel caches, and major support facilities;

(5) A general description of the type of exploratory activities planned, including alternate exploratory methods and techniques if proposed, and the manner and sequence in which such activities will be conducted;

(6) A description of how various exploratory methods and techniques will be utilized in an integrated fashion to avoid unnecessary duplication of the applicant's own work;

(7) A schedule for the exploratory activities proposed, including the approximate dates on which the various types of exploratory activities are proposed to be commenced and completed;

(8) A description of the applicant's proposed communication techniques;

(9) A description of the equipment, support facilities, methods of access and personnel that will be used in carrying out exploratory activities;

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(10) A hazardous substances control and contingency plan describing actions to be taken to use, store, control, clean up, and dispose of these materials in the event of a spill or accident;
(11) A general description of the anticipated impacts that the proposed exploratory activities may have on the refuge's wildlife, its habitat, the environment, subsistence uses and needs, and cultural resources, and a description of mitigating measures which will be implemented to minimize or avoid such impacts;
(12) A description of the proposed procedures for monitoring the environmental impacts of its operation and its compliance with all regulatory and permit requirements;
(13) A statement that, if authorized to conduct exploratory activities, the applicant shall comply with this part, its special use permit, its approved exploration plan, plan of operation, and all reasonable stipulations, demands and orders issued by the Regional Director;
(14) A description of the applicant's proposed data quality assurance and control program; and
(15) Such other pertinent information as the Regional Director may reasonably require.

If this alternative is selected, it is assumed that the Service will receive and possibly approve applications for seismic exploration activities on the 1002 area of the coastal plain. Proposed 3-D seismic exploration activities in the nearby National Petroleum Reserve - Alaska (NPRA) and analyzed in the BLM EA, DOI-BLM-AKF01000-2017-001-EA and the NPRA Integrated Activity Plan/EIS (2012), give us an understanding of what these activities would generally entail.

Seismic exploration maps the subsurface structure of rock formations by sending energy waves into the ground or water and then recording the reflected energy waves. One of the most common methods for creating these energy waves in the arctic is via vibroseis seismic operations which use truck-mounted vibrators that systematically put variable frequency energy into the earth. Several of these truck-mounted vibrators are located along a line and vibrate in synchrony in order to record energy along a transect. The reflected energy is recorded and the whole line moves ahead.

3-D seismic activities generally occur in the winter with crews beginning to mobilize and build ice roads and pads in December. Full crews arrive in January and commence seismic operations if the ice infrastructure has been completed. Seismic operations continue through most of April, with demobilization finishing by the first part of May. Crews may include 40 -160 people depending on the planned activity with operations occurring 24 hours a day. The camp facility often includes sled-mounted units for preparing and eating meals, sleeping areas, washrooms, offices, shops, medical facilities, generator rooms, and any other support needed. The camp moves along with the exploration work. Any ice roads or pads built during this time are left to melt in place. Any ice bridges built across rivers are removed in order to decrease the chance of ice damming during the melt season. When possible frozen lakes are used for landing strips.

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Without a specific exploration plan to evaluate, it is not possible to determine exact locations and timing of all the seismic work and staging. Although we can predict that seismic exploration activities will happen in the winter months, it is less clear what the timing of staging and pre-survey work would be. We can predict that ice roads may be used to stage and transport equipment and materials into the west end of the 1002 area of the coastal plain. Exploration activities further to the east would likely require barge transportation during the summer and fall before the sea ice freezes. Also, unlike the western side of the area, there is no nearby infrastructure on the eastside from which to build, possibly changing the kind and quantity of equipment used.

2.3 Alternatives Considered but Dismissed From Detailed Analysis

No other alternatives were analyzed in detail in this EA, because only a change of regulation will allow opportunities for submission of applications to conduct seismic exploration. The Service considered updating the environmental protection requirements of 50 CFR §§ 37.31 and 37.32, but determined that the regulations as currently written provide adequate and appropriate protection of refuge resources and allow the Regional Director to impose additional stipulations to ensure that permittees' activities are conducted in a manner which avoids significant adverse effects on the refuge's wildlife, its habitat, and environment.

3 Affected Environment

Per ANILCA § 1002(c), resource assessment baseline studies within the 1002 area of the coastal plain began shortly after its enactment and, as stipulated, are "continuing." Special emphasis was placed on caribou, wolves, wolverines, grizzly bears, migratory waterfowl, muskox, and polar bears of the coastal plain and their habitat. The purpose of the studies was to "assess the size, range, and distribution of the populations of fish and wildlife; determine the extent, location, and carrying capacity of the habitats of the fish and wildlife; assess the impacts of human activities and natural processes on the fish and wildlife and their habitats; analyze the potential impacts of oil and gas exploration, development, and production on such wildlife and habitats; and analyze the potential effects of such activities on the culture and lifestyles (including subsistence) of affected Native and other people."

The environmental setting, flora and fauna, water resources, cultural resources, and rural lifestyles (including subsistence) of the 1002 area of the coastal plain, Arctic Refuge, are generally defined and described in the *Final EIS and Preliminary Final Regulations: Proposed Oil and Gas Exploration within the Coastal Plain of the Arctic NWR* (DOI 1983), and *Coastal Plain Report* (Clough and others 1987).

Additional natural, water and cultural resource data and assessments are provided in the numerous studies conducted under the Arctic Refuge Coastal Plain Resource Assessment over the past 30 years (FWS 1982; Garner and Reynolds 1983, 1984, 1985, 1986, 1987; McCabe and others 1992; Douglas and others 2002; among others). Cumulative effects of oil and gas activities on the Alaska North Slope were reviewed by National Research Council, as these effects were not adequately integrated into ongoing studies up to that point (NRC 2003).

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Since 1988, the natural and cultural resources, water resources, and lifestyles (including subsistence) in the Arctic Refuge, including the 1002 area of the coastal plain, have been minimally managed by human influence or intrusion, and administered for their wilderness values and natural processes (FWS 1988a, 1988b, 2015a, 2015b).

3.1 PHYSICAL ENVIRONMENT

3.1.1 Soils

Soils in the coastal plain are described in the 2015 Arctic Refuge CCP as including "low terraces and floodplains of streams draining the North Slope of the Brooks Range. Materials underlying soils in this region consist of fluvial sands and silts, with increasing amounts of interstratified marine sediments near the coast. Generally, soils…thaw less than 18 inches in summer and are poorly drained. Loamy textures are common on terraces and floodplains, and organic soils occur in depressions. Locally, peaty materials are buried beneath windblown sand deposits."

3.1.2 Hydrology

Water resources on the coastal plain of the Arctic National Wildlife Refuge consist of streams, lakes, and springs. Streams of the Arctic coastal plain flow north, several forming large alluvial fans as they flow into the Beaufort Sea where they contribute substantial volumes of water and sediment to coastal ecosystems (Arctic CCP). Like other areas of the Arctic, the coastal plain is underlain by continuous permafrost limiting infiltration of surface water and limiting groundwater resources (Lyons and Trawicki 1994). Groundwater that may exist below permafrost is thought to be saline or brackish (Williams 1970). While ninety-nine percent of the 1002 area is classified as wetlands freshwater is limited and confined to the shallow zone above permafrost (Clough et al. 1987). Lakes are not evenly distributed across the coastal plain with concentrations occurring near the mouth of the Canning River and in the region of the Sadlerochit and Jago Rivers with very few lakes occupying the central Katakturuk River region (Trawicki et al. 1991). At Barter Island mean annual precipitation which includes the water equivalent of snow averages 6.3 inches per year, in Umiat east of the 1002 area on the North Slope it is 5.7 inches (Searby and Hunter 1971) emphasizing that climate and permafrost are dominant factors that limit water availability. The non-frozen water found on the coastal plain during the winter months is located in small isolated pools beneath ice hummocks associated with stream drainages , lakes with depths greater than 7 feet, and flowing surface waters associated with springs (Lyons and Trawicki 1994).

<u>Streams and Rivers</u>

The 1002 area has a relatively high density of streams and rivers compared to other areas of the North Slope (Brackney 2008). These habitats support thirteen species of fish, including Dolly

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Varden an important subsistence fish. The hydrography of these systems is strongly influenced by the climate which is characterized by extremely low winter temperatures and short, cool summers with low, desert-like levels of precipitation. Streamflow rapidly declines in most systems shortly after freeze up in September and ceases in most streams by December when they are generally frozen to the stream bed resulting in no flow or flow so low as to not be measureable (Lyons and Trawicki 1994). A few exceptions to this occur where springs result in open reaches and aufeis areas that develop providing important fish overwintering habitat (Arcone 1989). Break up on the Arctic coastal plain occurs during a brief period in late May or early June. Snowmelt begins in the mountains and foothills progressing towards the coastal plain. Rapidly melting water runs over the ground as sheetflow with infiltration limited by permafrost (Lyons and Trawicki 1994). Water in drainages rises rapidly, often flowing over ice covered stream channels. More than half of the annual discharge for these streams can occur during a period of several days to a few weeks (Clough et al. 1987, Sloan 1987). Based on origin, hydrologic regime, and chemical and biological characteristics, Craig and McCart (1975) classified North Slope streams into three categories: mountain, spring-fed, and tundra. Mountain streams are typically fast flowing and fed by varying proportions of snowmelt, glacier meltwater, and spring-fed tributaries. Waters are cold (usually less than 50 °F), occasionally turbid, moderately hard, and support low invertebrate densities. The most common species of fish in mountain streams is Dolly Varden. Mountain streams that receive glacial inputs are unique to the eastern North Slope, in the Jago, Hulahula, and Okpilak watersheds, discharge from glacial sources is the dominant source of flow when precipitation is low and air temperatures are high and transport large volumes of water, sediment and nutrients to downstream ecosystems (Arctic CCP). Spring-fed streams are often tributaries of mountain streams and have relatively stable flows and temperatures throughout the year. Spring-fed waters are characterized by low levels of dissolved solids and very high densities of macroinvertebrates. Many spring-fed streams provide critical spawning and overwintering habitat for Dolly Varden. Tundra streams originate in the Brooks Range Foothills and coastal plain ecoregions, are fed by surface runoff, tend to be meandering systems, and have low to moderate invertebrate densities. Waters are typically warmer and exhibit lower pH and conductivity relative to mountain and spring-fed streams (Arctic CCP). Huryn et al. (2004) found that gradients in freezing probability, nutrient concentrations, and substratum instability control invertebrate communities in these systems. Some projections indicate that glacial inputs could disappear within the next 50 years altering hydrology by reducing instream connectivity and negatively impacting fish migrating to critical overwintering habitat (Nolan et al. 2011). Surface water availability and instream connectivity will potentially be adversely impacted by deepening of the active layer on the coastal plain, increasing duration of the summer season, and increased evapotranspiration rates (Arctic CCP).

Springs and Aufeis Areas

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Six springs are located on the Arctic coastal plain identified through reconnaissance investigation by Childers et al. (1977): Sadlerochit Spring, Red Hill Spring, Katakturuk River tributary Spring, Hulahula River Spring, Okerokovik River Spring, and Aichilik River Spring. During the winter months pressurized water discharges from a spring pushing up through the ice to the surface where it spreads out and freezes forming aufeis areas that can become extensive. These formations melt more slowly than snow, generally persist into the summer and may provide a temporary source of freshwater (Kane and Slaughter 1973). Open water associated with springs provides important winter habitat particularly once surface water runoff ceases due to freezing (Lyons and Trawicki 1994). Most springs in Arctic Refuge have survived since the last glacial maximum (Yoshikawa et al. 2007), suggesting that they will continue to flow and be refugia for aquatic biota in a changing climate.

Lakes

The density of lakes in the Arctic coastal plain is low compared to the rest of the North Slope and as noted earlier their distribution is not uniform, nor is their size and depth (Arctic CCP). Jorgenson and Shur (2007) classified the coastal plain into regions based on lake origin: thaw, depression, riverine, and delta. Depression lake basins are formed in undulating sandy, alluvial marine or eolian deposits, and are the majority found on the coastal plain concentrated in the depression lakes region between the Hulahula and Niguanak rivers. Riverine lakes include oxbow and floodplain lakes along sinuous channels and thaw lakes formed in ice-rich abandoned channels. Riverine lakes are most concentrated along the Jago and Niguanak rivers. Delta lakes include thaw, riverine, and tidal lakes and most are found in deltas of the Hulahula, Jago, Aichilik, and Canning rivers (Arctic CCP). The majority of lakes on the coastal plain are shallow lakes with surface areas ranging from 1,500 acres to less than 10 acres (Trawicki et al. 1991). Recharge of these systems is generally limited to snow melt and direct precipitation in the immediate vicinity of the lake (Lyons and Trawicki 1994). When not connected to larger drainage networks, evaporation has a strong influence on water chemistry and plays an important role in regulating lake water balance (Arctic CCP). Maximum winter ice thickness on lakes in the Arctic is between 6-7 feet (Bilello and Bates 1969, 1971, 1972, and 1975). Clough et al. (1987) reported that most lakes have basins less than 7 feet deep and thus freeze to the substrate. These shallow lakes generally melt from the surface downward in spring. Deeper lakes that do not freeze to substrate may have ice present on the surface well into July. Due to the level of winter freezing, the depth of lakes restricts the presence of fish, Hobbie (1984) found fish present only in lakes with depths greater than 5.6 feet. Shallow lakes generally lack fish because they usually freeze solid but they provide important habitat to emergent vegetation, invertebrates, and migratory birds due to the earlier availability of ice-free areas. Trawicki et al. (1991) identified fish presence in lakes on the coastal plain to be more frequent and widespread than previously suspected. Ninespine stickleback (*Pungitius pungitus*) were found in 34 of 52 lakes surveyed (65%) in 1989. In the past half a century, the duration of ice cover, thermal regimes, and rates of

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primary productivity have likely changed. In the future, changes in temperature, active layer depth, fire frequency and severity, and erosion rates could affect lake distribution, water quality, water levels, size, and connectivity to other habitats (Arctic CCP).

Winter Specific Hydrologic Data

Hydrologic data for the 1002 area are limited, the Service collected short-term (less than five years) of data over two decades ago at 11 stream gage sites on five drainage systems across the coastal plain and conducted an inventory of 119 lake basins to create lake contour maps, water volume calculations and estimates of winter water volume beneath ice cover. These lake basins constituted the majority of larger lake basins found in the 1002 area. These data were collected in large part to address questions regarding winter water availability in the 1002 area in the event of exploration activities. The USGS has collected some additional hydrography data on the Canning and Hulahula Rivers. In the Service stream studies winter water was found to occur over a wide area in most of the major river drainages but it was restricted to small isolated pools beneath ice hummocks scattered throughout the braided portions of these rivers. The volume of water available was estimated to be small, 9 million gallons over the 237 miles of inventoried area (Elliot and Lyons 1990). Total estimated volume of water in the study lakes ranged from 55,382 acre-feet (18 billion gallons) when free of ice to a low of 3,366 acre-feet (1.1 billion gallons) beneath a maximum ice thickness of seven feet. Ninety percent of the available water was contained in just nine of the 119 surveyed lakes, the majority of these were found in the Canning River delta area (up to eighty percent of the total volume), and only two of these lakes were located in the region between the Katakturuk and Sadlerochit rivers (Trawicki et al. 1991).

Climate Change Effects

Historically, in the nearby NPR-A the coastal regions have not thawed until after the second week of June (BLM 2012). By mid-century, these areas are projected to thaw the first week of June. By late century these areas are expected to thaw as early as June 1st. Changes in freeze-up date are predicted to be even greater. Historic data indicates NPR-A water bodies freeze by mid-September. Models indicate freeze-up will not occur until late September in southern regions and early October along the coast. By the end of the century, coastal waterbodies may not freeze until the end of October. These changes will result in a six-week increase in the length of the ice-free season.

Landscape drying trends have been observed in northeastern Alaska (ACIA 2004). Increased temperatures and an extended growing season could increase the evapotranspiration rate, increasing the water deficit (defined as the amount by which evapotranspiration exceeds precipitation) and potentially affecting the annual water balance. The annual water balance represents the water available for plants and animals, streamflow, and groundwater recharge. Shallow water systems, including lakes and wetlands, could decrease in number and extent as the annual water balance experiences an ongoing deficit. Permafrost loss on the Refuge could also result in draining of many shallow water systems; the thawing of ice wedges and ice lenses could

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create more connections between surface water and groundwater systems. If wetlands and lakes continue to dry, an increase in vegetative cover can be expected eventually transitioning to dry meadows and shrublands. This would reduce the amount of habitat available for wetland-dependent species, such as waterfowl.

3.1.3 Climate

The North Slope is defined as the area north of the Brooks Range, including the Beaufort Sea Coastal Plain and the Brooks Range Foothills ecoregions. The climate of the North Slope is classified as arctic: summers are short and cool, and winters are long and cold. The growing season lasts from June to August. Subfreezing temperatures and snow may occur at any time during the year.

The Arctic coast experiences more frequent cloudiness and fog with higher winds; inland, clear skies are more common, winds are variable, and summers are warmer and less cloudy with increasing distance from the coast. At Barter Island on the coast, temperatures average 40 °F in July (warmest month) and -20 °F in February (coldest month) (Table 4-2). Temperatures on the coastal plain and in the northern foothills of the Brooks Range are more similar to those measured at weather stations at Kuparuk and Toolik Lake, ranging from means of 47 to 53 °F in July and -18 to -6 °F in February.

North of the Brooks Range, the Refuge receives little precipitation. The average annual water equivalent precipitation is less than 10 inches (in), most of which falls as summer rainfall, but it includes 32 to 46 in of snowfall. Evaporation rates are low due to low temperatures and a short growing season; the land is underlain by continuously frozen soil, which restricts soil drainage. Therefore, available soil moisture is considerably greater than the low annual precipitation would produce in a more temperate climate, and soils are usually saturated during summer.

Surface winds along the Arctic coast average 9 to 15 miles per hour (mph), with occasional intense storms generating winds exceeding 70 mph. Winds are predominantly from the northeast, although the strongest winds come from the west. September and October are the windiest months on the coast, probably due to maximum amounts of open water (Wendler et al. 2010). During winter, winds are a major force affecting the distribution and amount of snow cover on the coastal plain. Higher, rolling terrain is often blown clear, or nearly so, while dense snow drifts accumulate in sheltered areas along stream banks.

The Arctic is particularly sensitive to warming due to the historically extensive snow and ice cover, where the freezing point marks a critical threshold for stability of the landscape and thus both habitat and infrastructure sustainability. Accelerated melting of multiyear sea ice, reduction of terrestrial snow cover, and permafrost degradation are examples of the observed rapid Arctic-wide response to global warming.

Annual average near-surface air temperatures across Alaska and the Arctic have increased over the last 50 years at a rate more than twice as fast as the global average temperature (Taylor et al. 2017). There is limited meteorological monitoring on the North Slope, and no long term,

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continuous monitoring in the Arctic Refuge. Thus, long term trends are derived primarily from Utqiagvik (Barrow). Especially strong warming has occurred over Alaska's North Slope during autumn. For example, Utqiagvik's (formally Barrow) warming since 1979 exceeds 7°F (3.8°C) in September, 12°F (6.6°C) in October, and 10°F (5.5°C) in November (Wendler et al. 2014).

Our understanding of precipitation trends are limited on the North Slope, in part because the difficulty of collecting rain and snow in windy sites makes historical precipitation data less reliable than temperature data. Overall, the 2016 May Alaska statewide snow coverage was the lowest on record dating back to 1967; the snow coverage of 2015 was the second lowest, and 2014 was the fourth lowest (Taylor et al. 2017). The length of the snow season impacts the timing available for winter exploration activities as well as the timing of wildlife activities, including occupancy of migration and birthing habitats. Snowpack in the Brooks Range, and glacier mass, affect water availability in rivers and lakes for both fish and wildlife habitat and in support of industrial development.

Negative trends in precipitation were observed between 1950 and 1988 at Barter Island, on the Beaufort Sea coast in the center of the Arctic Refuge (Curtis et al. 1998; L'Heureux et al. 2004). Across six decades (1950-2010), researchers also observed a consistent decrease in winter precipitation at Utqiagvik (McAfee et al. 2013), which supported earlier analyses (L'Heureux et al. 2004). The Barter Island station, however, has not reported continuously since the late 1980s, so it cannot confirm recent trends at Barrow. At Bettles, in the western Brooks Range, there appears to be an increase in winter precipitation, with the difference from the Arctic Coastal Plain resulting from the Brooks Range acting as a barrier to moisture transport.

3.2 Biological Environment

3.2.1 Vegetation

North of the Brooks Range, the coastal plain is treeless tundra, composed mainly of hardy dwarf shrubs, sedges, and mosses. Habitats on the North Slope can be grouped into four broad categories: coastal lagoons, lowland wet tundra and lakes, upland moist tundra, and river floodplains with willow shrub thickets. The geography of the 1002 Area differs from the coastal plain further west in that there is generally less low, flat, wet tundra and a greater proportion of rolling, drier terrain. A detailed description of all the habitats on the Refuge can be found in the 2015 Refuge CCP. The following is a summary of the information found there as it pertains to the Refuge coastal plain.

Shrub thicket habitat can be categorized into two types: dry and moist prostrate dwarf shrub. Dry prostrate dwarf shrub occupies dry areas of the coastal plain tundra and on dry, infrequently-flooded river terraces or alluvial fans throughout the refuge. Moist habitats on slightly elevated microsites of the coastal plain are often drier as a result of greater exposure to wind and lack of water from surrounding terrain. Lichen are more common than mosses in these drier habitats. Bare soil as a result of frost action is common in this habitat type. Moist prostrate dwarf shrub contains similar shrub species as dry, but greater winter snow cover and summer soil moisture allows grasses, sedges, and mosses to thrive in the understory.

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The riparian shrub type develops on gravels along rivers and is dominated by the willows *Salix planifolia* and *S. alaxensis*. On the North Slope, this is the tallest vegetation type. Species composition and density is controlled by frequency of flooding, water velocity, and the size of particles deposited during flooding

The very wet graminoid vegetation type occurs on aquatic habitats surrounding large, open bodies of fresh water, very wet habitats that contain numerous small bodies of open water; and coastal marshes frequently inundated with salt water. Surface forms includ low-centered polygons with abundant standing water, thaw lake basins, edges of lakes, and lowbank coastline. There is usually little shrub, forb, or moss cover, except on drier microsites such as polygon rims.

3.2.2 Wetlands

Although the density is low compared to the rest of the North Slope, there are over four thousand lakes covering over 37,000 ac in the Refuge. Most (73 percent) of the lakes are in the coastal plain ecoregion. Most lakes in this region are shallow, freeze to the bottom during winter (Trawicki et al. 1991), and are recharged by snowmelt, overbank flooding, and precipitation. When not connected to larger drainage networks, evaporation has a strong influence on water chemistry and plays an important role in regulating lake water balance. Jorgenson and Shur (2007) classified the coastal plain into regions based on lake origin: thaw, depression, riverine, and delta. Thaw lakes are formed by the degradation of ice-rich sediments and, in the Refuge, are only in great abundance in a small thaw lake plain east of Demarcation Bay. Depression lake basins are formed in undulating sandy, alluvial marine or eolian deposits. Most of the lakes in the Refuge are in the depression lakes region between the Hulahula and Niguanak rivers. Riverine lakes include oxbow and floodplain lakes along sinuous channels and thaw lakes formed in ice-rich abandoned channels. Riverine lakes are most concentrated along the Jago and Niguanak rivers. Delta lakes include thaw, riverine, and tidal lakes and most are found in deltas of the Hulahula, Jago, Aichilik, and Canning rivers. Up to 80 percent of the winter water volume is in lakes in the Canning River delta (Trawicki et al. 1991).

Over 25 percent of the lakes on the North Slope of the Refuge are in the mountains and foothills. Most mountain lakes are of glacial origin and tend to be deeper, have larger surface areas, and store much greater volumes of water than coastal plain Lakes. The largest mountain lakes include Lake Peters (3,226), Lake Schrader (1,689 ac), Elusive Lake (772 ac), and Porcupine Lake (333 ac). With the exception of studies on two large deep glacial lakes, Lakes Peters and Schrader, the limnology of mountain lakes in the Refuge has not been well studied. In the late 1950s, Hobbie (1961) found that Lake Schrader was at the northern limit of thermally stratified lakes; Hobbie (1964) found that 50 percent of the annual primary productivity in Lake Peters occurred when the lake was still covered by ice. In the past half a century, the duration of ice cover, thermal regimes, inputs from glacial meltwater, and rates of primary productivity have likely changed. In the future, changes in temperature, active layer depth, fire frequency and severity, and erosion rates could affect lake distribution, water quality, water levels, size, and connectivity to other habitats.

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Landscape drying trends have been observed in northeastern Alaska. Riordan et al. (2006) reported a reduction in wetland extent and the number and surface area of lakes on parts of the Yukon Flats between 1980 and 2002. Many wetlands on the Yukon Flats Refuge that were once aquatic habitats, such as lakes, now are shrub and wet meadow habitats. Historical aerial photographs from the boreal forest part of Arctic Refuge also show lakes shrinking or disappearing in the past 60 years.

Increased temperatures and an extended growing season could increase the evapotranspiration rate, increasing the water deficit (defined as the amount by which evapotranspiration exceeds precipitation) and potentially affecting the annual water balance. The annual water balance represents the water available for plants and animals, stream flow, and groundwater recharge. Shallow water systems, including lakes and wetlands, would decrease in number and extent as the annual water balance experiences an ongoing deficit. Permafrost loss on the Refuge could also result in draining of many shallow water systems on the Refuge; the thawing of ice wedges and ice lenses could create more connections between surface water and groundwater systems. If wetlands and lakes continue to dry, an increase in vegetative cover can be expected; and they could eventually transition to dry meadows and shrublands. This would reduce the amount of habitat available for wetland-dependent species, such as waterfowl.

3.2.3 Fisheries

Two types of fish habitat dominate the Arctic coastal plain: streams and lakes. Lake habitats may be isolated and without upstream or downstream connections, and may be further defined as deep or shallow. Environmental extremes also dominate fish habitats, between freezing, i.e., below 0°C/32°F during the long winter and flowing waters (above 0°C/32°F) during the short summer months. This combination, along with size, location, and morphology, including chemical and physical characteristics of the numerous lakes and tributaries of the Arctic coastal plain determine the distribution, densities and diversity of fish species (see Affected Environment - Hydrology 3.1.2).

Fish species may be categorized into freshwater residents, diadromous (both marine and freshwater) and marine. About 62 marine and diadromous fish occur in in the Beaufort Sea adjacent to the coastal plain and these species include Arctic char, Arctic cisco, Arctic flounder, boreal smelt, Pacific salmon (pink and chum), and fourhorn sculpin (Craig 1984; Clough and others 1987; Gallaway and Fechhelm 2000; BLM 2012). Nearshore marine environments provide important foraging and spawning habitats while the moving waters of river deltas provide overwintering habitat for some species. About 21 species of freshwater fish, including diadromous species that are predominantly freshwater, occur in the coastal plain and include Arctic lamprey, Arctic grayling, round whitefish, broad whitefish, ninespine stickleback, and burbot (Clough and others 1987; Moulton and George 2000; BLM 2012).

The 3- to 4-month Arctic summer is a critical period for fish to find quality foraging habitats and food resources and reproduce. It may be safely assumed that any fresh waters deeper than 2-2.5

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meters (6-7 feet) deep, or alternatively below the maximum winter ice depth of the coastal plains environs may be suitable wintering habitat for fish (Bilello and Bates 1969, 1971, 1972, 1975 in Lyons and Trawicki 1994; Schmidt and others 1989; Moulton and George 2000). This type of habitat is considered restricted and a limiting factor to overwintering fish survival (Reynolds 1997). Large lakes are generally uncommon in the 1002 area of the coastal plain, and particularly those with overwintering capacity; do not freeze to the bottom during winter months, provide sufficient dissolved oxygen, and/or without salt water intrusion (Clough and others 1987).

Springs are important for spawning, rearing, and overwintering and these sites are generally more abundant and diverse than other waters for aquatic invertebrates as food resources (Glesne and Deschermeier 1984; Clough and others 1987).

The integrity of riparian areas is important for maintenance of water quality and fish populations on the coastal plain, more so at higher elevations where stream meandering during spring snowmelt or summer storm events is less prevalent than at lower elevations (Clough and others 1987).

Grayling are not as tolerant of brackish waters and occur more in riverine systems than char but are in large concentrations are only a few locations. Grayling make extensive migrations to and from spawning, rearing, foraging, and overwintering locations (West and Wiswar 1985; Mecklenburg and others 2002). Major Arctic grayling populations occur in the Canning, Tamayariak, Sadlerochit, Hulahula, Okpilak, and Aichilik Rivers. Arctic char (Dolley Varden) are primarily anadromous but rely on freshwater habitats for spawning, early rearing, and wintering. Therefore, char also migrate with primary movement corridors in the Canning, Aichilik and Hulahula Rivers. The Canning River has the largest char run and the Hulahula is the most important for subsistence purposes.

Smaller fish species which have little interest for sport or subsistence, are important food resources for birds, mammals and other fish.

Seventeen of the most commonly occurring fish species in the coastal plain are important subsistence resources (NRC 2003). Due to difficulty of access and seasonal restrictions, sport fishing may be considered minimal in the coastal plain (Clough and others 1987; BLM 2012). Arctic char is the most important subsistence freshwater fish species followed by Arctic grayling.

3.2.4 Bald and Golden Eagles

Bald eagles are considered a casual visitor on the coastal plain (Arctic Refuge CCP) but recent observations suggest that they may be more accurately considered a very rare possible breeder in the 1002 area of the coastal plain (T. Swem, pers. comm.). Golden eagles, on the other hand are fairly common visitors on the coastal plain, and rare breeders on the inland coastal plain (Arctic Refuge CCP). Across the entire Arctic Coastal Plain, overall golden eagle numbers in spring increased significantly between 1986 and 2012 at an annual rate of 7%; over the last decade of that period the increase was significant at an annual rate of 37% (Stehn et al. 2013). The mean

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annual index for golden eagles over the entire period was 118 birds, but in 2012, the index reached an all-time high of 522 (Stehn et al. 2013).

The 1002 area of the coastal plain is very important for non-breeding golden eagles, particularly subadults, which both scavenge and prey upon caribou during the calving and post-calving period of the Porcupine herd (Mauer 1985). Although none of the nest sites visited by Mauer (1985) and his colleagues were within the 1002 area of the coastal plain, subsequent observations have confirmed them as a breeding species there, including at nest sites within core calving areas (T. Swem, pers.comm.).

Within the refuge, golden eagles breeding north of the crest of the Brooks Range begin nesting very early in spring. Based on a three-year study (1988-1990), nest initiation dates in those golden eagles ranged from 23 March to 11 May, with annual mean nest initiation dates of 22 April, 14 April, and 5 April in 1988, 1989, and 1990, respectively (Young et al. 1995). Those dates would include the last third of the operations phase and the entirety of the demobilization phase of a recently-proposed winter seismic exploration project farther west on the North Slope (BLM CPAI-NPR- A Final Seismic Environmental Assessment, 2016). Elsewhere, disturbance and development correlated with reduction in golden eagle nest success (Kochert et al. 2002); winter seismic activity could have similar result.

3.2.5 Resident Birds

Four species of birds are considered permanent residents of the coastal plain: Willow Ptarmigan, Rock Ptarmigan, Gyrfalcon, and Common Raven (Arctic Refuge CCP). Gyrfalcons are an uncommon resident of the inland coastal plain (Arctic Refuge CCP); eyries are known in the 1002 area of the coastal plain (T. Swem, pers. comm.). Even in the middle of winter, gyrfalcons may be present on their nesting territories; in the coastal Northwest Territories of Canada (at latitudes comparable to, or greater than, those of the 1002 area of the coastal plain), gyrfalcons have been found on territory as early as February (Booms et al. 2008). Both species of ptarmigan are important components of the gyrfalcon diet, particularly in winter and early spring when other prey types are either absent or scarce (Watson et al. 2012). Nest initiation dates range from early April to early June and, aswith the Golden Eagle, early-nesting birds could be disturbed by winter seismic exploration during both the late operation and demobilization phases. Gyrfalcons are known to be disturbed by both fixed-wing aircraft and helicopter overflights; disturbed birds are less likely to use the same site in subsequent year (Booms et al. 2008).

3.2.6 Migratory Birds

In the northern foothills of the Brooks Range, Arctic coastal plain and adjacent marine waters, 158 species have been recorded, including 79 breeding species and 79 species that are migrants, visitors, or vagrants. Birds that use the Refuge have ranges that include all 50 U.S. states and six continents. Thirty-five species of waterfowl have been observed on the Refuge. The geese, except Canada geese, and tundra swans primarily breed on the coastal plain (Arctic CCP 2015).

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Red-throated loons have been identified as a species of Conservation Concern by the Service (2008a), Audubon Alaska (Stenhouse and Senner 2005) and the ADFG (2006). Its highest densities are found on the coastal plain and adjacent marine areas, but a few also breed in the Brooks Range and on the south side of the Refuge.

Twenty-six species of shorebirds breed on the Arctic Refuge, 22 of which breed on the coastal plain. Another species, the red knot, occurs as a migrant only. Of these 27 species, 21 are identified as species of Moderate or High Conservation Concern by the U.S. Shorebird Conservation Plan (Brown et al. 2001), Alaska Shorebird Conservation Plan (Alaska Shorebird Group 2008), the Service (2008a), and/or Audubon Alaska (Stenhouse and Senner 2005) because of small or declining populations.

3.2.7 Terrestrial Mammals other than Caribou

As established by ANILCA, the first purpose of the Arctic Refuge is to "conserve fish and wildlife populations and habitats in their natural diversity." Among the wildlife species specifically listed in ANILCA under this purpose are several species of large terrestrial mammals including caribou, Dall sheep, muskox, moose, brown bear, wolf, and wolverine. Caribou will be considered in the next section; Dall sheep do not occur on the coastal plain. Among the five species which do occur in that region, both muskox and moose have experienced marked population declines over the last few decades. After muskox were reintroduced to the North Slope in the Arctic Refuge in 1969 and 1970, the population grew steadily and rapidly from 1978 to 1985 and then remained relatively stable until nearly the end of the century. Beginning in 1998, however, numbers within the refuge dropped dramatically for the next half decade and have remained very low ever since. The overall muskox population in northeast Alaska and northwest Canada peaked in 1993, declined through 2006, and has remained relatively stable since then. Most of that decline was due to losses from the Arctic Refuge. Today, most of the muskox in the area are either west or east of the Arctic Refuge (Arctic Refuge CCP).

Moose populations in northeast Alaska, including the Arctic Refuge, increased rapidly in the third quarter of the 20th century. From 1989-1994, however, moose in this region declined by at least 50%, leading to harvest closures on state lands. By the early 21st century, moose populations west of the refuge had started to increase, and by 2015 there was some indication that moose were beginning to increase within the refuge.. However moose continue to occur at low density east of the Canning River on the coastal plain and in the northern foothills of the refuge. Because of concerns about the small population size, harvest restrictions have been implemented (Arctic Refuge CCP).

Of the two species, muskox may be more vulnerable to potential disturbance on the coastal plain. Female muskox don't breed until they are four or five years old, most only breed every other year (or less frequently), and produce just a single calf. They subsist on generally poor quality forage in the winter time, and to compensate, they conserve energy by reducing their winter activity. In addition, calves are born between mid-April and mid-May, 4-6 weeks before snowmelt and subsequent green-up produce nutritious forage. As a result, late winter is a time of

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high vulnerability, and if any muskox were in the vicinity of seismic exploration camps and activity, disturbance could dangerously impact their energy balance (Arctic Refuge CCP).

Grizzly bears, wolves, and wolverines all occur on the coastal plain, but are more common inland in the foothills and mountains of the Brooks Range. Among the three, bears may be the most vulnerable to disturbance. Throughout the Arctic, brown bears have low rates of reproduction. They exhibit a delayed age at first reproduction (nine years of age in the Arctic Refuge), mean litter size of two, high first-year mortality, and an interval between successful litters of greater than three years. In addition, they emerge from their dens from late March through May; females with cubs usually emerge later thanadult males (Arctic Refuge CCP). The den emergence period overlaps the late operation and entire demobilization phases of hypothetical winter seismic exploration. Human-bear conflicts would be possible at this time as recently-emerged and hungry bears are ranging widely in search of early spring food.

3.2.8 Caribou

Caribou are the most abundant large mammal in Arctic Refuge and are an important subsistence species for Iñupiat and Athabascan (Gwich'in) hunters. Caribou are also hunted and viewed by other visitors to the Refuge and are prey for brown bears and wolves.

Caribou have been present in northeastern Alaska and the northern Yukon since the early Pleistocene. Human use of caribou in the region may date back thousands of years. Remnants of caribou fences and corral structures used by the Gwich'in people are found throughout the current southern range of the Porcupine caribou herd (Warbelow et al. 1975).

Large caribou herds tend to migrate over long distances using seasonally available forage resources that are often widely distributed. Caribou move in response to changing weather conditions, biting and parasitic insect harassment, and predators. In arctic areas, caribou reproduction is highly synchronous and the majority of calving occurs in a two- to three-week period. Most adult females give birth to a single calf. Caribou calves are precocious, being able to stand and nurse within one hour after birth and follow their mothers within a few hours. The first 24 hours of life are critical, when a behavioral bond is formed between the calf and its mother. Disturbance of maternal groups on the calving grounds may interfere with bond formation and can increase calf mortality. After calving, small bands of cows with newborn calves gradually merge into larger groups and are joined by yearlings, barren females, and bulls arriving from wintering areas.

Summer weather conditions promote the emergence of mosquitoes, nose bots, warble flies, and other biting insects. Insect harassment drives caribou into densely packed groups. These post-calving aggregations often move toward the Arctic coast or to higher elevations in the mountains to find relief from insects.

By August, large aggregations gradually dissolve into widely dispersed small groups that move slowly toward winter ranges. Breeding takes place en route, and by mid-November, caribou arrive in areas where they will spend the winter.

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Four caribou herds live in northern Alaska. Two of these, the Porcupine and Central Arctic herds, consistently use Arctic Refuge seasonally or throughout the year. Caribou would be most susceptible to interaction and potential disturbance from winter exploration activities during their spring migration to calving grounds within the 1002 area of the coastal plain and for those that overwinter in that area, including members of the Teshekpuk Herd.

Porcupine Caribou Herd

An iconic symbol of Arctic Refuge, this herd migrates hundreds of miles from wintering grounds to give birth on the coastal plain and northern foothills of Arctic Refuge and nearby Yukon Territory in Canada. Residents of Arctic Village and, to a lesser extent, Kaktovik, hunt Porcupine caribou. Many visitors come to Arctic Refuge during early summer with hopes of seeing large numbers of caribou.

During the 1960s and 1970s, the Porcupine caribou herd was relatively stable at about 100,000 animals. Numbers steadily increased after 1978, peaked at 178,000 in 1989, and declined to 123,000 caribou in 2001 (Lenart 2007). Between 2002 and 2009, no estimates of abundance were available. During this period, caribou left the coastal plain and northern foothills of Arctic Refuge earlier and did not form large post-calving aggregations, or weather conditions precluded flights to photograph groups (E. Lenart, wildlife biologist, ADFG, pers. comm.). In 2010, 169,000 caribou were counted in a photocensus of the Porcupine caribou herd (Caikoski 2011). Between 2001 and 2013 the herd increased to levels not seen since monitoring began in 1977, with an estimated population of 197,000 (ADFG 2017b).

The Porcupine caribou herd ranges over 130,000 square mi (337,000 square km) of wild lands in northeastern Alaska and northwestern Canada (Lenart 2007). The entire Arctic Refuge coastal plain is key calving and post-calving habitat for Porcupine caribou (Griffith et al. 2002). Foothills and mountains of Arctic Refuge are also important summer, fall, and winter habitats, as well as spring and fall migration routes. As the summer progresses and willows (Salix sp.) emerge, caribou also use riparian habitats. The Porcupine caribou herd generally overwinters south of the Brooks Range in Arctic Refuge and in the Richardson and Ogilvie mountains of the Yukon Territory, Canada. Winter distribution varies by year but is primarily south of the Brooks Range (Caikoski 2011).

Spring migration to calving grounds begins in mid-April and continues through May. Pregnant caribou move northward from wintering areas toward calving grounds, where they give birth during the first week in June. Timing and routes of migration vary annually depending on where they overwintered, snow conditions, and timing of the onset of spring weather. Caribou wintering in Alaska often follow a northeasterly route to calving grounds, crossing the southern flanks and valleys of the Brooks Range, and eventually entering Canada near the Firth River. Caribou wintering in Canada also converge in this region. Some caribou wintering in Alaska move in a more northerly direction, crossing the eastern Brooks Range and traveling more directly toward calving grounds. As snowmelt progresses, caribou in the foothills spread northwestward along a broad front, primarily following the major river corridors and associated terraces where snow melt has advanced.

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For the past few decades, the Porcupine caribou herd has calved in a region encompassed the Arctic foothills and the coastal plain from the Canning River in Arctic Refuge to the Babbage River in Canada, an area of nearly 8.9 million ac (3.6 million ha) (Griffith et al. 2002). During the calving season in early June, Porcupine caribou selected areas of wet sedge, herbaceous tussock tundra and riparian vegetation types (Griffith et al. 2002). Emerging tussock cotton grass (*Eriophorum vaginatum*) flowers were an important source of high quality forage in areas used by calving caribou (Jorgenson et al. 2002). This plant species had greater biomass and forage quality in tussock tundra compared with other vegetation types. The distribution of tussock tundra and moist sedge-willow tundra was greater in calving areas in the Arctic Refuge 1002 area of the coastal plain than in areas further south and east (Jorgenson et al. 2002).

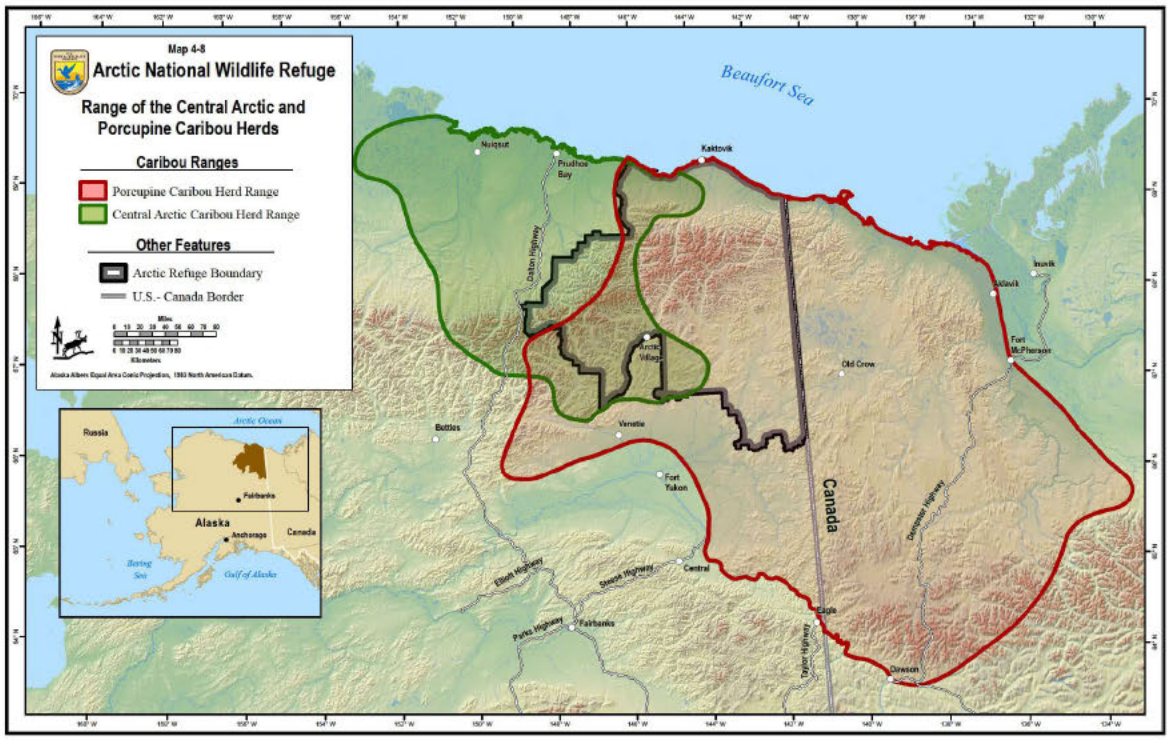
Central Arctic Caribou Herd

The annual range of the Central Arctic caribou herd overlaps that of the Porcupine caribou herd. Two main calving concentration areas have been identified for the Central Arctic caribou herd: a western area between the Kuparuk and Colville rivers, and an eastern area between the Sagavanirktok and Canning rivers. The eastern area includes the Canning River delta region in northwest Arctic Refuge.

During most winters, scattered groups of animals range throughout the coastal plain west of the Katakturuk River and adjacent uplands to the south. Between 2002 and 2009, the winter distribution of the Central Arctic caribou was north and south of the Brooks Range in Arctic Refuge. In some years, they mixed with Porcupine caribou wintering in the same region. In 2010, almost all Central Arctic caribou wintered on the south side of the Brooks Range in Alaska, as did Porcupine caribou.

This herd had about 5,000 caribou in the mid-1970s when it was first identified as a distinct herd (Cameron and Whitten 1979). By the early 1980s, it had grown to almost 13,000 and by the late 1990s, when net calf production was greater than 70 percent calves per female, it increased to over 25000 (Cameron et al. 2002). A photocensus in 2010 counted more than 70000 caribou in the Central Arctic herd, but a late spring in 2013 resulted in high mortality and the population dropped to 50,000 animals (ADFG 2017a). A 2016 estimate showed further dramatic declines, and the population estimate decreased an additional 50% and is at less than 23,000 caribou. The declines are attributed to both high adult female mortality and mixing of the Central, Teshekpuk and Porcupine herds.

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3.2.9 Polar Bear

Of the two polar bear subpopulations (or stocks) found in the United States, polar bears in the Southern Beaufort Sea (SBS) subpopulation are the most likely to occur in the 1002 area of the coastal plain. The subpopulation is shared by the U.S. and Canada and is listed as Threatened under the Endangered Species Act. Critical habitat was established in 2010. The boundary of the SBS subpopulation, as recognized by the Polar Bear Specialists Group, is Icy Cape, Alaska to the west and south of Banks Island and east of the Baillie Islands, Canada to the east (Obbard et al. 2010). The SBS subpopulation had an estimated population size of approximately 900 bears in 2010 (Bromaghin et al. 2015). This estimate represents a significant reduction from previous estimates of approximately 1,800 in 1986 (Amstrup et al. 1986), and 1,526 in 2006 (Regehr et al. 2006). Although there was some evidence in the 2010 estimate that the population might be showing signs of the subpopulation beginning to increase (Bromaghin et al. 2015). Analyses of over 20 years of data on the size and body condition of bears in this subpopulation demonstrated declines for most sex and age classes (Rode et al. 2010, 2014).

Population declines and the size and body condition of bears in the SBS subpopulation have been linked to declining sea ice conditions in the Beaufort Sea (Regehr et al. 2006; Rode et al. 2010, 2014, in press; Bromaghin et al. 2015). Declining sea ice conditions in the Beaufort Sea have also led to an increase in the proportion of the subpopulation coming onshore in summer and autumn (from 5.8% during 1986-1999 to 20% during 2000-2014) and a 30 day increase in time

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spent on land (Atwood et al. 2016). While on land, polar bears typically do not feed (Rode et al. 2015), although bears in the SBS subpopulation are drawn to bowhead whale remains from subsistence harvest, particularly adjacent to the community of Kaktovik, Alaska (Wilson et al. 2017). These whale remains may be helping offset lost hunting opportunities for bears in the SBS subpopulation due to sea ice loss (Herreman and Peacock 2013, Atwood et al. 2016).

In addition to a higher proportion of the SBS subpopulation occurring on shore during summer and autumn, there is also an increasing trend towards more bears denning on land (Olson et al. 2017). Denning substrate (i.e., sea ice or mainland) is significantly related to where bears occur in autumn. Pregnant polar bears in the SBS subpopulation that spent >25 days on land in autumn all subsequently denned on land (Olson et al. 2017). Between 1985-2013, the percent of bears denning on land in the SBS subpopulation increased from 34 to 55%, linked to sea ice declines. Designated Critical Denning Habitat overlaps with 77% of the 1002 area of the coastal plain (U.S. Fish and Wildlife Service 2010). There is also 38% more denning habitat available in the coastal plain of the Arctic Refuge than in the region immediately west of the refuge (Durner et al. 2006). Polar bears have been shown to den in the 1002 area of the coastal plain with greater frequency than expected based on available habitat (Amstrup 1993). Based on known den locations from 2000-2010, 22% of dens for bears in the SBS subpopulation occurred within the 1002 area of the coastal plain (Durner et al. 2010). Thus, the 1002 area of the coastal plain has been documented to be an important area for denning by polar bears and will likely increase in importance as the percent of bears denning on land increases with sea ice loss (Olson et al. 2017).

The mean dates of den entrance and emergence for polar bears that den on land in the SBS subpopulation is 11 November and 3 March, respectively (Rode et al. in review). Females observed with cubs in spring emerged 15 days later than females observed without cubs (Rode et al. in review). Land-based denning also appears to be important for polar bears, as bears that den on land have significantly higher reproductive success (Rode et al. in review).

3.2.10 Bowhead Whale

The bowhead whale is classified as endangered under the ESA and as depleted under the Marine Mammal Protection Act. It was listed in 1970, but no critical habitat has been designated. A detailed discussion of the bowhead whale migration and population history is included in the BLM Integrated Action Plan/EIS (2012). The Bering-Chukchi-Beaufort Seas stock of whale is important to the Inupiat peoples of the northern arctic for subsistence. If barging of materials to Kaktovik, Alaska, is required to support exploration of the eastern 1002 area, this population may be affected.

The size of the Bering-Chukchi-Beaufort Seas stock was estimated at 10,400 to 23,000 animals in 1848, before commercial whaling decreased the stock to between 1,000 and 3,000 animals by 1914 (Woodby and Botkin 1993). This stock has slowly increased since 1921 when commercial whaling ended, and in 2001 estimates indicated a population size of about 10,500 whales (George et al. 2004, Zeh and Punt 2005). Separate analyses suggest the mean annual rate of increase from 1978 to 2001 to be between 3.4 and 3.5 percent (George et al. 2004, Brandon and Wade 2004).

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Bowhead whales migrate through the Beaufort Sea while traveling between wintering areas in the Bering Sea and summer feeding grounds in the Canadian Beaufort Sea, although some animals may remain in areas offshore in the Beaufort and Chukchi seas throughout the summer. The spring migration typically begins in the Bering Sea in mid-March to early April, depending on ice conditions. During the spring migration, bowhead whales follow somewhat predictable leads that form along the coast of western Alaska to Point Barrow. From Point Barrow eastward to Amundsen Gulf, the leads and the migration occur farther from shore based largely on satellite telemetry tracks (Alaska Department of Fish and Game, unpublished data19). From April to June, most bowhead whales are distributed along a migration corridor that extends from their Bering Sea wintering grounds to their feeding grounds in the eastern Beaufort Sea (Moore and Reeves 1993). Some bowhead whales migrate westward to feeding grounds in the western Chukchi Sea (Bogoslovskaya et al. 1982, Mel'nikov et al. 1997, Alaska Department of Fish and Game satellite telemetry data). Bowhead whales arrive on their primary summer feeding grounds in the eastern Beaufort Sea from mid-May through June and remain in the Canadian Beaufort Sea and Amundsen Gulf until late August or early September. Some whales may occur regularly in the western Beaufort Sea, particularly near Barrow Canyon, and in the Chukchi Sea along the northwestern Alaskan coast in late summer. These animals may be summer residents but may also be "early autumn" migrants. However, it should be noted that recent telemetry data has suggested that bowhead movements are far more labile within their range than formerly thought (Quakenbush et al. 2010) and 'reverse' migratory behavior has been documented.

Bowhead whales that have summered in the eastern (Canadian) Beaufort Sea begin the fall migration in late August to September and are usually out of the Beaufort Sea by late October (Treacy 1988–1997, 2000, 2002a, 2000b; Moore and Reeves 1993). The fall migration route extends from the eastern Beaufort Sea, along the continental shelf across the Chukchi Sea, and down the coast of the Chukotka Peninsula (Moore and Reeves 1993, Quakenbush et al. 2010b) The extent of ice cover may influence the route, timing, or duration of the fall migration. Moore et al. (2000) noted that bowheads in the U.S. Beaufort Sea tended to be distributed closer to shore during their westward migration in light ice years. Miller et al. (1996) also observed that whales moving from 147° to 150° West longitude in the central Beaufort Sea, migrated closer to shore in light and moderate ice years (median distance offshore 18 to 25 miles), and farther offshore in heavy ice years (median distance offshore 35 to 45 miles).

3.2.11 Ringed & Bearded Seals

Ringed seals (Phoca hispida) are the smallest and most abundant of the Arctic ice seals (seals that use ice to carry out important life history traits) (Smith and Hammill 1981, Kingsley 1986). Ringed seals have a circumpolar distribution, occurring in all areas of the Arctic Ocean north of approximately 35° north latitude (Kelly et al. 2010, King 1983).
A detailed discussion of the ringed seal population and life history is included in the BLM Integrated Action Plan/EIS (2012).

Bearded seals (Erignathus barbatus nauticaus) are a pagophilic (ice-associated) seal present in the Chukchi and Beaufort seas year round. They are generally considered to inhabit areas of

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shallow water (less than 200 meters) that are at least seasonally ice covered (Burns 1970, Kelly 1988b, Cameron et al. 2010). A detailed discussion of the bearded seal population and life history is included in the BLM Integrated Action Plan/EIS (2012).

3.3 Social Environment

3.3.1 Cultural Resources & Historic Background

The Arctic Refuge CCP (2015) describes in detail the known cultural and historic context of the Refuge. When considering development within the Refuge's coastal plain, it is important to note that cultural resources on the North Slope and coastal plain are on or near the surface of the tundra and tend to be oriented along river corridors and coastal beaches. This means that many cultural resource sites on the Refuge are vulnerable to erosion and other natural forces, and to a lesser extent, from public use of Refuge lands and waters. Human use has occurred in the area for more than 10,000 years (Reanier 2003).

Communities surrounding the Arctic coastal plain or that rely on resources, such as caribou, from the coastal plain include Arctic Village, Chalkyitsik, Coldfoot, Deadhorse, Fort Yukon, Kaktovik, Prudhoe Bay,Venetie, and Wiseman. Details of the histories of all communities, except Deadhorse and Prudhoe Bay, are included in the Arctic Refuge CCP (2015). Deadhorse and Prudhoe Bay were not included in the CCP because their residents do not generally use Refuge wildlife resources. These communities are fundamentally support infrastructure for the operational oil fields.

Prudhoe Bay and Deadhorse
Prudhoe Bay was named in 1828 for Baron Prudhoe by British explorer Sir John Franklin. In the 1970s the site was extensively developed to support oil drilling operations. The 800-mile Trans Alaska Pipeline, constructed to transport crude oil from Prudhoe Bay to Valdez, has it's northern terminus here. At Valdez oil is loaded into marine tankers for shipment throughout the U.S. Prudhoe Bay is also the unofficial northern terminus of the Pan-American Highway. Deadhorse is a small community which is absorbed into Prudhoe Bay for statistical purposes.

Culture
Prudhoe Bay is a large work camp for the oil industry. All residents are employees of oil-drilling or oil-production and support companies and work long consecutive shifts. Living quarters and food are provided to the workforce, and there are a number of recreational facilities. There are no permanent residents of Prudhoe Bay.

3.3.2 Socioeconomic

Although the communities of Arctic Village, Chalkyitsik, Coldfoot, Fort Yukon, Kaktovik, Venetie, Wiseman, and Prudhoe Bay surround the Refuge, generally only economies of Kaktovik, Coldfoot, Wiseman, and Prudhoe Bay would be directly affected by oil and gas exploration as they are located either in locations where infrastructure could be staged or along

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the Haul Road, the only developed land route into the area. All of the communities would be indirectly affected if caribou, a valuable subsistence resource, was affected due to their proximity to and use of the Porcupine caribou herd.

Table 3 - 2: Demographic Characteristics of the Communities Near Arctic Refuge

Demographic Characteristics	Arctic Village	Chalkyitsik	Cold-foot	Fort Yukon	Kaktovik	Venetie	Wiseman	Prudhoe Bay
Overall 2010 Census Population	152	69	10	583	239	166	14	2174
American Indian and Alaska Native	135	59	1	45	212	152	0	163
White	7	10	9	520	24	3	13	1804
Two or more races	10	0	0	10	3	10	1	41
Other races	0	0	0	8	0	1	0	166
Median age	29	27.5	43	33.7	30.5	30.5	28.5	50
Median household income	$27,250 +/- $9,667	$38,750 +/- $16,617	Not Available	$33,194 +/- $7,432	$58,125 +/- $33,478	$28,333 +/- $21,379	Not Available	94,906 +/- 11,207
Employment in 2016								
Employed (#)	87	48	11	266	125	103	5	1978

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Employed in the Private Sector (#)	14	6	9	113	41	23	5	1978
Employed in local and/or state government (#)	73	42	2	153	84	80	0	0
Employed in all 4 Quarters (#)	31	27	9	138	93	40	0	1891

3.3.3 Environmental Justice

Some of the communities potentially affected by the Proposed Action are predominantly Alaska Native, with lower incomes than Alaska and U.S. averages. As a result of these socioeconomic characteristics, the analysis of environmental consequences of the Proposed Action and Alternatives in Chapter 4 will determine whether there are disproportionate adverse impacts on these communities as a result of the proposed project.

3.3.4 Subsistence

Section 803 of ANILCA defines subsistence uses as: The customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of inedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter or sharing for personal or family consumption; and for customary trade (16 U.S.C. § 3113).

One of the purposes of the Arctic Refuge is to provide the opportunity for continued subsistence uses by local residents in a manner consistent with the purposes of conserving fish and wildlife populations and habitats and fulfilling international treaty obligations with respect to fish and wildlife (USFWS 2015). With the exception of Prudhoe Bay, each of the affected communities within the proposed project area is characterized by active participation in subsistence fishing, hunting, and trapping on federal, state, and Native corporation lands.

Subsistence Harvest Practices In or Near the Refuge

According to the Arctic Refuge CCP (2015) Arctic Village, Chalkyitsik, Fort Yukon, Kaktovik, Venetie, and Wiseman use the Refuge for subsistence purposes. Due to their close proximity Arctic Village, a Gwich'in community, and Kaktovik, a Inupiat community, use the Refuge most frequently. The subsistence way of life encompasses much more than just a way of obtaining food or natural materials. It involves traditions that are important mechanisms for maintaining cultural values, family traditions, kinships, and passing on those values to younger generations. It is considered a way of life, rather than just an activity. (Alaska Federation of Natives 2010).

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Not only are subsistence opportunities critical to the cultural identities of these communities, the resources gained provide needed sustenance for residents. There are very few year-round employment opportunities and food costs are high due to the cost of air transportation.

Although both Arctic Village and Kaktovik rely heavily on the Refuge for subsistence resources, the resources used are significantly different. Subsistence harvest in Arctic Village was 10,000 to 21,000 pounds with moose and caribou constituting 90 percent of the harvest in each year, according to the State of Alaska's Community Subsistence Information System (1993-1997) and data collected by the Council of Athabascan Tribal Governments in 2001 and 2002. The harvested caribou from these surveys come primarily from the migrating Porcupine caribou herd. Because of this, the Gwich'in people consider the Porcupine caribou herd's calving grounds on the coastal plain as sacred ground, a birthing place for thousands of caribou each year (Gwich'in National 1988).

Kaktovik is an Inupiat community located on Barter Island on the shore of the Beaufort Sea. The Kaktovikmiut's way of life continues to be heavily dependent on subsistence harvest of marine and terrestrial animals and fish. Caribou hunting occurs throughout most of the year, while bowhead whaling occurs from late August to early October. When the community harvests a whale, marine resources composed 59 to 68 percent of their total subsistence harvest (Minerals Management Service 2003). In addition to whales, Kaktovik residents also harvest a considerable number of Dall's sheep and caribou, contributing 17 to 30 percent of the annual harvest by weight.

3.3.5 Land Use

There are currently no permanent developments in the coastal plain. The area is used by recreationists and local residents for fishing, wildlife viewing, hunting, hiking, bird-watching, and photography. The coastal plain is currently managed as a minimal management area. Minimal management is designed to maintain Refuge environments with minimal or no evidence of human modifications or changes. Public uses, economic activities or uses, and facilities are managed to minimize disturbances to habitats and resources. Ground-disturbing activities are avoided whenever possible.

3.3.6 Recreation

The coastal plain is located on lands within ADF&G Game Management Unit (GMU) 26C. ADF&G regulates the seasons, licenses, and bag limits (ADF&G 2015h). Access to prime hunting areas is typically by chartered aircraft, boat, or foot. Two guide use areas could be affected by exploration activities. Nonresident brown bear and Dall sheep hunters must be accompanied in the field by a big game guide authorized to operate in the area (USFWS 2014a).

There are two registration brown bear hunting seasons in GMU 26C. They are held from January 1 to May 31 and August 25 to May 31. In 2016, of the 27 permits given only 12 people reported going hunting (ADF&G website 2017). Caribou hunting is also popular and the hunt is open year round. No permit statistics were available to quantify caribou hunting pressure.

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3.3.7 Noise

Sound is defined as a particular auditory effect produced by a given source, for example the sound of rain on the roof, and is measured in decibels (dB). A-weighted sound level measurements (dBA) are a measure of how the human ear hears sound and is used to characterize sound levels. Table 3-4 shows dBA levels for sounds associated with the area and equipment being proposed for use in the action alternatives.

Table 3 - 4: dBA Levels

Source of Noise	dBA Level
Ambient sound without human influence	20 – 30 dBA
Ground wind 5-10 miles per hour	35 – 45 dBA
Ground wind 20 – 30 miles per hour	55 – 65 dBA
Single engine plane fly over at 1,000 ft	88 dBA
Cessna 206	79 dBA
Bell Huey 204	88 dBA
R-66	82 dBA
Propane generator at 500 ft away	30-35 dBA
(Bolin 2006, Illingworth and Rodkin 2006, Schulten 1997, ICAO Annex 2006, US Coast Guard 2010)	

Currently there is no source of non-ambient noise on the coastal plain, aside from ground wind and the occasional aircraft, high overhead. Generally, noise levels on the Refuge are expected to be between 20 and 30 dBA in calm winds and up to 40 to 50 dBA in moderate to strong winds.

3.3.8 Visual

Visual resources are often described in relation to landscape character or the overall impression created by an area's unique combination of features, such as land, vegetation, water, and existing structures (cultural modification). Viewsheds are the geographical areas that are visible from given locations. They include all surrounding points that are in line-of-sight with a given location and exclude points that are beyond the horizon or obstructed by terrain and other features.

The landscape character of the coastal plain is of a landscape that is relatively flat, yet interspersed with low ridges and depressions. Tall, linear lined objects would be an unusual characteristic. Viewsheds on the coastal plain are virtually free from indications of human activities except where subsistence structures are located.

3.3.9 Wilderness Values

The Arctic Refuge, including the coastal plain, was initially proposed as "The Last Great Wilderness" and wilderness values were highly prominent in its initial establishment as the Arctic National Wildlife Range. The Refuge's 2015 CCP recommended the 1002 area for Wilderness designation because it exemplifies the wilderness qualities of natural condition, natural quiet, scenery, wild character, and ecological wholeness. The area's diverse wildlife

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species are particularly valued because they exist in a wilderness context, with their natural behaviors, interactions, movements, and cycles continuing.

The area offers exceptional opportunities for wilderness oriented recreation—adventure, exploration, solitude, and emersion in the natural world. As well, the area holds high symbolic and existence value for millions of people who don't visit, but find satisfaction, inspiration, even hope in just knowing it exists.

4 Environmental Consequences

NEPA requires the disclosure of environmental impacts associated with the alternatives including the No Action Alternative. This chapter presents the anticipated environmental impacts of Alternative 1 (No Action) and Alternative 3 (Outer Route). These analyses provide the basis for comparing the effects of the alternatives on the Affected Environment. NEPA requires consideration of context, intensity, and duration of direct impacts, indirect impacts, cumulative impacts, and measures to mitigate for impacts.

The direct, indirect, and cumulative impacts are described for each issue (impact topic) and where applicable, by project phase (construction and operation). The impacts for each issue are based on the intensity (magnitude), duration, and context (extent) of the impact. Summary impact levels (negligible, minor, moderate, or major) are given for each issue. Definitions are provided below.

4.1 Definitions of Terms

Direct Effects – Direct effects are impacts that are caused by the alternatives at the same time and in the same place as the action.

Indirect Effects – Indirect effects are impacts caused by the alternatives that occur later in time or farther in distance than the action.

Long-term Effects – Long-term effects are impacts that would occur throughout the life of the project.

Short-term Effects- Short-term effects are impacts that would occur during only the construction phase of this project.

Cumulative Effects – The Council on Environmental Quality (CEQ) defines cumulative effects as impacts on the environment which result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant actions taking place over a period of time (40 CFR 1508.7). Informed decision making is served by consideration of cumulative effects resulting from projects that are proposed, under construction, recently completed, or anticipated to be implemented in the reasonably foreseeable future.

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CEQ guidance in considering cumulative effects states that the first steps in assessing cumulative effects involve defining the scope of the other actions and their interrelationship with a proposed action. The scope must consider other projects whose effects coincide with the location and timetable of a proposed action and other actions. Cumulative effects analyses must also evaluate the nature of interactions among these actions (CEQ 1997). The cumulative effects assessment is based on available information at the time of development of this EA.

To identify cumulative effects, the analysis needs to address two fundamental questions.

1. Does a relationship exist such that affected resource areas of the Proposed Action or alternatives might interact with the affected resource areas of past, present, or reasonably foreseeable future actions?
2. If such a relationship exists, then does an EA reveal any potentially significant effects not identified when the Proposed Action is considered alone?

Mitigation - Mitigation includes special procedures and minimization measures that are implemented to avoid, reduce, or compensate for effects caused by an action. Some mitigation measures are already incorporated into the Proposed Action to avoid and reduce the potential for adverse effects. Other mitigation measures could be characterized as Best Management Practices that further reduce or compensate for adverse effects.

4.2 SIGNIFICANCE CRITERIA

Summaries of the effects on the resources synthesize information about context, intensity, and duration, which are weighed against each other to produce a final assessment. While each summary reflects a determination using best professional judgment regarding the relative importance of the various factors involved, Table 4-1 provides a general guide for how summaries are reached.

Table 4 - 1: Descriptions of Final Assessment Categories

Assessment	Description
Beneficial	Resource improvements would occur and would have a perceptible change to the resource.
Adverse: Negligible	Impacts are generally extremely low in intensity (often they cannot be measured or observed), are temporary, and do not affect unique resources.
Adverse: Minor	Impacts tend to be low intensity or of short duration, although common resources may have more intense, longer-term impacts.
Adverse: Moderate	Impacts can be of any intensity or duration, although common resources are affected by higher intensity, longer impacts while unique resources are affected by medium or low intensity, shorter-duration impacts.
Adverse: Significant	Impacts that in their context and due to their intensity (severity) have the potential to meet the thresholds for significance set forth in CEQ regulations and therefore, warrant heightened attention and examination for potential mitigation in order to fulfill the policies set forth in NEPA.

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4.4 ALTERNATIVE 1 – NO ACTION

Direct and Indirect Effects: Implementation of the No Action Alternative would result in no direct or indirect impacts to any of the considered resources. There would be no new exploration activities allowed on the coastal plain; and therefore no effects due to this project would occur.

Cumulative Effects: No direct or indirect effects to the existing condition of the resources considered would occur under the No Action Alternative; therefore, no cumulative effects would occur on the resources.

4.5 ALTERNATIVE 2 – PHYSICAL ENVIRONMENT

4.5.1 Soils

Additional literature is needed in order to understand the environmental consequences of the proposed action on soils.

4.5.2 Hydrology

It is difficult to fully describe potential environmental consequences when the scope and nature of activities has not been fully outlined. This section is developed to address very general potential activities limited to seismic exploration of unknown scope and attendant infrastructure to accomplish this including development of ice roads. It is clear that because unfrozen water is limited in winter on the Arctic coastal plain, negative effects of water withdrawals on overwintering fish populations, benthic invertebrates, and birds and mammals that feed on those organisms seem likely (West et al. 1992). Water withdrawal and its direct influence on reducing available habitat (wetted space) probably impacts fish populations more than any other winter alteration (Cunjak 1996). Since the distribution of adult and juvenile fish is extremely restricted during the long arctic winter when most of a drainage is frozen solid (Craig and Poulin 1975), water removal , leading to reduced groundwater flow or altering baseflow, ice and temperature regimes has the potential to affect all life stages of some populations. Seismic activity could potentially reduce fish populations, divert fish from their normal locations, or adversely affect fish populations and habitat. Exploration activities bring the potential for fuel spills or other releases of contaminants that could affect water quality.

Seismic Exploration and Thermokarst Activity

Seismic exploration can cause thermokarst, especially when snow is insufficient to protect soil and vegetation (WesternGeco 2003). Removal or damage of the organic mat exposes soils to erosion by wind and water, which could deposit sediment into water bodies resulting in higher turbidity and concentrations of suspended sediment. To cause high turbidity, the peat mat must be sufficiently eroded to expose underlying mineral soils, and the mineral soils must be fine grained (BLM 2012).

Effects of seismic exploration on water resources and aquatic habitats

Seismic surveys can be conducted using dynamite (or other explosives), air guns, or Vibroseis to generate acoustical energy pulses necessary to locate subsurface geological formations that

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might contain oil or gas (BLM 2012). Research has demonstrated that high-intensity acoustic energy can lead to damaged auditory sensory hair cells in fish, effectively reducing the ability to hear (McCauley et al. 2003; Popper 2003; Smith et al. 2004; Popper et al. 2005). The extent of damage and the ability to regenerate these cells is dependent on the intensity and duration of noise and the species of fish. Underwater shock waves can also cause injury to the swim bladder and other organs and tissue (Wright 1982), which could result in a sub-lethal or lethal effects. Fleeing behavior is also a well-documented response by fish to anthropogenic sounds (Popper 2003; Popper et al. 2004). Because of a lack of information regarding the impacts on fish from Vibroseis specifically, winter field tests on the North Slope were conducted in 2000, to measure the sound pressure levels in water that were generated by Vibroseis rigs operating on the ice overhead (Greene 2000; Nyland 2002). The results indicated that these sound pressures were great enough 10 meters from the source to cause avoidance behavior, but no measurements were made directly below the Vibroseis equipment. Fish fleeing behavior was the most obvious effect of Vibroseis during the 2003 Alaska Department of Natural Resources/BLM study (Morris and Winters 2005). Because exploration using Vibroseis occurs in the winter when physiological stress is the greatest for most fish species, a flight response could potentially be detrimental. (BLM 2012)

Use of Explosives

Use of explosives is a major disturbance to fish and wildlife. These are particularly stressful to fish that are captive in overwintering habitats and would likely have a negative impact on terrestrial and aquatic animals that congregate near spring-fed oases during winter as well as presenting potential contamination issues.

Effects of Water Withdrawal from Lakes

In other areas of the North Slope the primary source of water during the winter months for exploration activities is unfrozen water that lies beneath the ice cover of both shallow and deep lakes. This water is somewhat saline because of the exclusion of ions during the freezing of the upper part of the lake. Water from lakes may be used for ice roads, pads and airstrips, and potable water for field crews. Typically the volume of water taken from an individual lake depends on the depth of the lake, volume of unfrozen water in the lake, and the presence and type of fish documented (BLM 2012).

Water withdrawal affects the available habitat for fish species if they are present, macroinvertebrates and can otherwise impact aquatic habitat by further altering water quality and reducing the water available when breakup occurs potentially affecting spring recharge and lake levels.

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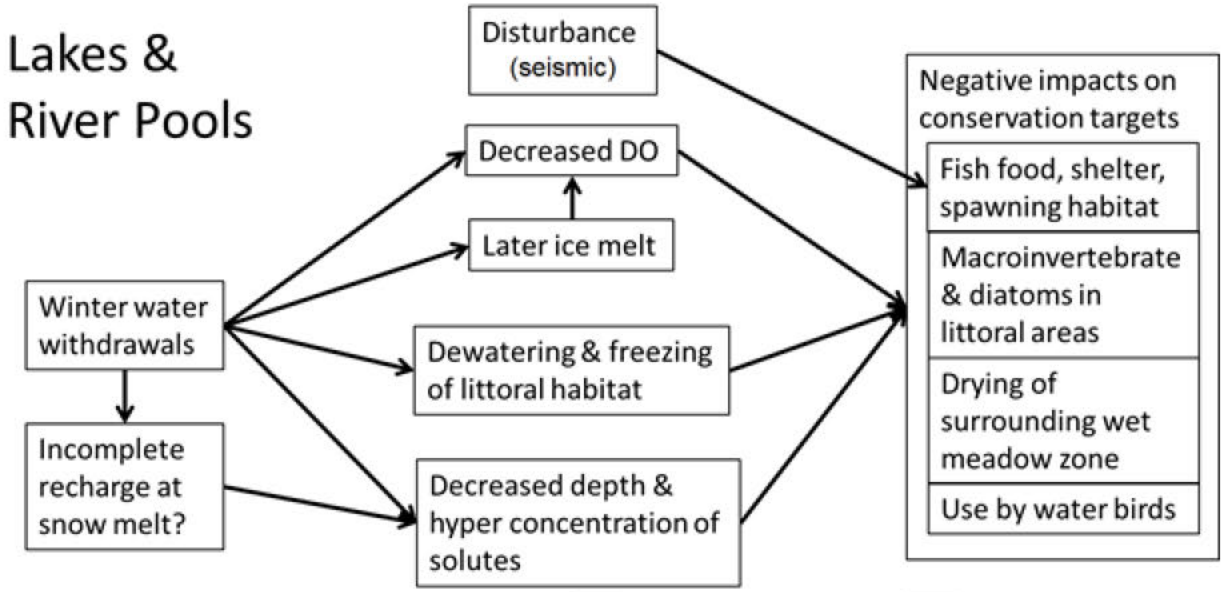


Figure X. Potential impacts of seismic exploration on lakes and rivers

Removal or compaction of snow can increase the depth of freezing on lakes, sometimes by one foot or more. As a result, the water quantity available in a lake during the winter months can be greatly reduced, and the salinity of the water beneath the ice can be increased further. Maintaining the natural hydrologic regime may not be possible under various pumping scenarios. To reduce impacts to the natural hydrologic regime, regulations typically prohibit snow compaction on fish-bearing lakes, but snow compaction is unavoidable when ice aggregates are removed from lakes (BLM 2012).

There are no studies assessing the effects of permitted withdrawals on lake water chemistry on the North Slope of Alaska. Hinzman et al. (2006) conducted a study to assess the effects of what turned out to be relatively small water withdrawals on water chemistry and lake-recharge. This work was funded by the Department of Energy and oil field companies, did not undergo a standard peer-review process, yet it is widely cited by the BLM and DOE. Unfortunately, only a small fraction of the permitted withdrawal volume was actually pumped from the study lakes, the study design had almost no ability to detect change, and the researchers were unable to get their dissolved oxygen sensors functioning to conduct any relevant measurements in pumped lakes. Thus, we have no information on potential impacts of heavy pumping that is currently allowed by water withdrawal permits on the North Slope of Alaska. Despite the low ability to detect change, Hinzman et al. (2006) did find that one of four pumped lakes did not fully recharge at snow melt. This suggests that water withdrawals far less than permitted volumes can have significant impacts on lake hydrology and the availability of wetted habitat. Canadian studies on ice-covered lakes have found that water withdrawals have a substantial and wide range of negative impacts on aquatic ecosystems (Cott et al. 2008). These include reduction of habitat for fish, waterfowl, and furbearers; reduction in oxygen available to overwintering fish; and dewatering and freezing of littoral habitats which kills plants, invertebrates, and fish eggs. Isolated lakes may be particularly vulnerable as they may not recharge at snowmelt. Organisms

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in small isolated lakes are particularly sensitive to water withdrawals. The effects of water withdrawals on wet meadow zones surrounding lakes are unknown, but would likely be great if lakes are not fully recharged at snowmelt. This would result in a reduction in habitat for waterfowl and shorebirds that use these lakes during the summer.

Effects during exploration on water chemistry from water withdrawals could be short term if lakes are fully recharged during spring. Impacts to overwintering fish and littoral zone communities will likely be more substantial and longer-term, especially in isolated lakes.

Effects of Ice Roads, Ice Pads and Ice Bridges

Ice roads and ice pads are used extensively during the winter season for access and for seismic exploration. Ice roads require about 1 million to 1.5 million gallons of water per linear mile and generally can be built at a rate of about 1.5 inches of thickness per day (BLM 1998). Ice pads can require up to 5 million gallons of water to build and range in size from 3 to 10 acres. Floating ice bridges may be necessary to cross large rivers and must be of sufficient thickness to handle heavy truck traffic. Smaller rivers require ice bridges, which are often constructed of aggregate chips and water and placed on grounded ice. Ice roads and bridges can cause additional freeze-down, reducing the already limited overwinter water volume available for fish habitat and affecting water quality. During snow melt ice bridges can create ice dam flooding if not removed properly.

4.6 ALTERNATIVE 2 - BIOLOGICAL ENVIRONMENT

4.6.1 Vegetation

The level of impact on vegetation is based on (1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource, (2) the proportion of the resource that would be affected relative to its occurrence in the region, (3) the sensitivity of the resource to the proposed activities, and (4) the duration of ecological ramifications. A habitat perspective is used to provide a framework for analysis of general classes of impacts. Impacts to vegetation could include removal of vegetation; loss of available habitat; the introduction of new nonnative, invasive species; dispersal of existing nonnative, invasive species; changes in phenology (i.e., delayed greenup) due to delayed spring melting of ice roads and ice pads; compression or destruction of vegetation if winter travel occurs in areas with insufficient snow cover; changes in moisture and/or nutrient availability due to erosion, soil compaction, melting permafrost, or topographic modifications; or adverse impacts from pollutants that are released from construction operations.

Direct and Indirect Effects: Negligible to Significant

Cumulative Effects: Negligible to Significant

4.6.2 Wetlands

Additional literature is needed in order to understand the environmental consequences of the proposed action on wetlands.

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4.6.3 Fisheries

Direct impacts would include mortality to fish or alterations to habitat by geophysical exploration that make these unacceptable or suboptimal for life history requirements and/or long-term survival, including contaminant spills, failure of sewage or waste-water disposal, blasting, channelization, culverts or barriers to movement, increased turbidity from construction, toxic effects of drilling muds or depletion of dissolved oxygen levels. Over-harvesting of selected fish species may occur if not stipulated as a prohibition to the increased human workforce during exploration or development.

Indirect impacts would fish swept into storage reservoirs during high flows (storm events, spring snowmelt or construction activities) where fish are trapped when water levels return to normal or are pumped out. Such events occur naturally. Additionally, such artificial impoundments may provide alternative overwintering habitat for some species in a region where such habitats are scarce. Access to and from the larger population would be necessary for this to be an effective benefit to fish species. Abandoned deep-water reservoirs have been beneficial for several fish species (Moulton and George 2000).

Early pipeline and development in the Prudhoe Bay area reduced some fish populations due to locations of road crossings, undersized or undercut culverts prior to understanding species-specific swimming needs (Moulton and George 2000).

Those species that do not migrate are not as likely to be affected by impacts related to barriers and some habitat changes. However, wintering areas are essential. Therefore, any factor linked with exploration or development that reduces adequate open water depths during winter months may have the potential to reduce populations at specific locations.

Each Arctic grayling river-population is distinct from others. Therefore, geophysical impacts could have a larger footprint on a landscape scale than a single site. However, the distribution of the Arctic grayling has increased in Prudhoe Bay environs since the development of the the oil-field (NRC 2003).

Direct, indirect, and cumulative effects of geophysical exploration and oil-field development pose little risks to freshwater fisheries and their habitats based on recent evaluations and using best management practices that have evolved since the late 1970s to late 1980s (Moulton and George 2000; NRC 2003; BLM 2012). The use of vibration equipment in lieu of blasting has reduced overpressure mortalities in fish and less intrusive to habitats. Low ground-bearing pressure vehicles reduce soil disturbances and potential for sediment mobilization and associated accumulation to lakes and streams. Capping the amount of water withdrawal from any natural waters may minimize overwinter mortalities or reduction of overwintering habitat for fish.

4.6.4 Bald and Golden Eagles

Additional literature is needed in order to understand the environmental consequences of the proposed action on eagle populations.

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4.6.5 Resident Birds

Additional literature is needed in order to understand the environmental consequences of the proposed action on resident birds.

4.6.6 Migratory Birds

Many species of migratory birds use the coastal plain for nesting or for feeding in preparation for fall migration. These include a variety of waterfowl and shorebirds that are dependent on aquatic and lakeshore habitats for nesting or feeding. If winter water withdrawals impact shoreline vegetation and/or aquatic plants, fish, and invertebrates, these effects could negatively impact waterfowl and shorebirds.

4.6.7 Terrestrial Mammals (Caribou, Muskox, Wolverine, Grizzly Bears)

Impacts to habitat used by terrestrial mammals would be minor, as most seismic activities would occur during the winter on frozen tundra or ice. Potential causes of disturbance to terrestrial mammals from seismic activities would include surface vehicular traffic on frozen tundra or ice and fixed-wing aircraft traffic. In most cases, these activities would cause short-term displacements of and/or disturbance to terrestrial mammals. Where 3-D seismic exploration survey lines are located only 660 to 1,200 feet apart, localized displacement of terrestrial mammals could last for several days or lead to complete abandonment of localized habitat.

Effects on caribou and moose could include temporary habitat displacement and increased energy expenditure associated with increased disturbance movement. Caribou overwintering on the coastal plain would likely be encountered during seismic surveys. It is possible that displacement of caribou by seismic exploration activities during winter could have a negative effect on their energy balance (intake versus expenditure). Because these animals are mobile and the operation would be short in duration (e.g., 2 to 3 days in one area), it is not anticipated that any lasting adverse impacts to caribou would result under most circumstances. However, this assumption has not been scientifically tested and conditions for winter survival vary from year to year. It is possible that this disturbance could have an additive effect on natural winter mortality and could disproportionately impact young of the year and pregnant cows. Caribou have been shown to exhibit panic or violent, running reactions to aircraft flying at elevations of approximately 160 feet and to exhibit strong escape responses (animals trotting or running) to aircraft flying at 150 to 1,000 feet (Calef et al. 1976). Additional effects on caribou nutrition during the calving and postcalving periods could occur as a result of delayed greenup of vegetation underlying ice roads and pads or areas of compacted snow. The severity of these impacts would be dependent on the extent of the affected areas and by timing of snowmelt during a particular year.

Previous studies of the effects of oil and gas exploration on muskoxen in Alaska and Canada focused on disturbances associated with winter seismic operations. Some muskoxen reacted to seismic activities at distances up to 2.5 miles from the operations; however, reactions were highly variable among individuals (Reynolds and LaPlant 1985). Responses varied from no change in behavior to becoming alert, forming defense formations, or running away (Winters and

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Shideler 1990). The movements of muskoxen away from the seismic operations did not exceed 3 miles and had no apparent effect on muskox distribution (Reynolds and LaPlant 1986). Unlike caribou, muskoxen are not able to travel and dig through snow easily. In the winter, they search out sites with shallow snow, and greatly reduce movements and activity to conserve energy (USDOI U.S. Fish and Wildlife Service 1999). Muskoxen survive the winter by using stored body fat and reducing movement to compensate for low forage intake (Dau 2001). Because of this strategy, muskoxen may be even more susceptible to disturbances during the winter. It is possible that repeated disturbances of the same animals during winter could result in increased energetic costs that could increase mortality rates. Depending upon the location of the seismic exploration, impacts on muskox populations would be non-existent to minor.

Seismic camps could result in localized disturbance and/or displacement of terrestrial mammals for up to a few days. Bears and foxes could also be attracted to camps and conflict could result. Since seismic camps generally move at least once a week and proper handling of wastes would be regulated through permitting, the potential for bears or foxes to be attracted to human food sources would be minor. In addition, most seismic activity would occur when bears were hibernating and not attracted to scents. However, grizzly bears denning on the coastal plain, including females with dependent cubs, would be exposed to disturbance from seismic activities. Disturbance during winter can cause bears to abandon their dens, which increases winter mortality. Mitigations measures, such as those employed in existing oil fields west of the refuge will be required to minimize this disturbance.

The potential effects of seismic activities on wolverines would include disturbance from air and surface vehicle traffic, and increased human presence. Wolverines are considered a shy and secretive species that is present at very low densities and may be sensitive to disturbance.

4.6.8 Caribou

addressed in previous section

4.6.9 Polar Bears

Terrestrial oil and gas industry seismic survey activities on the North Slope of Alaska typically require between 80 and 160 personnel. Substantial logistical support is required for a seismic survey operation, and also to support the personnel camps, vehicles, security, aircraft operations, restocking of the explosive magazine (if explosives are used), medical support, scientists, marine mammal observers, ice road construction, barge traffic, and many other logistical and support functions.

Polar bears present in the Arctic Refuge 1002 area may be affected by seismic survey activities in various ways. Noise, vibrations, sights, and smells produced by seismic survey activities may elicit a wide range of responses from polar bears. Polar bears respond to the sights and sound of snowmachines, vehicles, vessels, and aircraft; especially helicopters (Watts and Ratson 1989; Dyck 2001; Dyck and Baydack 2004; Andersen and Aars 2005). Polar bear responses to disturbance are highly variable and are influenced by an individual bear's

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previous experiences and tolerance level. Polar bears are most likely to respond to the majority of seismic survey activities with short-term behavioral and physiological responses such as avoidance, increased vigilance, increased heart rate, and other stress responses. Disturbance during resting may result in increased energy expenditure or adverse physiological responses (Watts et al. 1991), but short-term reactions like these will rarely affect the health or survival of individual animals or the population. The effects of fleeing from aircraft may be minimal if the event is short and the animal is otherwise healthy and unstressed. However, on a warmer day, a short run may be enough to overheat a well-insulated polar bear. The effect of fleeing an aircraft or ground vehicle on polar bear cubs, particularly cubs of the year, would likely be the use of energy that otherwise would be needed for survival during a critical time in a polar bear's life, and potentially separation from the female. If the exposure and separation, or both, were brief and singular then the effect would most likely be minimal. Chronic disturbances, extreme reactions, disruption of key behaviors such as feeding or denning, or separation of dependent cubs from the female are more likely to affect health or survival. Polar bears directly interacting with seismic survey activities increase the risk of human-bear encounters, conflicts, and injury or death of polar bears.

Seismic survey activities disturbing female polar bears at maternal den sites are of great concern. Minimizing disturbance while bears are in dens is important because timing of den emergence is significantly related to cub survival (Rode et al. in review). Female polar bears entering dens and females in dens with cubs are more sensitive to noises than other age and sex groups. Disturbance during the early stages of denning may cause a female polar bear to abandon the den site in search of another one. A female polar bear may locate another suitable den site and continue her reproductive process Denning female bears may abandon their dens early in response to stress (Amstrup 1993). Amstrup (1993) reported most polar bears in dens continue to occupy the dens after close approaches by aircraft. Although the snow attenuates some aircraft noise (Blix and Lentfer 1992), repeated overflights may cause polar bears to abandon or depart their dens. Premature den site abandonment after the birth of cubs, or if the female abandons the cubs after they emerge from the den, will result in cub mortality. The potential for disturbance increases once the female emerges from the den. She is more vigilant against perceived threats and easier to disturb.

Though human activities (e.g. industrial, subsistence) are expected to exert a smaller influence on polar bear populations than the loss of sea ice habitat (Atwood et al. 2015; Regehr et al. 2015), the cumulative effects of seismic survey activity and climate change are not well understood. Habitat loss due to changes in Arctic sea ice is the primary cause of decline in polar bear populations, and the decline of sea ice is expected to continue throughout the polar bear's range for the foreseeable future (73 FR 28212, May 15 2008). Under both stabilized and unabated greenhouse gas emissions models, polar bears are expected to have greatly decreased persistence throughout the region (Atwood et al. 2015). The effects of seismic survey activity in the Arctic Refuge 1002 area combined with the effects of climate change could have unknown effects on the Southern Beaufort Sea population of polar bears.

The requirements of incidental take authorizations under the Marine Mammal Protection Act, such as polar bear interaction plans, training, monitoring, and mitigation measures have proven

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effective at reducing the effects of oil and gas industry activities, including seismic surveys, on polar bears in other areas of northern Alaska. Mitigation measures, including a pre-activity den survey and a 1.6-km (1-mi) operational exclusion zone around known dens help to limit disturbance of denning female polar bears. The current incidental take regulations for oil and gas industry activity in the Beaufort Sea and adjacent areas of northern Alaska, published in the Federal Register on August 5, 2016 (81 FR 52276), include a comprehensive analysis of the effects of oil and gas industry activity to polar bears, as well as mitigation, monitoring, and reporting requirements. A detailed description of mitigation measures that limit the effects of seismic surveys on polar bears is available at title 50 of the Code of Federal Regulations, part 18, subpart J, section 18.128.

4.6.10 Bowhead Whale

Additional literature is needed in order to understand the environmental consequences of the proposed action on bowhead whales.

4.6.11 Bearded and Ringed Seals

Additional literature is needed in order to understand the environmental consequences of the proposed action on bearded and ringed seals.

4.7 Alternative 2 - Social Environment

4.7.1 Cultural Resources

Very little cultural resource investigations or inventories have occurred within the 1002 area. Therefore, pursuant to Section 106 of the National Historic Preservation Act, applications for exploration within the 1002 would be required to include sufficient identification and evaluation of cultural resources to ensure that potential adverse effects could be avoided, minimized or mitigated.

4.7.2 Socioeconomic

Impacts to socioeconomic resources would be considered to be significant if an action resulted in a substantial change in the local or regional population; and housing, community general services, or social conditions from the demands of additional population/population shifts. Impacts would also be considered major if there were a substantial change in the local or regional economy, employment, or spending or earning patterns.

Direct and Indirect Effects: We would expect minor effects in Coldfoot and Wiseman during transport of equipment and personnel. Communities used for staging, likely Prudhoe Bay and/or Kaktovik could expect to see increases in activity during the project. They would see increases in air traffic as equipment and personnel are transhipped to the field. Staging communities would also experience increased activity in hotelling and restaurants to support personnel. Project personnel would be experienced operators from outside the area.

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Cumulative Effects: Minor.

Mitigation: Not expected to be necessary.

4.7.3 Environmental Justice

A Federal agency is required to identify and address, as appropriate, any disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations (Executive Order 12898, February 11, 1994, amended January 30, 1995, by Executive Order 12948). This includes health risks and other impacts for people who rely principally on fish or wildlife for subsistence. Subsistence activities are a way of obtaining food or natural materials and an important mechanism for maintaining cultural values, family traditions, kinships, sharing practices, and relationships to the land.

Direct and Indirect Impacts: There would be no direct or indirect impacts to environmental justice expected from the proposed project.
Cumulative Effects: Negligible

Mitigation: No mitigation would be necessary. Impacts associated with Environmental Justice would be expected to be beneficial.

4.7.4 Subsistence

The Alaska National Interest Lands Conservation Act (ANILCA) Section 810 requires an evaluation of the effects on subsistence uses for any action to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands. A comprehensive ANILCA Section 810 analysis is included in Appendix G.

Direct and Indirect Effects: No impacts expected.

Cumulative Effects: No cumulative impacts expected.

Mitigation: None necessary

4.7.5 Land Use

Factors considered when determining whether an alternative would have a significant impact on land use were evaluated and distinguished by the degree to which the impact would result in:

- Displacement of or adverse effects to relatively large blocks of existing land uses; and
- Development that is inconsistent with adopted laws, regulations, or the long-term goals of approved land use plans or policies.

Direct and Indirect Effects: Neither land nor mineral ownership would change under this alternative. Direct effects would include the presence of personnel and equipment in areas heretofore undisturbed by humans. Operating of equipment could temporarily disturb wildlife.

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Habitats could be disturbed. In order to allow the proposed exploration activities on the Refuge, the Arctic CCP may need to be amended to change the management category from Minimal Management to Moderate Management for areas in the immediate vicinity of the exploration activities. The change to Moderate Management would allow impacts to the naturalness of the areas and distinct evidence of human-caused change. Habitats could be disturbed and their ability to function through natural processes might be impaired

Cumulative Effects: Implementation of the proposed alternative would temporarily increase the total effects on regional land use due to equipment operations and aircraft support. .

Mitigation: As a mitigation measure, project field activities would be scheduled to occur during winter months to avoid the most intensive hunting, fishing, and recreational activity periods.

4.7.6 Recreation and sport hunting

On-shore seismic surveys in the winter would likely be conducted using mobile seismic camps comprised of ski-mounted trailers that are moved every few days to once a week (BLM 2012). Such activities could displace species being sought by hunters in the area, having an impact on their success if they were unable to locate animals due to the disturbance. Any ice roads, ice pads or snow trails would be temporary. Disturbance lasts only while the survey or camp train is passing through. Lighting at the facilities would be visible to any hunters or recreationalists passing nearby. Persistence of compacted snow or ice structures may be encountered by recreationalists in the spring and are unlikely to be a barrier to recreation by foot or boat travel.

Direct and Indirect Impacts: Negligible to moderate, but temporary

Cumulative Impacts: None expected.

Mitigation: As a mitigation measure, project field activities would be scheduled to occur during winter months to avoid the most intensive hunting, fishing, and recreational activity periods.

4.7.7 Noise/Soundscape

Noise from vehicles, generators, aircraft and human presence has the potential to affect both humans and wildlife within the vicinity of seismic survey activities. The disturbance distance depends on the source and strength of noise, but should be negligible outside the immediate vicinity and is only temporary in nature.

Direct and Indirect Effects: Negligible

Cumulative Effects: None expected.

Mitigation: As a mitigation measure, project field activities would be scheduled to occur during winter months to avoid the most intensive hunting, fishing, and recreational activity periods.

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4.7.8 Visual

On-shore seismic surveys on the North Slope are only collected in the winter, therefore the colors of structures and equipment would be in contrast with the white color of the snow-covered landscape. Lights on equipment would be visible when the equipment is passing through an area. Few travelers would be expected on the Arctic Coastal Plain during the winter, minimizing the numbers of the public that would be affected by localized visual disturbance. Local subsistence users could be traveling on the tundra and observe the seismic activity. The BLM's NPRA EIS (2012) determined that "visual resources could be minimally impacted from the moving camps, aircraft, and human presence. The seismic operations would have a moderate contrast on the landscape character element of line."

Direct and Indirect Effects: Negligible

Cumulative Effects: None expected.

Mitigation: As a mitigation measure, project field activities would be scheduled to occur during winter months to avoid the most intensive hunting, fishing, and recreational activity periods.

4.7.9 Wilderness Values

Wilderness characteristics consist of size, naturalness, wildness, and outstanding opportunities for solitude or primitive and unconfined recreation. They may also include supplemental and symbolic values.

Seismic surveys would be conducted in winter, when there are fewer visitors seeking a wilderness experience come to the Arctic Coastal Plain. Ice roads, ice pads, airstrips, and snow trails would be used for staging winter seismic activities and are temporary in nature. The BLM's NPRA EIS (2012) describes seismic activity as consisting of low-ground-pressure vehicles to minimize potential impacts to the tundra. The typical survey lasts about 100 days. Seismic camps, which generally consist of six camp strings of five ski-mounted trailers, are typically moved every few days to once a week. The presence of this equipment on the Arctic Coastal Plain would have a significant but temporary impact on the wilderness value of the area where seismic surveys are being conducted during the time period of the activity. Impacted wilderness values would include naturalness, outstanding opportunities for solitude or primitive and unconfined recreation, and scenic values resulting from from the moving camps and associated noise from generators, aircraft, vehicles/trailers and human presence (BLM 2012). Impacts to wilderness values should be negligible once the activity is completed.

Longer lasting impacts to vegetation could result from seismic surveys, which could impact wilderness values of naturalness and scenic values. The color contrast would be minimal from ground view and almost nonexistent from more than a few hundred feet away (BLM 2012). After 8 to 9 years, the evidence of use would be minimal (BLM 2012). Seismic operations by their nature do not follow the same routes every year and the number of miles of survey line run can vary greatly from year to year.

Direct and Indirect Effects: Significant but temporary

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Cumulative Effects: None expected

Mitigation:

5 Cumulative Effects

Much of the current industrial activity on the north slope occurs from Prudhoe Bay west into th National Petroleum Reserve-Alaska and adjacent nearshore waters. The State of Alaska, Department of Natural Resources, Division of Oil and Gas has prepared the following summary of Alaska North Slope Oil and Gas Activity as of August 2017:

http://dog.dnr.alaska.gov/Documents/Maps/ActivityMaps/NorthSlope/NS_ActivityMap_August2017_KMT.pdf

Across the larger landscape of the North Slope (North Slope Borough), the coastal plain from Point Barrow to Point Demarcation (approximately the U.S. and Canadian border) is increasingly developed. This is especially true of the western end with the National Petroleum Reserve-Alaska (NPRA), Prudhoe Bay and adjoining oilfield from Tarn and Kuparuk on the western end to Point Thompson on the eastern end at the western-most boundary of the Arctic Refuge and 1002 area. With the discovery of oil in the late 1960s came the first explorations, developments and finally production. Following the international oil crisis of 1973, the Trans-Alaska Pipeline Systems (TAPS) was build and spanned Alaska from north to south, Prudhoe Bay to Valdez. The TAPS has been moving oil from the oilfield to transports for 40 years and likely to continue for the long term. Lateral pipelines are under construction or proposed to connect with the TAPS in the near future. The TAPS is approved to operate via DOE permit through 2032.

To accommodate construction, a road was constructed from Fairbanks to Deadhorse to convey personnel and materiel necessary to build and maintain the oilfields, pipeline and support services and allowed overland access to the North Slope year-round. Initially constructed with private funds and for industrial purposes only, the road was eventually turned over to the State of Alaska to maintain. In addition to still be maintained largely for industrial purposes, it is now a popular for vacationers and sport hunter access.

The oil and gas industry continue to expand with one of the most recent developments, the Liberty Project on the Alaska outer continental shelf (BOEM 2017) and the NPRA being opened for oil and gas lease sales, as announced in September 2017. The development of the North Slope, including the coastal plain environs is likely to continue into the foreseeable future (Clement and others 2013).

Increasing mean annual summer temperatures concurrent with projections for less snow cover during winter months will greatly facilitate development of industry, infrastructure, and public access to the North Slope.

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As a means of perspective, the described 1987 *Coastal Plain Report/EIS* full oil and gas production footprint was anticipated to use no more than 12,650 acres among scattered parcels, or 0.84 percent of the total 1.5 million acre 1002 area (Clough and Christiansen 1987). Given advances in the oil and gas state-of-the-industry since the late 1970s through late 1980s: increasing directional drilling capacities; reduced pad sizes; multiple drillings from a single pad; low ground-bearing pressure vehicles; winter site development; buffer zones around critical resources; among other features or best management practices (BMPs), the scope and scape of the exploration, development and production may be expected to be reduced from the initial estimate. All these considerations serve to mitigate direct, indirect and cumulative effects through avoiding, minimizing, rectifying, reducing, and/or compensating the significance of context and intensity for the proposed oil and gas exploration, development, and production activities.

The 29 listed mitigation recommendations of the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987), although now largely dated, provide a basis for updating and augmenting state-of-the-industry advances since (Clough and Christiansen 1987). Specifically, this includes the changes for threatened, endangered and sensitive (TES) species: arctic pennycress (*Noccaea arctica*, formerly *Thlaspi arcticum*), more common than initially determined; the delisting of the American Peregrine Falcon (*Falco peregrinus anatum*) and Arctic Peregrine Falcon (*F.p. tundrius*); and, listing of the polar bear (Ursus maritimus), among other considerations. Cumulative effects including some aspects of climate change, not adequately considered in the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987) are addressed at least up to the time of publication in *Cumulative Environmental Effects of Oil and Gas Activities on the Alaska's North Slope* (NRC 2003). Additionally, biological resources in relation to oilfield developments including: vegetation and biotic communities; caribou, grizzly bear; polar bear; Arctic fox; Pacific Loon; Tundra Swan; Lesser Snow Goose; Common Eider (Pacific Eider); shorebirds; freshwater invertebrates; freshwater fish; anadromous fish; and benthic marine communities are discussed in *The Natural History of an Arctic Oil Field: Development and the Biota* (Truett and Johnson 2000). Finally, parallels from exploration, development and production of oil and gas on the North Slope may be National Petroleum Reserve – Alaska EIS (BLM 2012), which are directly comparable to the coastal plain 1002 area.

As examples of advances in state-of-the-industry, oil and gas environmental impacts can be significantly reduced if these activities occur during winter months, when the tundra is frozen and protected by snow cover, and most wildlife are absent (Gliders and Cronin 2000). In summer, the thawing snow and lengthening days bring millions of shorebirds and waterfowl in search of nesting sites along with caribou migrating from wintering locations in the interior. The oil exploration and production process involves multiple stages that may require several years or even decades to complete for each oil field. New technologies involving reduced well spacing, elimination of reserve pits, directional drilling, winter maintenance and construction from ice pads and roads, aerial support, and the use of baseline and ongoing biological monitoring programs to facilitate decision making have reduced the areal impacts of development. The incorporation of baseline biological studies and monitoring of exploration and field development assists in minimizing impacts to high-value habitats and species. In this manner the oil and gas

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industry reduces encroachment on wildlife habitat and avoids disturbance to wildlife during critical periods (Gliders and Cronin 2000).

As a specific example, denning bears and particularly denning females with young were susceptible to seismic blasting during exploration surveys. Rousing bears, emerging and resettling, required energy reserves that might place individual bears at risk for long-term survival and especially cubs-of-the-year. In part this was because field crews were unaware of denning sites. Bear dens are now more closely monitored due to the threatened status of the polar bear, typically via radiotelemetry. Additionally, traditional blasting has been replaced by vibrators and sensor lines which are far less intrusive to denning bears. As a consequence, the disturbance threat has been greatly reduced through advances in technology (Reynolds and others 1986; McLellan and Shackleton 1988, 1989; Mattson 1990; Blix and Lentfer 1992; Linnell and others 2000).

However, cumulative effects of oil and gas exploration, development and production become problematic for long-term recovery and restoration. Some sites abandoned and rehabilitated to various degrees still show evidence of impacts 40 to 60 years following the activity (Walker and others 1987; Felix and Raynolds 1989; Gliders and Cronin 2000; Kemper and MacDonald 2009; Jorgenson and others 2010; McCarter and others 2017).

As an example of unknowns and uncertainty of climate change in relation to oil and gas exploration, development and production are water resources and their use for industry. While the creation of impoundments for water storage and subsequent use for drilling operations has created habitat and expanded the distribution of such species as the Arctic char (Moulton and George 2000; NRC 2003), it is only with the provision that pumping capacity is capped so that sufficient overwintering habitat is available below the maximum ice depth and large enough to contain dissolved oxygen for the longest period of ice coverage. This is important in a landscape where overwintering habitat for fish is limited (Reynolds 1997).

Climate projections for the North Slope indicate not only warming but drying through the summer months and less precipitation through the winter (ACIA 2004). This situation may lead to lower minimum depths in natural lakes or artificial impoundments where entrapments may increase that may ultimately affect fish species populations, invertebrate food resources and possibly trophic cascade effects (Ims and Fuglei 2005). As aquatic invertebrates are a primary food resource for migratory shorebirds, and reduction in this energy-rich, seasonal resource could greatly affect the survival of adults and nesting efforts (Bart and others 2012; Hof and others 2017).

Even using the largest footprint estimated for development from 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987), this may be scattered across the landscape of 1.5 million acres of the coastal plain 1002 area. As mean annual summer temperature increase, as they have to the present, migrating caribou will seek out the coolest remaining sites, including patches of snow which are used to avoid or reduce biting insects. Oil and gas developments have been demonstrated to affect movement and foraging behavior previously (Ballard and others 2000; Cameron and others 1979, 1989, 2005; Cronin and others 2000; among others). While behavioral

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responses may be individually or herd specific, and have not affected the overall health of North Slope caribou to this time, the point is that with future environmental change, a threshold may be crossed at some point in the future where wildlife resource requirements may come in direct conflict with industry.

Climate Change

As noted, increasing mean high summer temperature, increasing mean low winter temperatures, less precipitation and landscape drying are all projected for the larger North Slope environs over the next 100 years (ACIA 2004). This may be translated to less water for drilling operations including the risk of over-pumping water resources in a landscape with relatively limited open water despite the appearance of abundance. Such drying will affect wetland functions and values for wildlife resources and water quality. Less water and higher temperatures will place some species at risk for continued occupation of preferred habitats, such as overwintering habitat for freshwater fish, freshwater invertebrates, waterfowl and shorebird production, and may create conditions conducive for invasive species (vascular and nonvascular plants, invertebrates and vertebrates, and pathogens) to pioneer and establish populations. As an example the red fox is just now entering the Arctic Refuge which will ultimately compete with native Arctic fox and is a far more plastic and effective predator than native fox or equivalent mesocarnivores. Declines in waterfowl production have been demonstrated in multiple locations where red fox were not previous present. Increasing soil disturbances for development and infrastructure may create pathways for invasive plants and the increased movement of personnel and materiel may create human-subsidized transport of seeds or propagules.

Loss of sea ice will create the potential for increased shore zone erosion during storm or tide surge events. Sea level rise is already causing dislocation and relocation of traditional village sites to higher grounds if available elsewhere in Alaska.

As expressed by local residents and subsistence resource users during scoping for numerous development projects is the fear of displacement of those resources due to increasing fragmentation of the landscape for traditional lifestyles. Equal with this concern is the fear of catastrophic spills that will affect subsistence resources, particularly long-term incidents that may require years (or generations) to restore and rehabilitate to achieve pre-incident conditions.

Uncertainty

The oil and gas industry mitigation and BMPs have evolved based on experience, knowledge and technology. Similarly, understanding and knowledge of biological and water resources has increased over time and with technology. However, foreseeable changes may be acknowledged but uncertainty and lack of knowledge make management of oil and gas exploration, development, and production or natural resources management tenuous in many respects for the long-term (Wilson and others 2013). Only through a collaborative and cooperative effort, particularly through adaptive management, and industry and agency monitoring may positive goals and objectives be explored.

6 List of Preparers, Contributors, and Advisors

This EA was developed by U.S. Fish and Wildlife Service (Service) staff. The Service holds final responsibility for all content. Personnel for each contributing party are listed in Table 6-1.

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From: Alaska Conservation Foundation
To: Ted Swem, Jr.
Subject: November 2017 Landscape e-bulletin
Date: Thursday, November 16, 2017 5:40:28 PM

Alaska Conservation Foundation



Alaska Conservation Foundation
November 2017 Landscape E-Bulletin

Alaska Inspires. The Gwich'in people call the Coastal Plain of the Arctic Refuge "Iizhik Gwats'an Gwandaii Goodlit" (The Sacred Place Where Life Begins) for a reason. Hear Gwich'in leader Samuel Alexander explain to members of Congress how oil and gas development would endanger the car bou and his people, in his own moving words.

Defend the Refuge TODAY. Congress is moving with breakneck speed to industrialize the Arctic Refuge. On November 2nd, the Senate Energy & Natural Resources Committee took testimony, mostly from drilling advocates. And by November 8th, committee chair Alaska Sen. Lisa Murkowski introduced a bill that will authorize oil drilling on the Coastal Plain. Click here now to send a message urging your members of Congress to oppose any bill or budget item that includes drilling in the Arctic Refuge.

Americans to EPA: No Pebble Mine! An astonishing number of comments—over 750,000—were submitted to the EPA recently in support of protections for Bristol Bay from the Pebble Mine, including a record number from Alaskans. Thank you for continuing to speak up to defend one of the world's last—and greatest—wild salmon fisheries and the ways of life it sustains.

Attacks on the Tongass. There is an effort underway right now by Alaska's congressional delegation to dismantle the current Tongass Land Management Plan, which a diverse group of local Southeast Alaskans worked on and supported.

Overturning this plan will endanger the Tongass National Forest and the region's wild salmon and the ways of life they sustain. Click here to join ACF and long-time grantee Sitka Conservation Society in speaking up for the Tongass!

Celebrating Our Heroes. On October 4th, ACF paid tribute to the 2017 Conservation Achievement Award recipients, including Lifetime Achievement awardee Rick Sinnott, at an event in their honor. Read about this year's inspirational honorees and check out the a bum from the luncheon.

Climate Convening. In early November, ACF brought together 80 representatives of tribal, nonprofit, scientific and government agencies from across the state. These partners have been working on community-based conservation efforts across five major landscapes in Alaska to address the impacts of rapid climate change on our public lands, wildlife and cultural ways of life. ACF is leading the charge to help sustain and advance the momentum already created through these collaborations, as federal support for landscape conservation across the country has been eliminated in the President's proposed FY18 budget.

Farewell & Welcome. We wish to express thanks to four amazing staff members—Scott Hed, Amanda Piatt, Anne Remick and Lucas Veldhuis—as they transition from ACF on to new adventures and to three long-time board members—Jim DeWitt, Cliff Eames and Ruth Wood—who recently joined the ranks of emeritus trustees. And our warmest welcome to two new board members, Frankie Barker of Chickaloon and Cam Leonard of Fairbanks.

With Gratitude! ACF is thankful for the support of our donors across the country and our partners working around Alaska to protect what we all value —some of the last remaining healthy, intact natural ecosystems and fish and wildlife populations left on the planet. Together we are a powerful force in ensuring a healthy wild Alaska forever. Click here to make your year-end gift today. *Thank you.*

Wishing you a peaceful and joyful Thanksgiving!

Photo Credit: Arctic Caribou ©Art Wolfe/www.artwolfe.com

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From: Howard, Amee
To: Sara Boario
Subject: RDT Notes from Amee for Monday, November 20th
Date: Thursday, November 16, 2017 6:14:21 PM

RDT Notes for Monday, November 20th

On Wedenesday, November 15th the Senate Energy and Natural Resource (SENR) committee favorably marked-up the Chairman's mark regarding oil and gas development in the Arctic Refuge and sent it on to the Senate Budget Committee to (most likely) package with the tax language from the Senate Finance Committee. The SENR final passage vote was party-line except for **Sen. Manchin** (D-WV) (Yay: 13 Nay: 10). The Senate version of the **entire tax package** is then expected on the Senate floor soon after the Thanksgiving week recess. **Sen. Cantwell** will likely offer another amendment on the Senate floor to strip the Arctic NWR language from the tax package (if it is included as expected).

Reminder for folks to check out the External Affairs Google Site. Congressional and Legislative Affairs tracking log, monthly updates, and monthly legislation to watch is available for everyone to access.

Thanks so much!
Amee

--

Amee Howard
Congressional and Legislative Affairs
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"Conservation Begins with Hello"

From: Siekaniec, Greg
To: Jim Kurth
Cc: Ellis, Mitch; Fischbach, Tracy; Doug Damberg; Karen Clark
Subject: Arctic 1002 Area Environmental Assessment
Date: Thursday, November 16, 2017 6:24:42 PM
Attachments: 20171116_EA_ARC 1002 Reg Change_DRAFTwatermarked (3).docx

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Jim,

Attached is the EA version as it stands today. I asked that the document be marked as draft so we can give it a read in the morning for simple formatting and editing. The basic elements that we were asked to expand upon are contained and the team worked closely with the DOI solicitor office here in Anchorage.

Again, this is greatly expanded from the earlier request to provide a basic EA that recognized we will complete a full analysis of any application to conduct seismic investigations on the 1002 area of the Arctic NWR coastal plain. The analysis does bring in some new considerations as we now know much more about the species using the refuge and the endangered and critical habitat designations for polar bear.

Please let me know if you have some additional requirements as to how this is being handled such as placing in DTS for some routing scenario. I trust we will be able to discuss Friday morning as to next steps.

Regards,

Greg

Environmental Assessment for PROPOSED AMENDMENT TO REGULATIONS FOR GEOLOGICAL EXPLORATION OF THE COASTAL PLAIN 1002 AREA

U.S. Fish United States Fish and Wildlife Service
Arctic National Wildlife Refuge, Alaska

DRAFT

16 November 2017

U.S. Fish & Wildlife Service

Environmental Assessment
For the
Proposed Regulation Change for Management of the Coastal Plain 1002 Area of the Arctic National Wildlife Refuge, Alaska

This Environmental Assessment (EA) was prepared in accordance with the U.S. Department of the Interior (DOI) Departmental Manual 516, and is in compliance with the National Environmental Policy Act and the Council on Environmental Quality Regulations (40 CFR 1500-1508).

This EA serves as a public document to briefly provide sufficient evidence and analysis for determining the need to prepare an Environmental Impact Statement (EIS) .

This EA concisely describes the potential environmental impacts of the proposed action and the alternatives. The EA provides a list of the agencies and persons consulted during EA preparation.

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Glossary	
1002 area	identified as such in the map entitled *Arctic National Wildlife Refuge*, dated August 1980 [ANILCA § 1002(b)] (See Figure 1).
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act of 1980
BLM	Bureau of Land Management, U.S. Department of the Interior
CCP	Comprehensive Conservation Plan for National Wildlife Refuges, required by ANILCA
coastal plain	defined as that area shown on the map entitled Arctic National Wildlife Refuge dated August 1980 [ANILCA § 1002(b)], and legally described in 50 CFR Part 37 Appendix I-Legal Description of the Coastal Plain, Arctic National Wildlife Refuge, Alaska [see also 50 CFR § 37.2(d)] (See Figure 1).
cultural resource	defined as any district, site, building, structure, or object significant in American history, architecture, archeology, engineering or culture, as determined in accordance with 36 CFR § 60.6 [see 50 CFR § 37.2(e)]
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior; including BLM, USFWS, USGS
EA	Environmental Assessment, as stipulated under NEPA
EIS	Environmental Impact Statement, as stipulated under NEPA
exploratory activity	defined as surface geological exploration or seismic exploration or both of the coastal plain and all related activities and logistics required for either or both, and any other type of geophysical exploration of the coastal plain which involves or is a component of an exploration program for the coastal plain involving surface use of refuge lands and all related activities and logistics required for such exploration [see 50 CFR § 37.2(i)]
FONSI	Finding of No Significant Impact; Federal agency decision that concludes an EA
NEPA	National Environmental Policy Act of 1970 [40 CFR §§ 1500-1508]
NRC	National Research Council, National Academy of Sciences
NWR	National Wildlife Refuge
ROD	Record of Decision, Federal agency decision that concludes an EIS
USFWS	Fish and Wildlife Service, U.S. Department of the Interior
USGS	Geological Survey, U.S. Department of the Interior

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1 Introduction & Overview

1.1 Purpose and Need

The U.S. Fish and Wildlife Service (Service), proposes to amend the regulations at 50 CFR Part 37 - *Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska*, regarding the dates when an application may be submitted for a permit for a geological and geophysical exploration plan on the Arctic National Wildlife Refuge (Arctic Refuge) lands described in the Alaska National Interest Lands Conservation Act (ANILCA). This action is an update to our regulations to allow opportunities for applications to conduct seismic exploration. Further, the ability to collect new information on oil and gas resources will better inform public policy decisions. We are taking this action in support of Executive Order 13783, Promoting Energy Independence and Economic Growth.

1.2 Key Environmental Requirements & Integration of Other Environmental Statutes & Regulations

The *National Environmental Policy Act of 1969* (NEPA) requires federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions, including a no action alternative. This Environmental Assessment (EA) addresses the administrative action by the Service to permit new exploration plans in the Arctic Refuge. This EA does not evaluate decisions to issue special use permits for specific exploration plans as the details of those plans are unknown at this time. Any analysis by the Service at this time would be speculative in regards to methods, location and timing of specific exploration activities that may occur if the current regulations are amended to provide for additional geological and geophysical exploration.

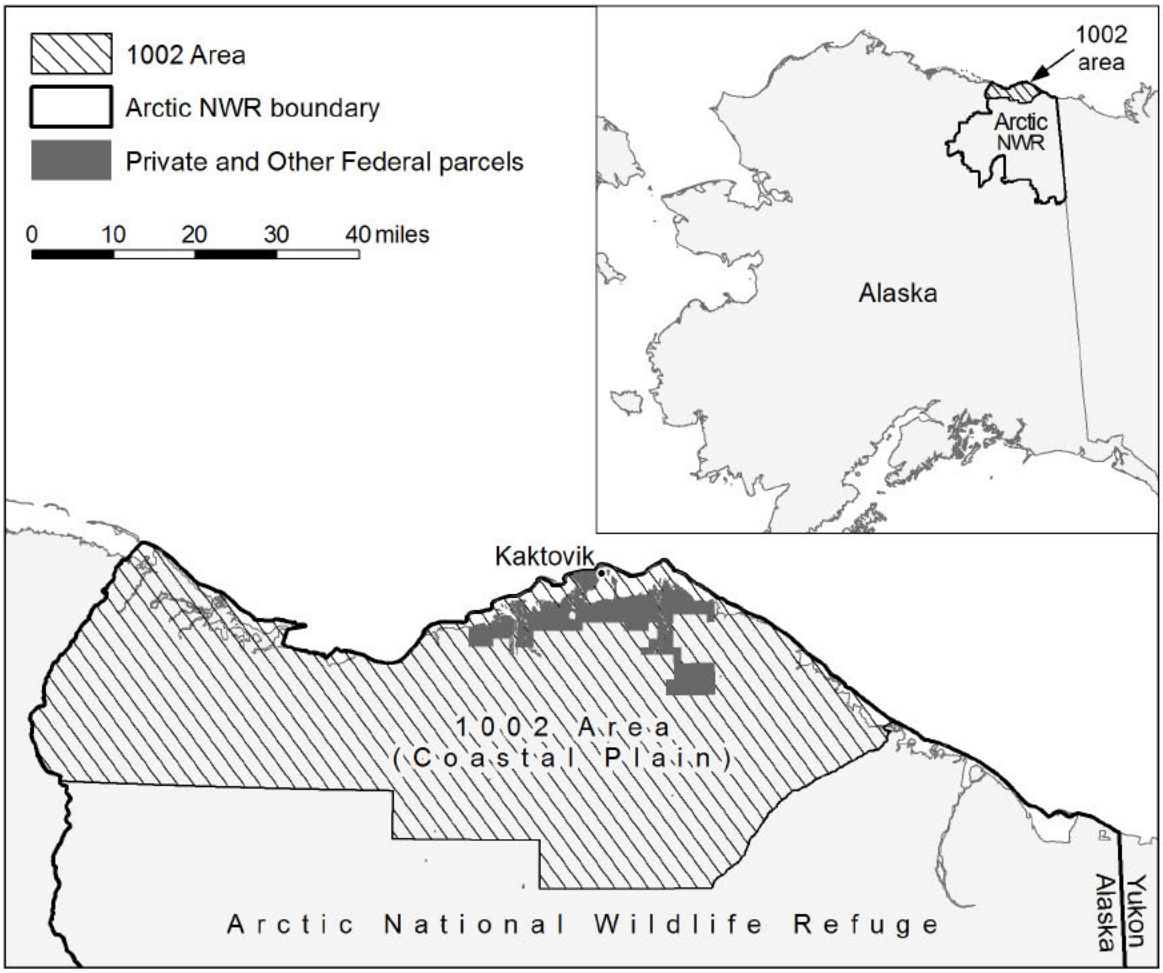
Section 7 of the *Endangered Species Act* (16 U.S.C. 1536) requires the DOI Secretary to ''review other programs administered by him (or her) and utilize such programs in furtherance of the purposes of the Act'' and to ''insure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat . . . .'' Prior to issuance of these regulations, we would consult under section 7 of the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 et seq.), to ensure that any applications for exploration in the coastal plain of the 1002 area of the coastal plain of Arctic Refuge is not likely to jeopardize the continued existence of any species designated as endangered or threatened, or modify or destroy its critical habitat, and that the regulations are consistent with conservation programs for those species. Similar to the NEPA analysis, plan-specific Section 7 reviews would be completed when explorations plans are submitted for review and processing.

The ANILCA is integral to how this proposed regulation change will be evaluated. When ANILCA was passed in 1980 the Act re-designated Arctic Refuge and required the writing of a

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Comprehensive Conservation Plan (CCP) for the Arctic Refuge (Title III), required the identification of federal actions which could have the potential to significantly restrict subsistence users (Title VIII), and required the DOI "to provide for a comprehensive and continuing inventory and assessment of the fish and wildlife resources of the coastal plain of the Arctic Refuge; an analysis of the impacts of oil and gas exploration, development, and production, and to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources" (Title X). The "coastal plain" was defined by a map entitled "Arctic National Wildlife Refuge", dated August 1980 (Figure 1).

Section 106 of the *National Historic Preservation Act of 1966* requires that federal agencies identify and assess the effects its actions may have on historic properties. "Properties" is broadly defined and does not just include built infrastructure. Prior to issuance of any permit given under these regulations, we would ensure that any applications for exploration in the coastal plain of Arctic Refuge are not likely to jeopardize historic properties.



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Figure 1. Arctic National Wildlife Refuge showing the coastal plain 1002 area.

The Arctic Refuge was first established in 1960 through Public Land Order 2214, for the purpose of preserving unique wildlife, wilderness, and recreational values. The original 8.9-million acre Arctic National Wildlife "Range" was withdrawn from all forms of appropriation under public land laws, including mining but not from mineral leasing.

In ANILCA Title III, the Arctic Refuge was expanded to 19-million acres (Figure 1). Under ANILCA § 303(2) the "purposes for which the Arctic National Wildlife Refuge was established and shall be managed include –

(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including participation in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge."

In Title VIII of ANILCA, § 810, Congress recognized the importance of federal lands to local residents of Alaska who had been using those lands to support their subsistence lifestyle for generations. As a result, federal land managers are required to identify whether a proposed land management action has the potential to significantly restrict subsistence opportunities. If so, then the manager is required to consult with local subsistence users and to seek to minimize such restrictions. In Title X of ANILCA, § 1002, Congress provided for a "comprehensive and continuing inventory and assessment of the fish and wildlife resource of the coastal plain of the Arctic Refuge; an analysis of the impacts of oil and gas exploration, development, and production, and to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources."

1.3 BACKGROUND

With the passage of ANILCA, three primary actions were required of the Service and DOI in relation to administration of the Arctic Refuge: (1) a CCP for the Arctic Refuge was to be

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written; (2) the DOI Secretary was to assess wildlife values and oil reserves in an area described in ANILCA § 1002; and, (3) the DOI Secretary was to authorize exploratory activity within the coastal plain "in a manner that avoids significant adverse effects on the fish and wildlife and other resources."

First, ANILCA § 304(g) directed the preparation of a CCP for each refuge in Alaska. Each plan is based on an identification and description of resources of the refuge, including fish and wildlife resources and wilderness values, and must "designate areas within the refuge according to their respective resources and values; specify programs for conserving fish and wildlife and the programs relating to maintaining the identified values proposed to be implemented within each such area; and specify uses within each area which may be compatible with the major purposes of the refuge."

An initial CCP and related EIS were prepared for Arctic Refuge. The Record of Decision (ROD) implemented the minimal management alternative (FWS 1988a, 1988b) which emphasized managing for natural, unaltered landscapes and natural processes. This decision was reiterated in 2015 when the CCP was revised. In this updated CCP and EIS, recommendations for Congressionally-designated Wilderness and four additional Wild and Scenic River designations were also included (FWS 2015a).

Second, under ANILCA § 1002 the DOI Secretary was required to assess the petroleum and wildlife values for a 1.5 million-acre portion of Arctic Refuge coastal plain referred to as the "1002" area (Figure 1). The assessment of the 1002 area of the coastal plain was essential to identifying potential oil and gas reserves and whether development activities would significantly and adversely affect fish, wildlife, habitats or the environment.

Biological studies and geological exploration coordinated by the Service, U.S. Geological Survey (USGS), and Bureau of Land Management (BLM) over a 2-year period on the coastal plain were initiated shortly after the enactment of ANILCA. Studies were to conclude 5 years after enactment of the Act, with final results and recommendations submitted to Congress 9 months later.

In April 1982, the Service completed the initial report summarizing current information regarding fish and wildlife, and their habitats occurring on the Arctic Refuge coastal plain (FWS 1982). Between 1982 and 1987 over 50 separate biological field studies in the 1002 area of the coastal plain have documented baseline conditions, most summarized in annual reports (Garner and Reynolds 1983, 1984, 1985, 1986, 1987). The baseline assessment period ended in 1987 with the submittal of the *Arctic National Wildlife Refuge, Alaska, Coastal Plain Resources Assessment: Report and Recommendation to the Congress of the United States and Final legislative Environmental Impact Statement* (hereafter, *Coastal Plain Report*) (Clough and others 1987). The recommendation to Congress at the time was to open the entire 1002 area of the coastal plain to an orderly oil and gas leasing program and in such circumstances as warranted, avoid unnecessary adverse effects on the environment (DOI Secretary Recommendation pp. 182-192 in Clough and others 1987).

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Baseline biological and water resource assessment in or near the 1002 area of the coastal plain continued from 1988 through 2002, coordinated among the USFWS, USGS, BLM, Alaska Department of Fish and Game, Canadian Wildlife Service, Yukon Department of Renewable Resources, Northwest Territories Department of Resources, Wildlife, and Economic Development, and academic institutions (Truett 1990; McCabe and others 1992; FWS 1994; Douglas and others 2002). Since 2002, biological studies have become increasingly landscape oriented, focusing on ecosystem processes and functions (Martin and others 2009).

Concurrent with the biological studies, oil and gas resource exploration and assessment were ongoing in the 1002 area of the coastal plain but ended with the submission of the 1987 *Coastal Plain Report* (Bird and Magoon 1987; Clough and others 1987; FWS 1990; GAO 1993). The Coastal Plain Report concluded that the 1002 area of the coastal plain was potentially rich in oil and gas resources. Based on the findings, there is a 95 percent chance the 1002 area of the coastal plain contains more than 4.8 billion barrels of oil and 11.5 trillion cubic feet of gas in-place (Clough and others 1987). There is a 19 percent chance that economically recoverable oil occurs on the 1002 area of the coastal plain. The average of all estimates of conditional economically recoverable oil resources is 3.2 billion barrels (Clough and others 1987). Finally, in order to conserve the wildlife resources of the area Congress outlined guidance in § 1002(d) for DOI to authorize exploration plans and to develop regulatory guidelines for these geological exploratory activities to ensure these activities do not significantly adversely affect fish and wildlife and their habitats, or the environment. Some of the requirements included a prohibition on the carrying out of exploratory activity during caribou calving and immediate post-calving seasons or during any other period in which human activity may have adverse effects; temporary or permanent closing of appropriate areas to such activity; specification of the support facilities, equipment and related manpower that is appropriate in connection with exploratory activity; and, requirements that exploratory activities be coordinated in such a manner as to avoid unnecessary duplication.

In April 1983, DOI published the final 50 CFR Part 37 guidelines (DOI 1983; FWS 1983). This regulation defines the general provisions for geological and geophysical exploration within the coastal plain of Arctic Refuge, including: purpose and definitions [Subpart A]; general requirements for exploratory activities [Subpart B]; exploration plans and the application process [Subpart C]; environmental protection to avoid significant adverse impacts to natural and cultural resources [Subpart D]; general administration [Subpart E]; and, reporting and data management to preclude unnecessary duplication [Subpart F].

In that rule, three permit application openings were established as described in Table 1. Each application opening allowed either continued work from a previous work session or new work to begin in the upcoming work session. All exploration work, regardless of when it was initiated, was to be completed by May 31, 1986. No new exploration plans have been accepted since 1984 and no new exploration work has occurred since 1986.

Table 1-1. Exploration Work Sessions and Their Respective Application Due Dates as Stipulated in 50 CFR 37.21.

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Type of Exploration Work	Exploration Work Sessions as Allowed in 50 CFR 37.21	Applications Due
Any exploration plans	April 19, 1983 – May 31, 1986	May 20, 1983
Exploration plans other than seismic exploration	June 1, 1984 – May 31, 1986	April 2, 1984
Any exploration plans	October 1, 1984 – May 31, 1986	June 4, 1984

1.4 Agency and Public Involvement

The USFWS is the lead agency in the development of this EA. For a 60-day period following the publication of the proposed rule in the Federal Register, the public may submit comments on both this draft EA and the proposed rule. After considering the comments received, the USFWS will issue a final EA and if it determines that the proposed action will not result in significant impacts it would issue a Finding of No Significant Impact (FONSI) for the EA, thus completing the NEPA analysis for the proposed action.

1.5 Consultation with Federally-Recognized Tribes and Native Corporations

In compliance with Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, federal agencies are required to consult with federally recognized tribal governments during the NEPA process for certain proposed actions, including the development of regulations, that may have a substantial direct effect on the tribes. Pursuant to Public Law 108-199, the Executive Order also applies to Native corporations established under the Alaska Native Claims Settlement Act. Within the USFWS and DOI the Executive Order is implemented by the Department of the Interior policies on Consultation with Indian Tribes (December 2011) and Consultation with ANCSA Corporations (August 2012). The Service has identified tribal governments and ANCSA Corporations potentially substantially affected by the proposed rule change, who are being invited to consult with USFWS on this proposed regulation change. Additional consultation opportunities will be provided prior to issuance of permits for exploration activities on the refuge.

1.6 Summary of Issues

In order to clarify the issues of greatest concern, the following two tables describe the issues being dismissed and further considered in this EA. If an issue has been considered but dismissed from further evaluation, a reason is given in Table 1-3 and the issue will not be discussed further

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in this EA. Issues being further evaluated are listed in Table 1-4. These issues will be further evaluated in Chapter 3 Affected Environment and Chapter 4 Environmental Consequences.

Table 1 - 3: Issues Dismissed from Further Evaluation

AFFECTED ENVIRONMENT	REASON FOR NOT-EVALUATING FURTHER
Geology	Neither the change in regulation nor the resulting exploration activities, which are non-extractive, will change the geology of the area.
Air Quality	With anticipated use of low sulfur fuel it is not expected that emissions concentrations or ice fog from motorized vehicles and equipment would ever reach levels that pose an environmental hazard or cause any significant degradation in air quality.
Steller and spectacled eiders	As migratory birds, neither of these threatened eiders would occupy breeding habitat during the period of winter exploration. Even if there were temporal overlap, only the very NW corner of the 1002 area of the coastal plain is within the breeding range of the spectacled eider, and they only occur there as a rare breeder at very low densities. Steller's eiders do not breed in the 1002 area of the coastal plain and are just a rare visitor along the coast.

Table 1 - 4: Issues Considered for Further Evaluation

AFFECTED ENVIRONMENT	REASON FOR FURTHER EVALUATION
Soils	Although the overall geology of the coastal plain would not be affected, the development of ice roads and ice pads and other associated infrastructure may expose areas to erosion. There is also a risk of fuel spills from equipment being used.
Hydrology	In any proposed winter exploration activity on Arctic Refuge, water withdrawals would be necessary to construct ice roads and other infrastructure that would potentially impact hydrology, aquatic habitats, wetlands and species that depend on them. There is also a risk of fuel spills and release of other contaminants that could impact water quality.
Climate	Although climate will not be affected by either of the alternatives directly, a description of past and present climate is useful in considering cumulative effects of the proposed action to other resources. For this reason a description of climate trends is included in Chapter 3.
Vegetation	In any proposed industrial activity on Arctic Refuge, there is a concern that invasive species will be introduced. We are also concerned about the effects of the development ice roads and ice pads and other associated infrastructure may create.
Wetlands	Depending on the amount of water needed for the development of ice

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	roads and pads, water available for healthy wetlands may be affected.
Fish	Water needed for the development of ice roads and pads, could be withdrawn from aquatic habitat impacting fish populations. Seismic testing over water bodies may also impact fish.
Bald and Golden Eagles	Golden Eagles are rare breeders on the coastal plain, and initiate nesting very early in the spring on the North Slope (earliest of 23 March, with three annual mean initiation dates of 5 April, 14 April, and 22 April); thus, could be affected by "winter" seismic exploration. Bald Eagles are probable, but very rare, breeders on the coastal plain.
Resident Birds	Gyrfalcons are rare breeders on the coastal plain, and initiate nesting very early in the spring; thus, could be affected by seismic exploration. Their primary late winter/early spring prey is rock and willow ptarmigan which are uncommon and common permanent residents, respectively, on the coastal plain.
Migratory Birds	Water needed for the development of ice roads and pads could be withdrawn from aquatic habitat impacting migrating waterfowl and shorebird populations.
Caribou	The coastal plain is within the territory of the Porcupine Caribou Herd which travels north and south and is a primary subsistence resource for many of the Native people who live in and around the Refuge.
Terrestrial Mammals, Not Including Caribou	Both muskox and moose are now rare on the coastal plain; their populations have declined in recent years. Muskox may be particularly sensitive to late winter disturbance given nutritional challenges and calving beginning in mid-April. Bears, wolves, and wolverines all occur on the coastal plain, although they are more abundant in the foothills and mountains. Brown bears emerge from their dens from late March through May; this period could well overlap seismic exploration periods.
Polar Bears	A majority of female polar bears of the Southern Beaufort Sea population now den on the Refuge coastal plain. As a result much of the area has been designated critical habitat.
Bowhead Whale	Now that there is limited sea ice during much of the year, exploration equipment could be transported to the area via barges through a known bowhead whale migration corridor.
Ringed and Bearded Seals	Now that there is limited sea ice during much of the year, exploration equipment could be transported to the area via barges through known bearded and ringed seal habitat.
Cultural Resources	The reverberation created by seismic exploration is known to damage buried artifacts.
Socioeconomic	Exploration activities have the potential to create employment opportunities within communities neighboring the Refuge and may also affect subsistence resource availability.
Environmental Justice	Under EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, federal agencies are

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	required to develop strategies to address environmental justice concerns in their approach to operations.
Subsistence	Exploration activities have the potential to affect resource availability by creating disturbances that change caribou and polar bear movements.
Land Use	The development of any semi-permanent developments in the Coastal Plain may require a change to the land management status from "Minimal" to "Moderate" management.
Noise	Noise from vehicles, generators, aircraft, and human presence has the potential to change the natural soundscape during seismic exploration.
Visual	Due to the relatively flat nature of the landscape, equipment associated with seismic exploration will be noticeable to recreationalists and residents in the vicinity.
Wilderness Values	The resulting exploration activities will require a significant level of industrial activity during the exploration work season in limited areas.

2 Proposed Action and Alternatives

2.1 Alternative 1 (No Action Alternative)

Under the no action alternative, the existing regulation would not be amended or updated. Management of the Coastal Plain, Arctic Refuge, would continue as presently and as stipulated in the ROD for the Arctic Refuge CCP (FWS 2015). There would continue to be no oil and gas exploration on Arctic Refuge.

2.2 Alternative 2 - Proposed Action

The Service proposes to allow opportunities for submission of applications to conduct seismic exploration by amending and updating the regulatory language of 50 CFR Part 37 - *Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska*, specifically § 37.21(b) and (c) as follows:

PART 37 – GEOLOGICAL AND GEOPHYSICAL EXPLORATION OF THE COASTAL PLAIN, ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

Subpart C – Exploration Plans

§ 37.21 Application Requirements.

(a) Prior to submitting an exploration plan, applicants may meet with the Regional Director to discuss their proposed plans and exploratory activities and the requirements of this part.

(b) Any person wanting to conduct exploratory activities may apply for a special use permit by submitting for approval one or more written exploration plans, in triplicate, to the Regional

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Director, Region 7, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503.

(c) In addition to containing the information required in paragraph (d) of this section, any exploration plan submitted shall describe the applicant's plan for carrying out an integrated program of exploratory activities in such a manner as will satisfy the objective and limitations stated in § 37.1. If an applicant submits an exploration plan in any given year with the intention of submitting another exploration plan the following year, the applicant shall describe in its initial plan how its future exploratory activities will be integrated with those proposed under its initial plan. Each exploration plan submitted must be published and be the subject of a public hearing in accordance with requirements of § 37.22(b).

(d) An exploration plan shall set forth in general terms such information as is required by this part and by the Regional Director in determining whether the plan is consistent with this part, including, but not limited to:

(1) The name and address of any person who will conduct the proposed exploratory activities, i.e., the applicant/permittee, and, if that person is an agency, firm, corporation, organization, or association, the names and addresses of the responsible officials, or, if a partnership, the names and addresses of all partners;

(2) The names and addresses of all persons planning at the time of plan submittal to participate in the proposed exploratory activities or share in the data and information resulting therefrom through a cost-sharing or any other arrangement;

(3) Evidence of the applicant's technical and financial ability to conduct integrated and well-designed exploratory activities in an arctic or subarctic environment and of the applicant's responsibility in complying with any exploration permits previously held by it;

(4) A map at a scale of 1:250,000 of the geographic areas in which exploratory activities are proposed and of the approximate locations of the applicant's proposed geophysical survey lines, travel routes to and within the refuge, fuel caches, and major support facilities;

(5) A general description of the type of exploratory activities planned, including alternate exploratory methods and techniques if proposed, and the manner and sequence in which such activities will be conducted;

(6) A description of how various exploratory methods and techniques will be utilized in an integrated fashion to avoid unnecessary duplication of the applicant's own work;

(7) A schedule for the exploratory activities proposed, including the approximate dates on which the various types of exploratory activities are proposed to be commenced and completed;

(8) A description of the applicant's proposed communication techniques;

(9) A description of the equipment, support facilities, methods of access and personnel that will be used in carrying out exploratory activities;

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(10) A hazardous substances control and contingency plan describing actions to be taken to use, store, control, clean up, and dispose of these materials in the event of a spill or accident;
(11) A general description of the anticipated impacts that the proposed exploratory activities may have on the refuge's wildlife, its habitat, the environment, subsistence uses and needs, and cultural resources, and a description of mitigating measures which will be implemented to minimize or avoid such impacts;
(12) A description of the proposed procedures for monitoring the environmental impacts of its operation and its compliance with all regulatory and permit requirements;
(13) A statement that, if authorized to conduct exploratory activities, the applicant shall comply with this part, its special use permit, its approved exploration plan, plan of operation, and all reasonable stipulations, demands and orders issued by the Regional Director;
(14) A description of the applicant's proposed data quality assurance and control program; and
(15) Such other pertinent information as the Regional Director may reasonably require.

If this alternative is selected, it is assumed that the Service will receive and possibly approve applications for seismic exploration activities on the 1002 area of the coastal plain. Proposed 3-D seismic exploration activities in the nearby National Petroleum Reserve - Alaska (NPRA) and analyzed in the BLM EA, DOI-BLM-AKF01000-2017-001-EA and the NPRA Integrated Activity Plan/EIS (2012), give us an understanding of what these activities would generally entail.

Seismic exploration maps the subsurface structure of rock formations by sending energy waves into the ground or water and then recording the reflected energy waves. One of the most common methods for creating these energy waves in the arctic is via vibroseis seismic operations which use truck-mounted vibrators that systematically put variable frequency energy into the earth. Several of these truck-mounted vibrators are located along a line and vibrate in synchrony in order to record energy along a transect. The reflected energy is recorded and the whole line moves ahead.

3-D seismic activities generally occur in the winter with crews beginning to mobilize and build ice roads and pads in December. Full crews arrive in January and commence seismic operations if the ice infrastructure has been completed. Seismic operations continue through most of April, with demobilization finishing by the first part of May. Crews may include 40 -160 people depending on the planned activity with operations occurring 24 hours a day. The camp facility often includes sled-mounted units for preparing and eating meals, sleeping areas, washrooms, offices, shops, medical facilities, generator rooms, and any other support needed. The camp moves along with the exploration work. Any ice roads or pads built during this time are left to melt in place. Any ice bridges built across rivers are removed in order to decrease the chance of ice damming during the melt season. Frozen lakes are often used for landing strips.

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Without a specific exploration plan to evaluate, it is not possible to determine exact locations and timing of all the seismic work and staging. Although we can predict that seismic exploration activities will happen in the winter months, it is less clear what the timing of staging and pre-survey work would be. We can predict that ice roads may be used to stage and transport equipment and materials into the west end of the 1002 area of the coastal plain. Exploration activities further to the east would likely require barge transportation during the summer and fall before the sea ice freezes. Also, unlike the western side of the area, there is no nearby infrastructure on the eastside from which to build, possibly changing the kind and quantity of equipment used.

2.3 Alternatives Considered but Dismissed From Detailed Analysis

No other alternatives were analyzed in detail in this EA, because the proposed change of regulation will allow opportunities for submission of applications to conduct seismic exploration. The Service considered updating the environmental protection requirements of 50 CFR §§ 37.31 and 37.32, but determined that the regulations as currently written provide adequate and appropriate protection of refuge resources and allow the Regional Director to impose additional stipulations to ensure that permittees' activities are conducted in a manner which avoids significant adverse effects on the refuge's wildlife, its habitat, and environment.

3 Affected Environment

Per ANILCA § 1002(c), resource assessment baseline studies within the 1002 area of the coastal plain began shortly after its enactment and, as stipulated, are "continuing." Special emphasis was placed on caribou, wolves, wolverines, grizzly bears, migratory waterfowl, muskox, and polar bears of the coastal plain and their habitat. The purpose of the studies was to "assess the size, range, and distribution of the populations of fish and wildlife; determine the extent, location, and carrying capacity of the habitats of the fish and wildlife; assess the impacts of human activities and natural processes on the fish and wildlife and their habitats; analyze the potential impacts of oil and gas exploration, development, and production on such wildlife and habitats; and analyze the potential effects of such activities on the culture and lifestyles (including subsistence) of affected Native and other people."

The environmental setting, flora and fauna, water resources, cultural resources, and rural lifestyles (including subsistence) of the 1002 area of the coastal plain, Arctic Refuge, are generally defined and described in the *Final EIS and Preliminary Final Regulations: Proposed Oil and Gas Exploration within the Coastal Plain of the Arctic NWR* (DOI 1983), and *Coastal Plain Report* (Clough and others 1987).

Additional natural, water and cultural resource data and assessments are provided in the numerous studies conducted under the Arctic Refuge Coastal Plain Resource Assessment over the past 30 years (FWS 1982; Garner and Reynolds 1983, 1984, 1985, 1986, 1987; McCabe and others 1992; Douglas and others 2002; among others). Cumulative effects of oil and gas activities on the Alaska North Slope were reviewed by National Research Council, as these effects were not adequately integrated into ongoing studies up to that point (NRC 2003).

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Since 1988, the natural and cultural resources, water resources, and lifestyles (including subsistence) in the Arctic Refuge, including the 1002 area of the coastal plain, have been minimally managed by human influence or intrusion, and administered for their wilderness values and natural processes (FWS 1988a, 1988b, 2015a, 2015b).

3.1 PHYSICAL ENVIRONMENT

3.1.1 Soils

Soils in the coastal plain are described in the 2015 Arctic Refuge CCP as including "low terraces and floodplains of streams draining the North Slope of the Brooks Range. Materials underlying soils in this region consist of fluvial sands and silts, with increasing amounts of interstratified marine sediments near the coast. Generally, soils…thaw less than 18 inches in summer and are poorly drained. Loamy textures are common on terraces and floodplains, and organic soils occur in depressions. Locally, peaty materials are buried beneath windblown sand deposits."

3.1.2 Hydrology

Water resources on the coastal plain of the Arctic National Wildlife Refuge consist of streams, lakes, and springs. Streams of the Arctic coastal plain flow north, several forming large alluvial fans as they flow into the Beaufort Sea where they contribute substantial volumes of water and sediment to coastal ecosystems (Arctic CCP). Like other areas of the Arctic, the coastal plain is underlain by continuous permafrost limiting infiltration of surface water and limiting groundwater resources (Lyons and Trawicki 1994). Groundwater that may exist below permafrost is thought to be saline or brackish (Williams 1970). While ninety-nine percent of the 1002 area is classified as wetlands freshwater is limited and confined to the shallow zone above permafrost (Clough et al. 1987). Lakes are not evenly distributed across the coastal plain with concentrations occurring near the mouth of the Canning River and in the region of the Sadlerochit and Jago Rivers with very few lakes occupying the central Katakturuk River region (Trawicki et al. 1991). At Barter Island mean annual precipitation which includes the water equivalent of snow averages 6.3 inches per year, in Umiat east of the 1002 area on the North Slope it is 5.7 inches (Searby and Hunter 1971) emphasizing that climate and permafrost are dominant factors that limit water availability. The non-frozen water found on the coastal plain during the winter months is located in small isolated pools beneath ice hummocks associated with stream drainages , lakes with depths greater than 7 feet, and flowing surface waters associated with springs (Lyons and Trawicki 1994).

<u>Streams and Rivers</u>

The 1002 area has a relatively high density of streams and rivers compared to other areas of the North Slope (Brackney 2008). These habitats support thirteen species of fish, including Dolly

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Varden an important subsistence fish. The hydrography of these systems is strongly influenced by the climate which is characterized by extremely low winter temperatures and short, cool summers with low, desert-like levels of precipitation. Streamflow rapidly declines in most systems shortly after freeze up in September and ceases in most streams by December when they are generally frozen to the stream bed resulting in no flow or flow so low as to not be measureable (Lyons and Trawicki 1994). A few exceptions to this occur where springs result in open reaches and aufeis areas that develop providing important fish overwintering habitat (Arcone 1989). Break up on the Arctic coastal plain occurs during a brief period in late May or early June. Snowmelt begins in the mountains and foothills progressing towards the coastal plain. Rapidly melting water runs over the ground as sheetflow with infiltration limited by permafrost (Lyons and Trawicki 1994). Water in drainages rises rapidly, often flowing over ice covered stream channels. More than half of the annual discharge for these streams can occur during a period of several days to a few weeks (Clough et al. 1987, Sloan 1987). Based on origin, hydrologic regime, and chemical and biological characteristics, Craig and McCart (1975) classified North Slope streams into three categories: mountain, spring-fed, and tundra. Mountain streams are typically fast flowing and fed by varying proportions of snowmelt, glacier meltwater, and spring-fed tributaries. Waters are cold (usually less than 50 °F), occasionally turbid, moderately hard, and support low invertebrate densities. The most common species of fish in mountain streams is Dolly Varden. Mountain streams that receive glacial inputs are unique to the eastern North Slope, in the Jago, Hulahula, and Okpilak watersheds, discharge from glacial sources is the dominant source of flow when precipitation is low and air temperatures are high and transport large volumes of water, sediment and nutrients to downstream ecosystems (Arctic CCP). Spring-fed streams are often tributaries of mountain streams and have relatively stable flows and temperatures throughout the year. Spring-fed waters are characterized by low levels of dissolved solids and very high densities of macroinvertebrates. Many spring-fed streams provide critical spawning and overwintering habitat for Dolly Varden. Tundra streams originate in the Brooks Range Foothills and coastal plain ecoregions, are fed by surface runoff, tend to be meandering systems, and have low to moderate invertebrate densities. Waters are typically warmer and exhibit lower pH and conductivity relative to mountain and spring-fed streams (Arctic CCP). Huryn et al. (2004) found that gradients in freezing probability, nutrient concentrations, and substratum instability control invertebrate communities in these systems. Some projections indicate that glacial inputs could disappear within the next 50 years altering hydrology by reducing instream connectivity and negatively impacting fish migrating to critical overwintering habitat (Nolan et al. 2011). Surface water availability and instream connectivity will potentially be adversely impacted by deepening of the active layer on the coastal plain, increasing duration of the summer season, and increased evapotranspiration rates (Arctic CCP).

Springs and Aufeis Areas

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Six springs are located on the Arctic coastal plain identified through reconnaissance investigation by Childers et al. (1977): Sadlerochit Spring, Red Hill Spring, Katakturuk River tributary Spring, Hulahula River Spring, Okerokovik River Spring, and Aichilik River Spring. During the winter months pressurized water discharges from a spring pushing up through the ice to the surface where it spreads out and freezes forming aufeis areas that can become extensive. These formations melt more slowly than snow, generally persist into the summer and may provide a temporary source of freshwater (Kane and Slaughter 1973). Open water associated with springs provides important winter habitat particularly once surface water runoff ceases due to freezing (Lyons and Trawicki 1994). Most springs in Arctic Refuge have survived since the last glacial maximum (Yoshikawa et al. 2007), suggesting that they will continue to flow and be refugia for aquatic biota in a changing climate.

Lakes

The density of lakes in the Arctic coastal plain is low compared to the rest of the North Slope and as noted earlier their distribution is not uniform, nor is their size and depth (Arctic CCP). Jorgenson and Shur (2007) classified the coastal plain into regions based on lake origin: thaw, depression, riverine, and delta. Depression lake basins are formed in undulating sandy, alluvial marine or eolian deposits, and are the majority found on the coastal plain concentrated in the depression lakes region between the Hulahula and Niguanak rivers. Riverine lakes include oxbow and floodplain lakes along sinuous channels and thaw lakes formed in ice-rich abandoned channels. Riverine lakes are most concentrated along the Jago and Niguanak rivers. Delta lakes include thaw, riverine, and tidal lakes and most are found in deltas of the Hulahula, Jago, Aichilik, and Canning rivers (Arctic CCP). The majority of lakes on the coastal plain are shallow lakes with surface areas ranging from 1,500 acres to less than 10 acres (Trawicki et al. 1991). Recharge of these systems is generally limited to snow melt and direct precipitation in the immediate vicinity of the lake (Lyons and Trawicki 1994). When not connected to larger drainage networks, evaporation has a strong influence on water chemistry and plays an important role in regulating lake water balance (Arctic CCP). Maximum winter ice thickness on lakes in the Arctic is between 6-7 feet (Bilello and Bates 1969, 1971, 1972, and 1975). Clough et al. (1987) reported that most lakes have basins less than 7 feet deep and thus freeze to the substrate. These shallow lakes generally melt from the surface downward in spring. Deeper lakes that do not freeze to substrate may have ice present on the surface well into July. Due to the level of winter freezing, the depth of lakes restricts the presence of fish, Hobbie (1984) found fish present only in lakes with depths greater than 5.6 feet. Shallow lakes generally lack fish because they usually freeze solid but they provide important habitat to emergent vegetation, invertebrates, and migratory birds due to the earlier availability of ice-free areas. Trawicki et al. (1991) identified fish presence in lakes on the coastal plain to be more frequent and widespread than previously suspected. Ninespine stickleback (*Pungitius pungitus*) was found in 34 of 52 lakes surveyed (65%) in 1989. In the past half a century, the duration of ice cover, thermal regimes, and rates of

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primary productivity have likely changed. In the future, changes in temperature, active layer depth, fire frequency and severity, and erosion rates could affect lake distribution, water quality, water levels, size, and connectivity to other habitats (Arctic CCP).

Winter Specific Hydrologic Data

Hydrologic data for the 1002 area are limited, the Service collected short-term (less than five years) of data over two decades ago at 11 stream gage sites on five drainage systems across the coastal plain and conducted an inventory of 119 lake basins to create lake contour maps, water volume calculations and estimates of winter water volume beneath ice cover. These lake basins constituted the majority of larger lake basins found in the 1002 area. These data were collected in large part to address questions regarding winter water availability in the 1002 area in the event of exploration activities. The USGS has collected some additional hydrography data on the Canning and Hulahula Rivers. In the Service stream studies winter water was found to occur over a wide area in most of the major river drainages but it was restricted to small isolated pools beneath ice hummocks scattered throughout the braided portions of these rivers. The volume of water available was estimated to be small, 9 million gallons over the 237 miles of inventoried area (Elliot and Lyons 1990). Total estimated volume of water in the study lakes ranged from 55,382 acre-feet (18 billion gallons) when free of ice to a low of 3,366 acre-feet (1.1 billion gallons) beneath a maximum ice thickness of seven feet. Ninety percent of the available water was contained in just nine of the 119 surveyed lakes, the majority of these were found in the Canning River delta area (up to eighty percent of the total volume), and only two of these lakes were located in the region between the Katakturuk and Sadlerochit rivers (Trawicki et al. 1991).

Climate Change Effects

Historically, in the nearby NPR-A the coastal regions have not thawed until after the second week of June (BLM 2012). By mid-century, these areas are projected to thaw the first week of June. By late century these areas are expected to thaw as early as June 1st. Changes in freeze-up date are predicted to be even greater. Historic data indicates NPR-A water bodies freeze by mid-September. Models indicate freeze-up will not occur until late September in southern regions and early October along the coast. By the end of the century, coastal waterbodies may not freeze until the end of October. These changes will result in a six-week increase in the length of the ice-free season.

Landscape drying trends have been observed in northeastern Alaska (ACIA 2004). Increased temperatures and an extended growing season could increase the evapotranspiration rate, increasing the water deficit (defined as the amount by which evapotranspiration exceeds precipitation) and potentially affecting the annual water balance. The annual water balance represents the water available for plants and animals, streamflow, and groundwater recharge. Shallow water systems, including lakes and wetlands, could decrease in number and extent as the annual water balance experiences an ongoing deficit. Permafrost loss on the Refuge could also result in draining of many shallow water systems; the thawing of ice wedges and ice lenses could

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create more connections between surface water and groundwater systems. If wetlands and lakes continue to dry, an increase in vegetative cover can be expected eventually transitioning to dry meadows and shrublands. This would reduce the amount of habitat available for wetland-dependent species, such as waterfowl.

3.1.3 Climate

The North Slope is defined as the area north of the Brooks Range, including the Beaufort Sea Coastal Plain and the Brooks Range Foothills ecoregions. The climate of the North Slope is classified as arctic: summers are short and cool, and winters are long and cold. The growing season lasts from June to August. Subfreezing temperatures and snow may occur at any time during the year.

The Arctic coast experiences more frequent cloudiness and fog with higher winds; inland, clear skies are more common, winds are variable, and summers are warmer and less cloudy with increasing distance from the coast. At Barter Island on the coast, temperatures average 40 °F in July (warmest month) and -20 °F in February (coldest month) (Table 4-2). Temperatures on the coastal plain and in the northern foothills of the Brooks Range are more similar to those measured at weather stations at Kuparuk and Toolik Lake, ranging from means of 47 to 53 °F in July and -18 to -6 °F in February.

North of the Brooks Range, the Refuge receives little precipitation. The average annual water equivalent precipitation is less than 10 inches (in), most of which falls as summer rainfall, but it includes 32 to 46 in of snowfall. Evaporation rates are low due to low temperatures and a short growing season; the land is underlain by continuously frozen soil, which restricts soil drainage. Therefore, available soil moisture is considerably greater than the low annual precipitation would produce in a more temperate climate, and soils are usually saturated during summer.

Surface winds along the Arctic coast average 9 to 15 miles per hour (mph), with occasional intense storms generating winds exceeding 70 mph. Winds are predominantly from the northeast, although the strongest winds come from the west. September and October are the windiest months on the coast, probably due to maximum amounts of open water (Wendler et al. 2010). During winter, winds are a major force affecting the distribution and amount of snow cover on the coastal plain. Higher, rolling terrain is often blown clear, or nearly so, while dense snow drifts accumulate in sheltered areas along stream banks.

The Arctic is particularly sensitive to warming due to the historically extensive snow and ice cover, where the freezing point marks a critical threshold for stability of the landscape and thus both habitat and infrastructure sustainability. Accelerated melting of multiyear sea ice, reduction of terrestrial snow cover, and permafrost degradation are examples of the observed rapid Arctic-wide response to global warming.

Annual average near-surface air temperatures across Alaska and the Arctic have increased over the last 50 years at a rate more than twice as fast as the global average temperature (Taylor et al. 2017). There is limited meteorological monitoring on the North Slope, and no long term,

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continuous monitoring in the Arctic Refuge. Thus, long term trends are derived primarily from Utqiagvik (Barrow). Especially strong warming has occurred over Alaska's North Slope during autumn. For example, Utqiagvik's (formally Barrow) warming since 1979 exceeds 7°F (3.8°C) in September, 12°F (6.6°C) in October, and 10°F (5.5°C) in November (Wendler et al. 2014).

Our understanding of precipitation trends are limited on the North Slope, in part because the difficulty of collecting rain and snow in windy sites makes historical precipitation data less reliable than temperature data. Overall, the 2016 May Alaska statewide snow coverage was the lowest on record dating back to 1967; the snow coverage of 2015 was the second lowest, and 2014 was the fourth lowest (Taylor et al. 2017). The length of the snow season impacts the timing available for winter exploration activities as well as the timing of wildlife activities, including occupancy of migration and birthing habitats. Snowpack in the Brooks Range, and glacier mass, affect water availability in rivers and lakes for both fish and wildlife habitat and in support of industrial development.

Negative trends in precipitation were observed between 1950 and 1988 at Barter Island, on the Beaufort Sea coast in the center of the Arctic Refuge (Curtis et al. 1998; L'Heureux et al. 2004). Across six decades (1950-2010), researchers also observed a consistent decrease in winter precipitation at Utqiagvik (McAfee et al. 2013), which supported earlier analyses (L'Heureux et al. 2004). The Barter Island station, however, has not reported continuously since the late 1980s, so it cannot confirm recent trends at Barrow. At Bettles, in the western Brooks Range, there appears to be an increase in winter precipitation, with the difference from the Arctic Coastal Plain resulting from the Brooks Range acting as a barrier to moisture transport.

3.2 Biological Environment

3.2.1 Vegetation

North of the Brooks Range, the coastal plain is treeless tundra, composed mainly of hardy dwarf shrubs, sedges, and mosses. Habitats on the North Slope can be grouped into four broad categories: coastal lagoons, lowland wet tundra and lakes, upland moist tundra, and river floodplains with willow shrub thickets. The geography of the 1002 Area differs from the coastal plain further west in that there is generally less low, flat, wet tundra and a greater proportion of rolling, drier terrain. A detailed description of all the habitats on the Refuge can be found in the 2015 Refuge CCP. The following is a summary of the information found there as it pertains to the Refuge coastal plain.

Shrub thicket habitat can be categorized into two types: dry and moist prostrate dwarf shrub. Dry prostrate dwarf shrub occupies dry areas of the coastal plain tundra and on dry, infrequently-flooded river terraces or alluvial fans throughout the refuge. Moist habitats on slightly elevated microsites of the coastal plain are often drier as a result of greater exposure to wind and lack of water from surrounding terrain. Lichen are more common than mosses in these drier habitats. Bare soil as a result of frost action is common in this habitat type. Moist prostrate dwarf shrub contains similar shrub species as dry, but greater winter snow cover and summer soil moisture allows grasses, sedges, and mosses to thrive in the understory.

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The riparian shrub type develops on gravels along rivers and is dominated by the willows *Salix planifolia* and *S. alaxensis*. On the North Slope, this is the tallest vegetation type. Species composition and density is controlled by frequency of flooding, water velocity, and the size of particles deposited during flooding

The very wet graminoid vegetation type occurs on aquatic habitats surrounding large, open bodies of fresh water, very wet habitats that contain numerous small bodies of open water; and coastal marshes frequently inundated with salt water. Surface forms includ low-centered polygons with abundant standing water, thaw lake basins, edges of lakes, and lowbank coastline. There is usually little shrub, forb, or moss cover, except on drier microsites such as polygon rims.

3.2.2 Wetlands

Although the density is low compared to the rest of the North Slope, there are over four thousand lakes covering over 37,000 ac in the Refuge. Most (73 percent) of the lakes are in the coastal plain ecoregion. Most lakes in this region are shallow, freeze to the bottom during winter (Trawicki et al. 1991), and are recharged by snowmelt, overbank flooding, and precipitation. When not connected to larger drainage networks, evaporation has a strong influence on water chemistry and plays an important role in regulating lake water balance. Jorgenson and Shur (2007) classified the coastal plain into regions based on lake origin: thaw, depression, riverine, and delta. Thaw lakes are formed by the degradation of ice-rich sediments and, in the Refuge, are only in great abundance in a small thaw lake plain east of Demarcation Bay. Depression lake basins are formed in undulating sandy, alluvial marine or eolian deposits. Most of the lakes in the Refuge are in the depression lakes region between the Hulahula and Niguanak rivers. Riverine lakes include oxbow and floodplain lakes along sinuous channels and thaw lakes formed in ice-rich abandoned channels. Riverine lakes are most concentrated along the Jago and Niguanak rivers. Delta lakes include thaw, riverine, and tidal lakes and most are found in deltas of the Hulahula, Jago, Aichilik, and Canning rivers. Up to 80 percent of the winter water volume is in lakes in the Canning River delta (Trawicki et al. 1991).

Over 25 percent of the lakes on the North Slope of the Refuge are in the mountains and foothills. Most mountain lakes are of glacial origin and tend to be deeper, have larger surface areas, and store much greater volumes of water than coastal plain Lakes. The largest mountain lakes include Lake Peters (3,226), Lake Schrader (1,689 ac), Elusive Lake (772 ac), and Porcupine Lake (333 ac). With the exception of studies on two large deep glacial lakes, Lakes Peters and Schrader, the limnology of mountain lakes in the Refuge has not been well studied. In the late 1950s, Hobbie (1961) found that Lake Schrader was at the northern limit of thermally stratified lakes; Hobbie (1964) found that 50 percent of the annual primary productivity in Lake Peters occurred when the lake was still covered by ice. In the past half a century, the duration of ice cover, thermal regimes, inputs from glacial meltwater, and rates of primary productivity have likely changed. In the future, changes in temperature, active layer depth, fire frequency and severity, and erosion rates could affect lake distribution, water quality, water levels, size, and connectivity to other habitats.

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Landscape drying trends have been observed in northeastern Alaska. Riordan et al. (2006) reported a reduction in wetland extent and the number and surface area of lakes on parts of the Yukon Flats between 1980 and 2002. Many wetlands on the Yukon Flats Refuge that were once aquatic habitats, such as lakes, now are shrub and wet meadow habitats. Historical aerial photographs from the boreal forest part of Arctic Refuge also show lakes shrinking or disappearing in the past 60 years.

Increased temperatures and an extended growing season could increase the evapotranspiration rate, increasing the water deficit (defined as the amount by which evapotranspiration exceeds precipitation) and potentially affecting the annual water balance. The annual water balance represents the water available for plants and animals, stream flow, and groundwater recharge. Shallow water systems, including lakes and wetlands, would decrease in number and extent as the annual water balance experiences an ongoing deficit. Permafrost loss on the Refuge could also result in draining of many shallow water systems on the Refuge; the thawing of ice wedges and ice lenses could create more connections between surface water and groundwater systems. If wetlands and lakes continue to dry, an increase in vegetative cover can be expected; and they could eventually transition to dry meadows and shrublands. This would reduce the amount of habitat available for wetland-dependent species, such as waterfowl.

3.2.3 Fisheries

Two types of fish habitat dominate the Arctic coastal plain: streams and lakes. Lake habitats may be isolated and without upstream or downstream connections, and may be further defined as deep or shallow. Environmental extremes also dominate fish habitats, between freezing, i.e., below 0°C/32°F during the long winter and flowing waters (above 0°C/32°F) during the short summer months. This combination, along with size, location, and morphology, including chemical and physical characteristics of the numerous lakes and tributaries of the Arctic coastal plain determine the distribution, densities and diversity of fish species (see Affected Environment - Hydrology 3.1.2).

Fish species may be categorized into freshwater residents, diadromous (both marine and freshwater) and marine. About 62 marine and diadromous fish occur in in the Beaufort Sea adjacent to the coastal plain and these species include Arctic char, Arctic cisco, Arctic flounder, boreal smelt, Pacific salmon (pink and chum), and fourhorn sculpin (Craig 1984; Clough and others 1987; Gallaway and Fechhelm 2000; BLM 2012). Nearshore marine environments provide important foraging and spawning habitats while the moving waters of river deltas provide overwintering habitat for some species. About 21 species of freshwater fish, including diadromous species that are predominantly freshwater, occur in the coastal plain and include Arctic lamprey, Arctic grayling, round whitefish, broad whitefish, ninespine stickleback, and burbot (Clough and others 1987; Moulton and George 2000; BLM 2012).

The 3- to 4-month Arctic summer is a critical period for fish to find quality foraging habitats and food resources and reproduce. It may be safely assumed that any fresh waters deeper than 2-2.5

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meters (6-7 feet) deep, or alternatively below the maximum winter ice depth of the coastal plains environs may be suitable wintering habitat for fish (Bilello and Bates 1969, 1971, 1972, 1975 in Lyons and Trawicki 1994; Schmidt and others 1989; Moulton and George 2000). This type of habitat is considered restricted and a limiting factor to overwintering fish survival (Reynolds 1997). Large lakes are generally uncommon in the 1002 area of the coastal plain, and particularly those with overwintering capacity; do not freeze to the bottom during winter months, provide sufficient dissolved oxygen, and/or without salt water intrusion (Clough and others 1987).

Springs are important for spawning, rearing, and overwintering and these sites are generally more abundant and diverse than other waters for aquatic invertebrates as food resources (Glesne and Deschermeier 1984; Clough and others 1987).

The integrity of riparian areas is important for maintenance of water quality and fish populations on the coastal plain, more so at higher elevations where stream meandering during spring snowmelt or summer storm events is less prevalent than at lower elevations (Clough and others 1987).

Grayling are not as tolerant of brackish waters and occur more in riverine systems than char but are in large concentrations are only a few locations. Grayling make extensive migrations to and from spawning, rearing, foraging, and overwintering locations (West and Wiswar 1985; Mecklenburg and others 2002). Major Arctic grayling populations occur in the Canning, Tamayariak, Sadlerochit, Hulahula, Okpilak, and Aichilik Rivers. Arctic char (Dolley Varden) are primarily anadromous but rely on freshwater habitats for spawning, early rearing, and wintering. Therefore, char also migrate with primary movement corridors in the Canning, Aichilik and Hulahula Rivers. The Canning River has the largest char run and the Hulahula is the most important for subsistence purposes.

Smaller fish species which have little interest for sport or subsistence, are important food resources for birds, mammals and other fish.

Seventeen of the most commonly occurring fish species in the coastal plain are important subsistence resources (NRC 2003). Due to difficulty of access and seasonal restrictions, sport fishing may be considered minimal in the coastal plain (Clough and others 1987; BLM 2012). Arctic char is the most important subsistence freshwater fish species followed by Arctic grayling.

3.2.4 Bald and Golden Eagles

Bald eagles are considered a casual visitor on the coastal plain (Arctic Refuge CCP) but recent observations suggest that they may be more accurately considered a very rare possible breeder in the 1002 area of the coastal plain (T. Swem, pers. comm.). Golden eagles, on the other hand are fairly common visitors on the coastal plain, and rare breeders on the inland coastal plain (Arctic Refuge CCP). Across the entire Arctic Coastal Plain, overall golden eagle numbers in spring increased significantly between 1986 and 2012 at an annual rate of 7%; over the last decade of that period the increase was significant at an annual rate of 37% (Stehn et al. 2013). The mean

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annual index for golden eagles over the entire period was 118 birds, but in 2012, the index reached an all-time high of 522 (Stehn et al. 2013).

The 1002 area of the coastal plain is very important for non-breeding golden eagles, particularly subadults, which both scavenge and prey upon caribou during the calving and post-calving period of the Porcupine herd (Mauer 1985). Although none of the nest sites visited by Mauer (1985) and his colleagues were within the 1002 area of the coastal plain, subsequent observations have confirmed them as a breeding species there, including at nest sites within core calving areas (T. Swem, pers.comm.).

Within the refuge, golden eagles breeding north of the crest of the Brooks Range begin nesting very early in spring. Based on a three-year study (1988-1990), nest initiation dates in those golden eagles ranged from 23 March to 11 May, with annual mean nest initiation dates of 22 April, 14 April, and 5 April in 1988, 1989, and 1990, respectively (Young et al. 1995). Those dates would include the last third of the operations phase and the entirety of the demobilization phase of a recently-proposed winter seismic exploration project farther west on the North Slope (BLM CPAI-NPR- A Final Seismic Environmental Assessment, 2016). Elsewhere, disturbance and development correlated with reduction in golden eagle nest success (Kochert et al. 2002); winter seismic activity could have similar result.

3.2.5 Resident Birds

Four species of birds are considered permanent residents of the coastal plain: Willow Ptarmigan, Rock Ptarmigan, Gyrfalcon, and Common Raven (Arctic Refuge CCP). Gyrfalcons are an uncommon resident of the inland coastal plain (Arctic Refuge CCP); eyries are known in the 1002 area of the coastal plain (T. Swem, pers. comm.). Even in the middle of winter, gyrfalcons may be present on their nesting territories; in the coastal Northwest Territories of Canada (at latitudes comparable to, or greater than, those of the 1002 area of the coastal plain), gyrfalcons have been found on territory as early as February (Booms et al. 2008). Both species of ptarmigan are important components of the gyrfalcon diet, particularly in winter and early spring when other prey types are either absent or scarce (Watson et al. 2012). Nest initiation dates range from early April to early June and, aswith the Golden Eagle, early-nesting birds could be disturbed by winter seismic exploration during both the late operation and demobilization phases. Gyrfalcons are known to be disturbed by both fixed-wing aircraft and helicopter overflights; disturbed birds are less likely to use the same site in subsequent year (Booms et al. 2008).

3.2.6 Migratory Birds

In the northern foothills of the Brooks Range, Arctic coastal plain and adjacent marine waters, 158 species have been recorded, including 79 breeding species and 79 species that are migrants, visitors, or vagrants. Birds that use the Refuge have ranges that include all 50 U.S. states and six continents. Thirty-five species of waterfowl have been observed on the Refuge. The geese, except Canada geese, and tundra swans primarily breed on the coastal plain (Arctic CCP 2015).

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Red-throated loons have been identified as a species of Conservation Concern by the Service (2008a), Audubon Alaska (Stenhouse and Senner 2005) and the ADFG (2006). Its highest densities are found on the coastal plain and adjacent marine areas, but a few also breed in the Brooks Range and on the south side of the Refuge.

Twenty-six species of shorebirds breed on the Arctic Refuge, of which 22 breed on the coastal plain. Another species, the red knot, occurs as a migrant only. Of these 27 species, 21 are identified as species of Moderate or High Conservation Concern by the U.S. Shorebird Conservation Plan (Brown et al. 2001), Alaska Shorebird Conservation Plan (Alaska Shorebird Group 2008), the Service (2008a), and/or Audubon Alaska (Stenhouse and Senner 2005) because of small or declining populations.

3.2.7 Terrestrial Mammals other than Caribou

As established by ANILCA, the first purpose of the Arctic Refuge is to "conserve fish and wildlife populations and habitats in their natural diversity." Among the wildlife species specifically listed in ANILCA under this purpose are several species of large terrestrial mammals including caribou, Dall sheep, muskox, moose, brown bear, wolf, and wolverine. Caribou will be considered in the next section; Dall sheep do not occur on the coastal plain. Among the five species which do occur in that region, both muskox and moose have experienced marked population declines over the last few decades. After muskox were reintroduced to the North Slope in the Arctic Refuge in 1969 and 1970, the population grew steadily and rapidly from 1978 to 1985 and then remained relatively stable until nearly the end of the century. Beginning in 1998, however, numbers within the refuge dropped dramatically for the next half decade and have remained very low ever since. The overall muskox population in northeast Alaska and northwest Canada peaked in 1993, declined through 2006, and has remained relatively stable since then. Most of that decline was due to losses from the Arctic Refuge. Today, most of the muskox in the area are either west or east of the Arctic Refuge (Arctic Refuge CCP).

Moose populations in northeast Alaska, including the Arctic Refuge, increased rapidly in the third quarter of the 20th century. From 1989-1994, however, moose in this region declined by at least 50%, leading to harvest closures on state lands. By the early 21st century, moose populations west of the refuge had started to increase, and by 2015 there was some indication that moose were beginning to increase within the refuge.. However moose continue to occur at low density east of the Canning River on the coastal plain and in the northern foothills of the refuge. Because of concerns about the small population size, harvest restrictions have been implemented (Arctic Refuge CCP).

Of the two species, muskox may be more vulnerable to potential disturbance on the coastal plain. Female muskox don't breed until they are four or five years old, most only breed every other year (or less frequently), and produce just a single calf. They subsist on generally poor quality forage in the winter time, and to compensate, they conserve energy by reducing their winter activity. In addition, calves are born between mid-April and mid-May, 4-6 weeks before snowmelt and subsequent green-up produce nutritious forage. As a result, late winter is a time of

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high vulnerability, and if any muskox were in the vicinity of seismic exploration camps and activity, disturbance could dangerously impact their energy balance (Arctic Refuge CCP).

Grizzly bears, wolves, and wolverines all occur on the coastal plain, but are more common inland in the foothills and mountains of the Brooks Range. Among the three, bears may be the most vulnerable to disturbance. Throughout the Arctic, brown bears have low rates of reproduction. They exhibit a delayed age at first reproduction (nine years of age in the Arctic Refuge), mean litter size of two, high first-year mortality, and an interval between successful litters of greater than three years. In addition, they emerge from their dens from late March through May; females with cubs usually emerge later thanadult males (Arctic Refuge CCP). The den emergence period overlaps the late operation and entire demobilization phases of hypothetical winter seismic exploration. Human-bear conflicts would be possible at this time as recently-emerged and hungry bears are ranging widely in search of early spring food.

3.2.8 Caribou

Caribou are the most abundant large mammal in Arctic Refuge and are an important subsistence species for Iñupiat and Athabascan (Gwich'in) hunters. Caribou are also hunted and viewed by other visitors to the Refuge and are prey for brown bears and wolves.

Caribou have been present in northeastern Alaska and the northern Yukon since the early Pleistocene. Human use of caribou in the region may date back thousands of years. Remnants of caribou fences and corral structures used by the Gwich'in people are found throughout the current southern range of the Porcupine caribou herd (Warbelow et al. 1975).

Large caribou herds tend to migrate over long distances using seasonally available forage resources that are often widely distributed. Caribou move in response to changing weather conditions, biting and parasitic insect harassment, and predators. In arctic areas, caribou reproduction is highly synchronous and the majority of calving occurs in a two- to three-week period. Most adult females give birth to a single calf. Caribou calves are precocious, being able to stand and nurse within one hour after birth and follow their mothers within a few hours. The first 24 hours of life are critical, when a behavioral bond is formed between the calf and its mother. Disturbance of maternal groups on the calving grounds may interfere with bond formation and can increase calf mortality. After calving, small bands of cows with newborn calves gradually merge into larger groups and are joined by yearlings, barren females, and bulls arriving from wintering areas.

Summer weather conditions promote the emergence of mosquitoes, nose bots, warble flies, and other biting insects. Insect harassment drives caribou into densely packed groups. These post-calving aggregations often move toward the Arctic coast or to higher elevations in the mountains to find relief from insects.

By August, large aggregations gradually dissolve into widely dispersed small groups that move slowly toward winter ranges. Breeding takes place en route, and by mid-November, caribou arrive in areas where they will spend the winter.

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Four caribou herds live in northern Alaska. Two of these, the Porcupine and Central Arctic herds, consistently use Arctic Refuge seasonally or throughout the year. Caribou would be most susceptible to interaction and potential disturbance from winter exploration activities during their spring migration to calving grounds within the 1002 area of the coastal plain and for those that overwinter in that area, including members of the Teshekpuk Herd.

Porcupine Caribou Herd

An iconic symbol of Arctic Refuge, this herd migrates hundreds of miles from wintering grounds to give birth on the coastal plain and northern foothills of Arctic Refuge and nearby Yukon Territory in Canada. Residents of Arctic Village and, to a lesser extent, Kaktovik, hunt Porcupine caribou. Many visitors come to Arctic Refuge during early summer with hopes of seeing large numbers of caribou.

During the 1960s and 1970s, the Porcupine caribou herd was relatively stable at about 100,000 animals. Numbers steadily increased after 1978, peaked at 178,000 in 1989, and declined to 123,000 caribou in 2001 (Lenart 2007). Between 2002 and 2009, no estimates of abundance were available. During this period, caribou left the coastal plain and northern foothills of Arctic Refuge earlier and did not form large post-calving aggregations, or weather conditions precluded flights to photograph groups (E. Lenart, wildlife biologist, ADFG, pers. comm.). In 2010, 169,000 caribou were counted in a photocensus of the Porcupine caribou herd (Caikoski 2011). Between 2001 and 2013 the herd increased to levels not seen since monitoring began in 1977, with an estimated population of 197,000 (ADFG 2017b).

The Porcupine caribou herd ranges over 130,000 square mi (337,000 square km) of wild lands in northeastern Alaska and northwestern Canada (Lenart 2007). The entire Arctic Refuge coastal plain is key calving and post-calving habitat for Porcupine caribou (Griffith et al. 2002). Foothills and mountains of Arctic Refuge are also important summer, fall, and winter habitats, as well as spring and fall migration routes. As the summer progresses and willows (Salix sp.) emerge, caribou also use riparian habitats. The Porcupine caribou herd generally overwinters south of the Brooks Range in Arctic Refuge and in the Richardson and Ogilvie mountains of the Yukon Territory, Canada. Winter distribution varies by year but is primarily south of the Brooks Range (Caikoski 2011).

Spring migration to calving grounds begins in mid-April and continues through May. Pregnant caribou move northward from wintering areas toward calving grounds, where they give birth during the first week in June. Timing and routes of migration vary annually depending on where they overwintered, snow conditions, and timing of the onset of spring weather. Caribou wintering in Alaska often follow a northeasterly route to calving grounds, crossing the southern flanks and valleys of the Brooks Range, and eventually entering Canada near the Firth River. Caribou wintering in Canada also converge in this region. Some caribou wintering in Alaska move in a more northerly direction, crossing the eastern Brooks Range and traveling more directly toward calving grounds. As snowmelt progresses, caribou in the foothills spread northwestward along a broad front, primarily following the major river corridors and associated terraces where snow melt has advanced.

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For the past few decades, the Porcupine caribou herd has calved in a region encompassed the Arctic foothills and the coastal plain from the Canning River in Arctic Refuge to the Babbage River in Canada, an area of nearly 8.9 million ac (3.6 million ha) (Griffith et al. 2002). During the calving season in early June, Porcupine caribou selected areas of wet sedge, herbaceous tussock tundra and riparian vegetation types (Griffith et al. 2002). Emerging tussock cotton grass (*Eriophorum vaginatum*) flowers were an important source of high quality forage in areas used by calving caribou (Jorgenson et al. 2002). This plant species had greater biomass and forage quality in tussock tundra compared with other vegetation types. The distribution of tussock tundra and moist sedge-willow tundra was greater in calving areas in the Arctic Refuge 1002 area of the coastal plain than in areas further south and east (Jorgenson et al. 2002).

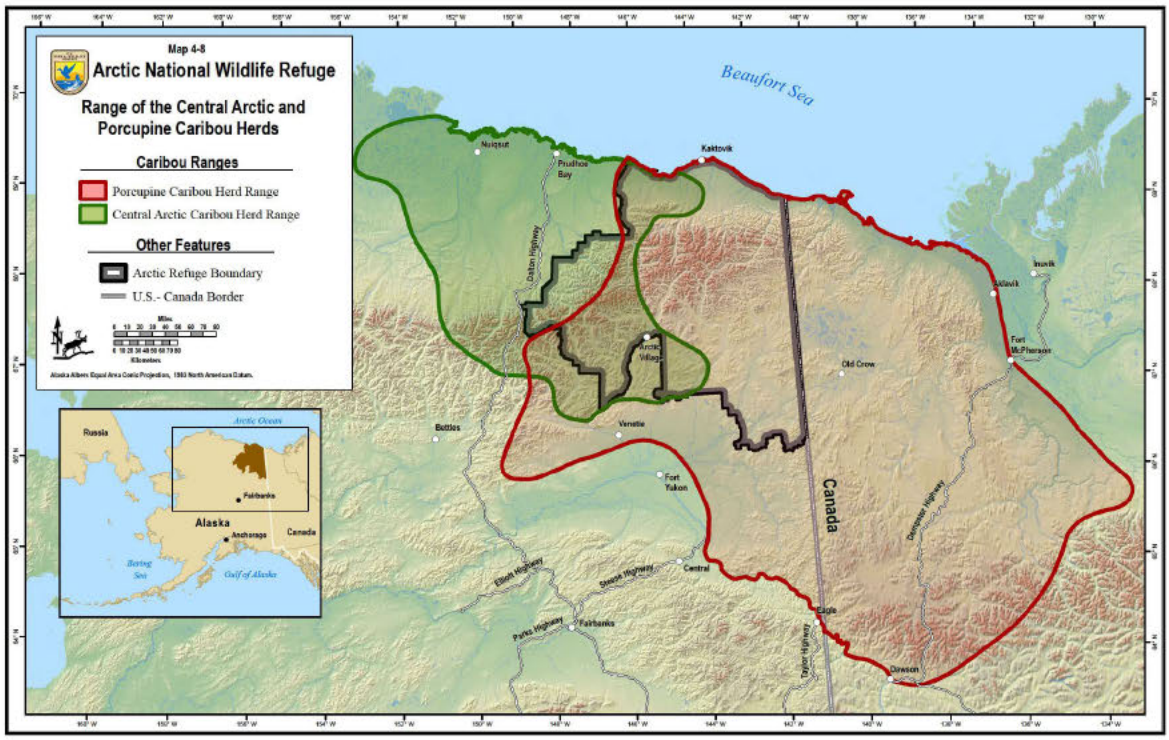
Central Arctic Caribou Herd

The annual range of the Central Arctic caribou herd overlaps that of the Porcupine caribou herd. Two main calving concentration areas have been identified for the Central Arctic caribou herd: a western area between the Kuparuk and Colville rivers, and an eastern area between the Sagavanirktok and Canning rivers. The eastern area includes the Canning River delta region in northwest Arctic Refuge.

During most winters, scattered groups of animals range throughout the coastal plain west of the Katakturuk River and adjacent uplands to the south. Between 2002 and 2009, the winter distribution of the Central Arctic caribou was north and south of the Brooks Range in Arctic Refuge. In some years, they mixed with Porcupine caribou wintering in the same region. In 2010, almost all Central Arctic caribou wintered on the south side of the Brooks Range in Alaska, as did Porcupine caribou.

This herd had about 5,000 caribou in the mid-1970s when it was first identified as a distinct herd (Cameron and Whitten 1979). By the early 1980s, it had grown to almost 13,000 and by the late 1990s, when net calf production was greater than 70 percent calves per female, it increased to over 25000 (Cameron et al. 2002). A photo census in 2010 counted more than 70000 caribou in the Central Arctic herd, but a late spring in 2013 resulted in high mortality and the population dropped to 50,000 animals (ADFG 2017a). A 2016 estimate showed further dramatic declines, and the population estimate decreased an additional 50% and is at less than 23,000 caribou. The declines are attributed to both high adult female mortality and mixing of the Central, Teshekpuk and Porcupine herds.

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3.2.9 Polar Bear

Of the two polar bear subpopulations (or stocks) found in the United States, polar bears in the Southern Beaufort Sea (SBS) subpopulation are the most likely to occur in the 1002 area of the coastal plain. The subpopulation is shared by the U.S. and Canada and is listed as Threatened under the Endangered Species Act. Critical habitat was established in 2010. The boundary of the SBS subpopulation, as recognized by the Polar Bear Specialists Group, is Icy Cape, Alaska to the west and south of Banks Island and east of the Baillie Islands, Canada to the east (Obbard et al. 2010). The SBS subpopulation had an estimated population size of approximately 900 bears in 2010 (Bromaghin et al. 2015). This estimate represents a significant reduction from previous estimates of approximately 1,800 in 1986 (Amstrup et al. 1986), and 1,526 in 2006 (Regehr et al. 2006). Although there was some evidence in the 2010 estimate that the population might be showing signs of the subpopulation beginning to increase (Bromaghin et al. 2015). Analyses of over 20 years of data on the size and body condition of bears in this subpopulation demonstrated declines for most sex and age classes (Rode et al. 2010, 2014).

Population declines and the size and body condition of bears in the SBS subpopulation have been linked to declining sea ice conditions in the Beaufort Sea (Regehr et al. 2006; Rode et al. 2010, 2014, in press; Bromaghin et al. 2015). Declining sea ice conditions in the Beaufort Sea have also led to an increase in the proportion of the subpopulation coming onshore in summer and autumn (from 5.8% during 1986-1999 to 20% during 2000-2014) and a 30 day increase in time

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spent on land (Atwood et al. 2016). While on land, polar bears typically do not feed (Rode et al. 2015), although bears in the SBS subpopulation are drawn to bowhead whale remains from subsistence harvest, particularly adjacent to the community of Kaktovik, Alaska (Wilson et al. 2017). These whale remains may be helping offset lost hunting opportunities for bears in the SBS subpopulation due to sea ice loss (Herreman and Peacock 2013, Atwood et al. 2016).

In addition to a higher proportion of the SBS subpopulation occurring on shore during summer and autumn, there is also an increasing trend towards more bears denning on land (Olson et al. 2017). Denning substrate (i.e., sea ice or mainland) is significantly related to where bears occur in autumn. Pregnant polar bears in the SBS subpopulation that spent >25 days on land in autumn all subsequently denned on land (Olson et al. 2017). Between 1985-2013 the percent of bears denning on land in the SBS subpopulation increased from 34 to 55% and is linked to sea ice declines. Designated Critical Denning Habitat overlaps with 77% of the 1002 area of the coastal plain (U.S. Fish and Wildlife Service 2010). There is also 38% more denning habitat available in the coastal plain of the Arctic Refuge than in the region immediately west of the refuge (Durner et al. 2006). Polar bears have been shown to den in the 1002 area of the coastal plain with greater frequency than expected based on available habitat (Amstrup 1993). Based on known den locations from 2000-2010, 22% of dens for bears in the SBS subpopulation occurred within the 1002 area of the coastal plain (Durner et al. 2010). Thus, the 1002 area of the coastal plain has been documented to be an important area for denning by polar bears and will likely increase in importance as the percent of bears denning on land increases with sea ice loss (Olson et al. 2017).

The mean dates of den entrance and emergence for polar bears that den on land in the SBS subpopulation is 11 November and 3 March, respectively (Rode et al. in review). Females observed with cubs in spring emerged 15 days later than females observed without cubs (Rode et al. in review). Land-based denning also appears to be important for polar bears, as bears that den on land have significantly higher reproductive success (Rode et al. in review).

3.2.10 Bowhead Whale

The bowhead whale is classified as endangered under the ESA and as depleted under the Marine Mammal Protection Act. It was listed in 1970, but no critical habitat has been designated. A detailed discussion of the bowhead whale migration and population history is included in the BLM Integrated Action Plan/EIS (2012). The Bering-Chukchi-Beaufort Seas stock of whale is important to the Inupiat peoples of the northern arctic for subsistence. If barging of materials to Kaktovik, Alaska, is required to support exploration of the eastern 1002 area, this population may be affected.

The size of the Bering-Chukchi-Beaufort Seas stock was estimated at 10,400 to 23,000 animals in 1848, before commercial whaling decreased the stock to between 1,000 and 3,000 animals by 1914 (Woodby and Botkin 1993). This stock has slowly increased since 1921 when commercial whaling ended, and in 2001 estimates indicated a population size of about 10,500 whales (George et al. 2004, Zeh and Punt 2005). Separate analyses suggest the mean annual rate of increase from 1978 to 2001 to be between 3.4 and 3.5 percent (George et al. 2004, Brandon and Wade 2004).

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Bowhead whales migrate through the Beaufort Sea while traveling between wintering areas in the Bering Sea and summer feeding grounds in the Canadian Beaufort Sea, although some animals may remain in areas offshore in the Beaufort and Chukchi seas throughout the summer. The spring migration typically begins in the Bering Sea in mid-March to early April, depending on ice conditions. During the spring migration, bowhead whales follow somewhat predictable leads that form along the coast of western Alaska to Point Barrow. From Point Barrow eastward to Amundsen Gulf, the leads and the migration occur farther from shore based largely on satellite telemetry tracks (Alaska Department of Fish and Game, unpublished data19). From April to June, most bowhead whales are distributed along a migration corridor that extends from their Bering Sea wintering grounds to their feeding grounds in the eastern Beaufort Sea (Moore and Reeves 1993). Some bowhead whales migrate westward to feeding grounds in the western Chukchi Sea (Bogoslovskaya et al. 1982, Mel'nikov et al. 1997, Alaska Department of Fish and Game satellite telemetry data). Bowhead whales arrive on their primary summer feeding grounds in the eastern Beaufort Sea from mid-May through June and remain in the Canadian Beaufort Sea and Amundsen Gulf until late August or early September. Some whales may occur regularly in the western Beaufort Sea, particularly near Barrow Canyon, and in the Chukchi Sea along the northwestern Alaskan coast in late summer. These animals may be summer residents but may also be "early autumn" migrants. However, it should be noted that recent telemetry data has suggested that bowhead movements are far more labile within their range than formerly thought (Quakenbush et al. 2010) and 'reverse' migratory behavior has been documented.

Bowhead whales that have summered in the eastern (Canadian) Beaufort Sea begin the fall migration in late August to September and are usually out of the Beaufort Sea by late October (Treacy 1988–1997, 2000, 2002a, 2000b; Moore and Reeves 1993). The fall migration route extends from the eastern Beaufort Sea, along the continental shelf across the Chukchi Sea, and down the coast of the Chukotka Peninsula (Moore and Reeves 1993, Quakenbush et al. 2010b) The extent of ice cover may influence the route, timing, or duration of the fall migration. Moore et al. (2000) noted that bowheads in the U.S. Beaufort Sea tended to be distributed closer to shore during their westward migration in light ice years. Miller et al. (1996) also observed that whales moving from 147° to 150° West longitude in the central Beaufort Sea, migrated closer to shore in light and moderate ice years (median distance offshore 18 to 25 miles), and farther offshore in heavy ice years (median distance offshore 35 to 45 miles).

3.2.11 Ringed & Bearded Seals

Ringed seals (Phoca hispida) are the smallest and most abundant of the Arctic ice seals (seals that use ice to carry out important life history traits) (Smith and Hammill 1981, Kingsley 1986). Ringed seals have a circumpolar distribution, occurring in all areas of the Arctic Ocean north of approximately 35° north latitude (Kelly et al. 2010, King 1983).
A detailed discussion of the ringed seal population and life history is included in the BLM Integrated Action Plan/EIS (2012).

Bearded seals (Erignathus barbatus nauticaus) are a pagophilic (ice-associated) seal present in the Chukchi and Beaufort seas year round. They are generally considered to inhabit areas of

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shallow water (less than 200 meters) that are at least seasonally ice covered (Burns 1970, Kelly 1988b, Cameron et al. 2010). A detailed discussion of the bearded seal population and life history is included in the BLM Integrated Action Plan/EIS (2012).

3.3 Social Environment

3.3.1 Cultural Resources & Historic Background

The Arctic Refuge CCP (2015) describes in detail the known cultural and historic context of the Refuge. When considering development within the Refuge's coastal plain, it is important to note that cultural resources on the North Slope and coastal plain are on or near the surface of the tundra and tend to be oriented along river corridors and coastal beaches. This means that many cultural resource sites on the Refuge are vulnerable to erosion and other natural forces, and to a lesser extent, from public use of Refuge lands and waters. Human use has occurred in the area for more than 10,000 years (Reanier 2003).

Communities surrounding the Arctic coastal plain or that rely on resources, such as caribou, from the coastal plain include Arctic Village, Chalkyitsik, Coldfoot, Deadhorse, Fort Yukon, Kaktovik, Prudhoe Bay,Venetie, and Wiseman. Details of the histories of all communities, except Deadhorse and Prudhoe Bay, are included in the Arctic Refuge CCP (2015). Deadhorse and Prudhoe Bay were not included in the CCP because their residents do not generally use Refuge wildlife resources. These communities are fundamentally support infrastructure for the operational oil fields.

Prudhoe Bay and Deadhorse
Prudhoe Bay was named in 1828 for Baron Prudhoe by British explorer Sir John Franklin. In the 1970s the site was extensively developed to support oil drilling operations. The 800-mile Trans Alaska Pipeline, constructed to transport crude oil from Prudhoe Bay to Valdez, has its northern terminus here. At Valdez oil is loaded into marine tankers for shipment throughout the U.S. Prudhoe Bay is also the unofficial northern terminus of the Pan-American Highway. Deadhorse is a small community which is absorbed into Prudhoe Bay for statistical purposes.

Culture
Prudhoe Bay is a large work camp for the oil industry. All residents are employees of oil-drilling or oil-production and support companies and work long consecutive shifts. Living quarters and food are provided to the workforce, and there are a number of recreational facilities. There are no permanent residents of Prudhoe Bay.

3.3.2 Socioeconomic

Although the communities of Arctic Village, Chalkyitsik, Coldfoot, Fort Yukon, Kaktovik, Venetie, Wiseman, and Prudhoe Bay surround the Refuge, generally only economies of Kaktovik, Coldfoot, Wiseman, and Prudhoe Bay would be directly affected by oil and gas exploration as they are located either in locations where infrastructure could be staged or along

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the Haul Road, the only developed land route into the area. All of the communities would be indirectly affected if caribou, a valuable subsistence resource, was affected due to their proximity to and use of the Porcupine caribou herd.

Table 3 - 2: Demographic Characteristics of the Communities Near Arctic Refuge

Demographic Characteristics	Arctic Village	Chalkyitsik	Cold-foot	Fort Yukon	Kaktovik	Venetie	Wiseman	Prudhoe Bay
Overall 2010 Census Population	152	69	10	583	239	166	14	2174
American Indian and Alaska Native	135	59	1	45	212	152	0	163
White	7	10	9	520	24	3	13	1804
Two or more races	10	0	0	10	3	10	1	41
Other races	0	0	0	8	0	1	0	166
Median age	29	27.5	43	33.7	30.5	30.5	28.5	50
Median household income	$27,250 +/- $9,667	$38,750 +/- $16,617	Not Available	$33,194 +/- $7,432	$58,125 +/- $33,478	$28,333 +/- $21,379	Not Available	94,906 +/- 11,207
Employment in 2016								
Employed (#)	87	48	11	266	125	103	5	1978

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Employed in the Private Sector (#)	14	6	9	113	41	23	5	1978
Employed in local and/or state government (#)	73	42	2	153	84	80	0	0
Employed in all 4 Quarters (#)	31	27	9	138	93	40	0	1891

3.3.3 Environmental Justice

Some of the communities potentially affected by the Proposed Action are predominantly Alaska Native, with lower incomes than Alaska and U.S. averages. As a result of these socioeconomic characteristics, the analysis of environmental consequences of the Proposed Action and Alternatives in Chapter 4 will determine whether there are disproportionate adverse impacts on these communities as a result of the proposed project.

3.3.4 Subsistence

Section 803 of ANILCA defines subsistence uses as: The customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of inedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter or sharing for personal or family consumption; and for customary trade (16 U.S.C. § 3113).

One of the purposes of the Arctic Refuge is to provide the opportunity for continued subsistence uses by local residents in a manner consistent with the purposes of conserving fish and wildlife populations and habitats and fulfilling international treaty obligations with respect to fish and wildlife (USFWS 2015). With the exception of Prudhoe Bay, each of the affected communities within the proposed project area is characterized by active participation in subsistence fishing, hunting, and trapping on federal, state, and Native corporation lands.

Subsistence Harvest Practices In or Near the Refuge

According to the Arctic Refuge CCP (2015) Arctic Village, Chalkyitsik, Fort Yukon, Kaktovik, Venetie, and Wiseman use the Refuge for subsistence purposes. Due to their close proximity Arctic Village, a Gwich'in community, and Kaktovik, a Inupiat community, use the Refuge most frequently. The subsistence way of life encompasses much more than just a way of obtaining food or natural materials. It involves traditions that are important mechanisms for maintaining cultural values, family traditions, kinships, and passing on those values to younger generations. It is considered a way of life, rather than just an activity. (Alaska Federation of Natives 2010).

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Not only are subsistence opportunities critical to the cultural identities of these communities, the resources gained provide needed sustenance for residents. There are very few year-round employment opportunities and food costs are high due to the cost of air transportation.

Although both Arctic Village and Kaktovik rely heavily on the Refuge for subsistence resources, the resources used are significantly different. Subsistence harvest in Arctic Village was 10,000 to 21,000 pounds with moose and caribou constituting 90 percent of the harvest in each year, according to the State of Alaska's Community Subsistence Information System (1993-1997) and data collected by the Council of Athabascan Tribal Governments in 2001 and 2002. The harvested caribou from these surveys come primarily from the migrating Porcupine caribou herd. Because of this, the Gwich'in people consider the Porcupine caribou herd's calving grounds on the coastal plain as sacred ground, a birthing place for thousands of caribou each year (Gwich'in National 1988).

Kaktovik is an Inupiat community located on Barter Island on the shore of the Beaufort Sea. The Kaktovikmiut's way of life continues to be heavily dependent on subsistence harvest of marine and terrestrial animals and fish. Caribou hunting occurs throughout most of the year, while bowhead whaling occurs from late August to early October. When the community harvests a whale, marine resources composed 59 to 68 percent of their total subsistence harvest (Minerals Management Service 2003). In addition to whales, Kaktovik residents also harvest a considerable number of Dall's sheep and caribou, contributing 17 to 30 percent of the annual harvest by weight.

3.3.5 Land Use

There are currently no permanent developments in the coastal plain. The area is used by recreationists and local residents for fishing, wildlife viewing, hunting, hiking, bird-watching, and photography. The coastal plain is currently managed as a minimal management area. Minimal management is designed to maintain Refuge environments with minimal or no evidence of human modifications or changes. Public uses, economic activities or uses, and facilities are managed to minimize disturbances to habitats and resources. Ground-disturbing activities are avoided whenever possible.

3.3.6 Recreation

The coastal plain is located on lands within ADF&G Game Management Unit (GMU) 26C. ADF&G regulates the seasons, licenses, and bag limits (ADF&G 2015h). Access to prime hunting areas is typically by chartered aircraft, boat, or foot. Two guide use areas could be affected by exploration activities. Nonresident brown bear and Dall sheep hunters must be accompanied in the field by a big game guide authorized to operate in the area (USFWS 2014a).

There are two registration brown bear hunting seasons in GMU 26C. They are held from January 1 to May 31 and August 25 to May 31. In 2016, of the 27 permits issued 12 people reported going hunting (ADF&G website 2017). Caribou hunting is also popular and the hunt is open year round. No permit statistics were available to quantify caribou hunting pressure.

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3.3.7 Noise

Sound is defined as a particular auditory effect produced by a given source, for example the sound of rain on the roof, and is measured in decibels (dB). A-weighted sound level measurements (dBA) are a measure of how the human ear hears sound and is used to characterize sound levels. Table 3-4 shows dBA levels for sounds associated with the area and equipment being proposed for use in the action alternatives.

Table 3 - 4: dBA Levels

Source of Noise	dBA Level
Ambient sound without human influence	20 – 30 dBA
Ground wind 5-10 miles per hour	35 – 45 dBA
Ground wind 20 – 30 miles per hour	55 – 65 dBA
Single engine plane fly over at 1,000 ft	88 dBA
Cessna 206	79 dBA
Bell Huey 204	88 dBA
R-66	82 dBA
Propane generator at 500 ft away	30-35 dBA
(Bolin 2006, Illingworth and Rodkin 2006, Schulten 1997, ICAO Annex 2006, US Coast Guard 2010)	

Currently there is no source of non-ambient noise on the coastal plain, aside from ground wind and the occasional aircraft, high overhead. Generally, noise levels on the Refuge are expected to be between 20 and 30 dBA in calm winds and up to 40 to 50 dBA in moderate to strong winds.

3.3.8 Visual

Visual resources are often described in relation to landscape character or the overall impression created by an area's unique combination of features, such as land, vegetation, water, and existing structures (cultural modification). Viewsheds are the geographical areas that are visible from given locations. They include all surrounding points that are in line-of-sight with a given location and exclude points that are beyond the horizon or obstructed by terrain and other features.

The landscape character of the coastal plain is of a landscape that is relatively flat, yet interspersed with low ridges and depressions. Tall, linear lined objects would be an unusual characteristic. Viewsheds on the coastal plain are virtually free from indications of human activities except where subsistence structures are located.

3.3.9 Wilderness Values

The Arctic Refuge, including the coastal plain, was initially proposed as "The Last Great Wilderness" and wilderness values were highly prominent in its initial establishment as the Arctic National Wildlife Range. The Refuge's 2015 CCP recommended the 1002 area for Wilderness designation because it exemplifies the wilderness qualities of natural condition, natural quiet, scenery, wild character, and ecological wholeness. The area's diverse wildlife

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species are particularly valued because they exist in a wilderness context, with their natural behaviors, interactions, movements, and cycles continuing.

The area offers exceptional opportunities for wilderness oriented recreation—adventure, exploration, solitude, and emersion in the natural world. As well, the area holds high symbolic and existence value for millions of people who don't visit, but find satisfaction, inspiration, even hope in just knowing it exists.

4 Environmental Consequences

NEPA requires the disclosure of environmental impacts associated with the alternatives including the No Action Alternative. This chapter presents the anticipated environmental impacts of Alternative 1 (No Action) and Alternative 3 (Outer Route). These analyses provide the basis for comparing the effects of the alternatives on the Affected Environment. NEPA requires consideration of context, intensity, and duration of direct impacts, indirect impacts, cumulative impacts, and measures to mitigate for impacts.

The direct, indirect, and cumulative impacts are described for each issue (impact topic) and where applicable, by project phase (construction and operation). The impacts for each issue are based on the intensity (magnitude), duration, and context (extent) of the impact. Summary impact levels (negligible, minor, moderate, or major) are given for each issue. Definitions are provided below.

4.1 Definitions of Terms

Direct Effects – Direct effects are impacts that are caused by the alternatives at the same time and in the same place as the action.

Indirect Effects – Indirect effects are impacts caused by the alternatives that occur later in time or farther in distance than the action.

Long-term Effects – Long-term effects are impacts that would occur throughout the life of the project.

Short-term Effects- Short-term effects are impacts that would occur during only the construction phase of this project.

Cumulative Effects – The Council on Environmental Quality (CEQ) defines cumulative effects as impacts on the environment which result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant actions taking place over a period of time (40 CFR 1508.7). Informed decision making is served by consideration of cumulative effects resulting from projects that are proposed, under construction, recently completed, or anticipated to be implemented in the reasonably foreseeable future.

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CEQ guidance in considering cumulative effects states that the first steps in assessing cumulative effects involve defining the scope of the other actions and their interrelationship with a proposed action. The scope must consider other projects whose effects coincide with the location and timetable of a proposed action and other actions. Cumulative effects analyses must also evaluate the nature of interactions among these actions (CEQ 1997). The cumulative effects assessment is based on available information at the time of development of this EA.

To identify cumulative effects, the analysis needs to address two fundamental questions.

1. Does a relationship exist such that affected resource areas of the Proposed Action or alternatives might interact with the affected resource areas of past, present, or reasonably foreseeable future actions?
2. If such a relationship exists, then does an EA reveal any potentially significant effects not identified when the Proposed Action is considered alone?

Mitigation - Mitigation includes special procedures and minimization measures that are implemented to avoid, reduce, or compensate for effects caused by an action. Some mitigation measures are already incorporated into the Proposed Action to avoid and reduce the potential for adverse effects. Other mitigation measures could be characterized as Best Management Practices that further reduce or compensate for adverse effects.

4.2 SIGNIFICANCE CRITERIA

Summaries of the effects on the resources synthesize information about context, intensity, and duration, which are weighed against each other to produce a final assessment. While each summary reflects a determination using best professional judgment regarding the relative importance of the various factors involved, Table 4-1 provides a general guide for how summaries are reached.

Table 4 - 1: Descriptions of Final Assessment Categories

Assessment	Description
Beneficial	Resource improvements would occur and would have a perceptible change to the resource.
Adverse: Negligible	Impacts are generally extremely low in intensity (often they cannot be measured or observed), are temporary, and do not affect unique resources.
Adverse: Minor	Impacts tend to be low intensity or of short duration, although common resources may have more intense, longer-term impacts.
Adverse: Moderate	Impacts can be of any intensity or duration, although common resources are affected by higher intensity, longer impacts while unique resources are affected by medium or low intensity, shorter-duration impacts.
Adverse: Significant	Impacts that in their context and due to their intensity (severity) have the potential to meet the thresholds for significance set forth in CEQ regulations and therefore, warrant heightened attention and examination for potential mitigation in order to fulfill the policies set forth in NEPA.

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4.4 ALTERNATIVE 1 – NO ACTION

Direct and Indirect Effects: Implementation of the No Action Alternative would result in no direct or indirect impacts to any of the considered resources. There would be no new exploration activities allowed on the coastal plain; and therefore no effects due to this project would occur.

Cumulative Effects: No direct or indirect effects to the existing condition of the resources considered would occur under the No Action Alternative; therefore, no cumulative effects would occur on the resources.

4.5 ALTERNATIVE 2 – PHYSICAL ENVIRONMENT

4.5.1 Soils

Additional literature is needed in order to understand the environmental consequences of the proposed action on soils.

4.5.2 Hydrology

It is difficult to fully describe potential environmental consequences when the scope and nature of activities has not been fully outlined. This section is developed to address very general potential activities limited to seismic exploration of unknown scope and attendant infrastructure to accomplish this including development of ice roads. It is clear that because unfrozen water is limited in winter on the Arctic coastal plain, negative effects of water withdrawals on overwintering fish populations, benthic invertebrates, and birds and mammals that feed on those organisms seem likely (West et al. 1992). Water withdrawal and its direct influence on reducing available habitat (wetted space) probably impacts fish populations more than any other winter alteration (Cunjak 1996). Since the distribution of adult and juvenile fish is extremely restricted during the long arctic winter when most of a drainage is frozen solid (Craig and Poulin 1975), water removal , leading to reduced groundwater flow or altering baseflow, ice and temperature regimes has the potential to affect all life stages of some populations. Seismic activity could potentially reduce fish populations, divert fish from their normal locations, or adversely affect fish populations and habitat. Exploration activities bring the potential for fuel spills or other releases of contaminants that could affect water quality.

Seismic Exploration and Thermokarst Activity

Seismic exploration can cause thermokarst, especially when snow is insufficient to protect soil and vegetation (WesternGeco 2003). Removal or damage of the organic mat exposes soils to erosion by wind and water, which could deposit sediment into water bodies resulting in higher turbidity and concentrations of suspended sediment. To cause high turbidity, the peat mat must be sufficiently eroded to expose underlying mineral soils, and the mineral soils must be fine grained (BLM 2012).

Effects of seismic exploration on water resources and aquatic habitats

Seismic surveys can be conducted using dynamite (or other explosives), air guns, or Vibroseis to generate acoustical energy pulses necessary to locate subsurface geological formations that

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might contain oil or gas (BLM 2012). Research has demonstrated that high-intensity acoustic energy can lead to damaged auditory sensory hair cells in fish, effectively reducing the ability to hear (McCauley et al. 2003; Popper 2003; Smith et al. 2004; Popper et al. 2005). The extent of damage and the ability to regenerate these cells is dependent on the intensity and duration of noise and the species of fish. Underwater shock waves can also cause injury to the swim bladder and other organs and tissue (Wright 1982), which could result in a sub-lethal or lethal effects. Fleeing behavior is also a well-documented response by fish to anthropogenic sounds (Popper 2003; Popper et al. 2004). Because of a lack of information regarding the impacts on fish from Vibroseis specifically, winter field tests on the North Slope were conducted in 2000, to measure the sound pressure levels in water that were generated by Vibroseis rigs operating on the ice overhead (Greene 2000; Nyland 2002). The results indicated that these sound pressures were great enough 10 meters from the source to cause avoidance behavior, but no measurements were made directly below the Vibroseis equipment. Fish fleeing behavior was the most obvious effect of Vibroseis during the 2003 Alaska Department of Natural Resources/BLM study (Morris and Winters 2005). Because exploration using Vibroseis occurs in the winter when physiological stress is the greatest for most fish species, a flight response could potentially be detrimental. (BLM 2012)

Use of Explosives

Use of explosives is a major disturbance to fish and wildlife. These are particularly stressful to fish that are captive in overwintering habitats and would likely have a negative impact on terrestrial and aquatic animals that congregate near spring-fed oases during winter as well as presenting potential contamination issues.

Effects of Water Withdrawal from Lakes

In other areas of the North Slope the primary source of water during the winter months for exploration activities is unfrozen water that lies beneath the ice cover of both shallow and deep lakes. This water is somewhat saline because of the exclusion of ions during the freezing of the upper part of the lake. Water from lakes may be used for ice roads, pads and airstrips, and potable water for field crews. Typically the volume of water taken from an individual lake depends on the depth of the lake, volume of unfrozen water in the lake, and the presence and type of fish documented (BLM 2012).

Water withdrawal affects the available habitat for fish species if they are present, macroinvertebrates and can otherwise impact aquatic habitat by further altering water quality and reducing the water available when breakup occurs potentially affecting spring recharge and lake levels.

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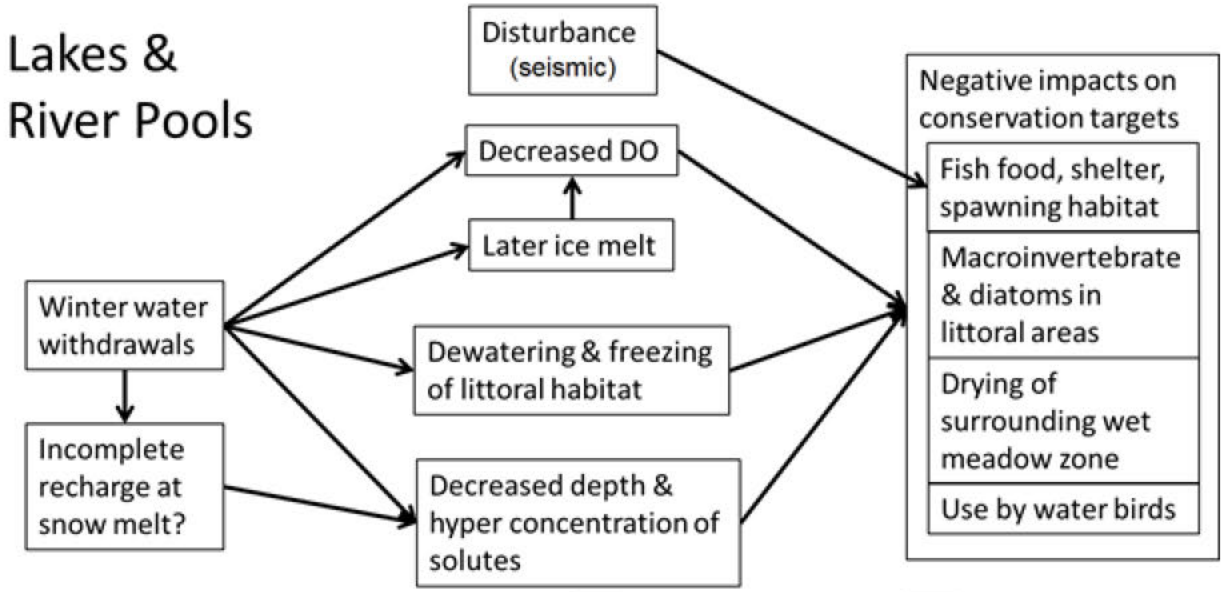


Figure X. Potential impacts of seismic exploration on lakes and rivers

Removal or compaction of snow can increase the depth of freezing on lakes, sometimes by one foot or more. As a result, the water quantity available in a lake during the winter months can be greatly reduced, and the salinity of the water beneath the ice can be increased further. Maintaining the natural hydrologic regime may not be possible under various pumping scenarios. To reduce impacts to the natural hydrologic regime, regulations typically prohibit snow compaction on fish-bearing lakes, but snow compaction is unavoidable when ice aggregates are removed from lakes (BLM 2012).

There are no studies assessing the effects of permitted withdrawals on lake water chemistry on the North Slope of Alaska. Hinzman et al. (2006) conducted a study to assess the effects of what turned out to be relatively small water withdrawals on water chemistry and lake-recharge. This work was funded by the Department of Energy and oil field companies, and did not undergo a standard peer-review process, yet it is widely cited by the BLM and DOE. Unfortunately, only a small fraction of the permitted withdrawal volume was actually pumped from the study lakes, the study design had almost no ability to detect change, and the researchers were unable to get their dissolved oxygen sensors functioning to conduct any relevant measurements in pumped lakes. Thus, we have no information on potential impacts of heavy pumping that is currently allowed by water withdrawal permits on the North Slope of Alaska. Despite the low ability to detect change, Hinzman et al. (2006) did find that one of four pumped lakes did not fully recharge at snow melt. This suggests that water withdrawals far less than permitted volumes can have significant impacts on lake hydrology and the availability of wetted habitat. Canadian studies on ice-covered lakes have found that water withdrawals have a substantial and wide range of negative impacts on aquatic ecosystems (Cott et al. 2008). These include reduction of habitat for fish, waterfowl, and furbearers; reduction in oxygen available to overwintering fish; and dewatering and freezing of littoral habitats which kills plants, invertebrates, and fish eggs. Isolated lakes may be particularly vulnerable as they may not recharge at snowmelt. Organisms

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in small isolated lakes are particularly sensitive to water withdrawals. The effects of water withdrawals on wet meadow zones surrounding lakes are unknown, but would likely be great if lakes are not fully recharged at snowmelt. This would result in a reduction in habitat for waterfowl and shorebirds that use these lakes during the summer.

Effects during exploration on water chemistry from water withdrawals could be short term if lakes are fully recharged during spring. Impacts to overwintering fish and littoral zone communities will likely be more substantial and longer-term, especially in isolated lakes.

Effects of Ice Roads, Ice Pads and Ice Bridges

Ice roads and ice pads are used extensively during the winter season for access and for seismic exploration. Ice roads require about 1 million to 1.5 million gallons of water per linear mile and generally can be built at a rate of about 1.5 inches of thickness per day (BLM 1998). Ice pads can require up to 5 million gallons of water to build and range in size from 3 to 10 acres. Floating ice bridges may be necessary to cross large rivers and must be of sufficient thickness to handle heavy truck traffic. Smaller rivers require ice bridges, which are often constructed of aggregate chips and water and placed on grounded ice. Ice roads and bridges can cause additional freeze-down, reducing the already limited overwinter water volume available for fish habitat and affecting water quality. During snow melt ice bridges can create ice dam flooding if not removed properly.

4.6 ALTERNATIVE 2 - BIOLOGICAL ENVIRONMENT

4.6.1 Vegetation

The level of impact on vegetation is based on (1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource, (2) the proportion of the resource that would be affected relative to its occurrence in the region, (3) the sensitivity of the resource to the proposed activities, and (4) the duration of ecological ramifications. A habitat perspective is used to provide a framework for analysis of general classes of impacts. Impacts to vegetation could include removal of vegetation; loss of available habitat; the introduction of new nonnative, invasive species; dispersal of existing nonnative, invasive species; changes in phenology (i.e., delayed greenup) due to delayed spring melting of ice roads and ice pads; compression or destruction of vegetation if winter travel occurs in areas with insufficient snow cover; changes in moisture and/or nutrient availability due to erosion, soil compaction, melting permafrost, or topographic modifications; or adverse impacts from pollutants that are released from construction operations.

Direct and Indirect Effects: Negligible to Significant

Cumulative Effects: Negligible to Significant

4.6.2 Wetlands

Additional literature is needed in order to understand the environmental consequences of the proposed action on wetlands.

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4.6.3 Fisheries

Direct impacts would include mortality to fish or alterations to habitat by geophysical exploration that make these unacceptable or suboptimal for life history requirements and/or long-term survival, including contaminant spills, failure of sewage or waste-water disposal, blasting, channelization, culverts or barriers to movement, increased turbidity from construction, toxic effects of drilling muds or depletion of dissolved oxygen levels. Over-harvesting of selected fish species may occur if not stipulated as a prohibition to the increased human workforce during exploration or development.

Indirect impacts would fish swept into storage reservoirs during high flows (storm events, spring snowmelt or construction activities) where fish are trapped when water levels return to normal or are pumped out. Such events occur naturally. Additionally, such artificial impoundments may provide alternative overwintering habitat for some species in a region where such habitats are scarce. Access to and from the larger population would be necessary for this to be an effective benefit to fish species. Abandoned deep-water reservoirs have been beneficial for several fish species (Moulton and George 2000).

Early pipeline and development in the Prudhoe Bay area reduced some fish populations due to locations of road crossings, undersized or undercut culverts prior to understanding species-specific swimming needs (Moulton and George 2000).

Those species that do not migrate are not as likely to be affected by impacts related to barriers and some habitat changes. However, wintering areas are essential. Therefore, any factor linked with exploration or development that reduces adequate open water depths during winter months may have the potential to reduce populations at specific locations.

Each Arctic grayling river-population is distinct from others. Therefore, geophysical impacts could have a larger footprint on a landscape scale than a single site. However, the distribution of the Arctic grayling has increased in Prudhoe Bay environs since the development of the the oil-field (NRC 2003).

Direct, indirect, and cumulative effects of geophysical exploration and oil-field development pose little risks to freshwater fisheries and their habitats based on recent evaluations and using best management practices that have evolved since the late 1970s to late 1980s (Moulton and George 2000; NRC 2003; BLM 2012). The use of vibration equipment in lieu of blasting has reduced overpressure mortalities in fish and less intrusive to habitats. Low ground-bearing pressure vehicles reduce soil disturbances and potential for sediment mobilization and associated accumulation to lakes and streams. Capping the amount of water withdrawal from any natural waters may minimize overwinter mortalities or reduction of overwintering habitat for fish.

4.6.4 Bald and Golden Eagles

Additional literature is needed in order to understand the environmental consequences of the proposed action on eagle populations.

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4.6.5 Resident Birds

Additional literature is needed in order to understand the environmental consequences of the proposed action on resident birds.

4.6.6 Migratory Birds

Many species of migratory birds use the coastal plain for nesting or for feeding in preparation for fall migration. These include a variety of waterfowl and shorebirds that are dependent on aquatic and lakeshore habitats for nesting or feeding. If winter water withdrawals impact shoreline vegetation and/or aquatic plants, fish, and invertebrates, these effects could negatively impact waterfowl and shorebirds.

4.6.7 Terrestrial Mammals (Caribou, Muskox, Wolverine, Grizzly Bears)

Impacts to habitat used by terrestrial mammals would be minor, as most seismic activities would occur during the winter on frozen tundra or ice. Potential causes of disturbance to terrestrial mammals from seismic activities would include surface vehicular traffic on frozen tundra or ice and fixed-wing aircraft traffic. In most cases, these activities would cause short-term displacements of and/or disturbance to terrestrial mammals. Where 3-D seismic exploration survey lines are located only 660 to 1,200 feet apart, localized displacement of terrestrial mammals could last for several days or lead to complete abandonment of localized habitat.

Effects on caribou and moose could include temporary habitat displacement and increased energy expenditure associated with increased disturbance movement. Caribou overwintering on the coastal plain would likely be encountered during seismic surveys. It is possible that displacement of caribou by seismic exploration activities during winter could have a negative effect on their energy balance (intake versus expenditure). Because these animals are mobile and the operation would be short in duration (e.g., 2 to 3 days in one area), it is not anticipated that any lasting adverse impacts to caribou would result under most circumstances. However, this assumption has not been scientifically tested and conditions for winter survival vary from year to year. It is possible that this disturbance could have an additive effect on natural winter mortality and could disproportionately impact young of the year and pregnant cows. Caribou have been shown to exhibit panic or violent, running reactions to aircraft flying at elevations of approximately 160 feet and to exhibit strong escape responses (animals trotting or running) to aircraft flying at 150 to 1,000 feet (Calef et al. 1976). Additional effects on caribou nutrition during the calving and post calving periods could occur as a result of delayed green up of vegetation underlying ice roads and pads or areas of compacted snow. The severity of these impacts would be dependent on the extent of the affected areas and by timing of snowmelt during a particular year.

Previous studies of the effects of oil and gas exploration on muskoxen in Alaska and Canada focused on disturbances associated with winter seismic operations. Some muskoxen reacted to seismic activities at distances up to 2.5 miles from the operations; however, reactions were highly variable among individuals (Reynolds and LaPlant 1985). Responses varied from no change in behavior to becoming alert, forming defense formations, or running away (Winters and

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Shideler 1990). The movements of muskoxen away from the seismic operations did not exceed 3 miles and had no apparent effect on muskox distribution (Reynolds and LaPlant 1986). Unlike caribou, muskoxen are not able to travel and dig through snow easily. In the winter, they search out sites with shallow snow, and greatly reduce movements and activity to conserve energy (USDOI U.S. Fish and Wildlife Service 1999). Muskoxen survive the winter by using stored body fat and reducing movement to compensate for low forage intake (Dau 2001). Because of this strategy, muskoxen may be even more susceptible to disturbances during the winter. It is possible that repeated disturbances of the same animals during winter could result in increased energetic costs that could increase mortality rates. Depending upon the location of the seismic exploration, impacts on muskox populations would be non-existent to minor.

Seismic camps could result in localized disturbance and/or displacement of terrestrial mammals for up to a few days. Bears and foxes could also be attracted to camps and conflict could result. Since seismic camps generally move at least once a week and proper handling of wastes would be regulated through permitting, the potential for bears or foxes to be attracted to human food sources would be minor. In addition, most seismic activity would occur when bears were hibernating and not attracted to scents. However, grizzly bears denning on the coastal plain, including females with dependent cubs, would be exposed to disturbance from seismic activities. Disturbance during winter can cause bears to abandon their dens, which increases winter mortality. Mitigations measures, such as those employed in existing oil fields west of the refuge will be required to minimize this disturbance.

The potential effects of seismic activities on wolverines would include disturbance from air and surface vehicle traffic, and increased human presence. Wolverines are considered a shy and secretive species that is present at very low densities and may be sensitive to disturbance.

4.6.8 Caribou

Addressed in previous section

4.6.9 Polar Bears

Terrestrial oil and gas industry seismic survey activities on the North Slope of Alaska typically require between 80 and 160 personnel. Substantial logistical support is required for a seismic survey operation, and also to support the personnel camps, vehicles, security, aircraft operations, restocking of the explosive magazine (if explosives are used), medical support, scientists, marine mammal observers, ice road construction, barge traffic, and many other logistical and support functions.

Polar bears present in the Arctic Refuge 1002 area may be affected by seismic survey activities in various ways. Noise, vibrations, sights, and smells produced by seismic survey activities may elicit a wide range of responses from polar bears. Polar bears respond to the sights and sound of snowmachines, vehicles, vessels, and aircraft; especially helicopters (Watts and Ratson 1989; Dyck 2001; Dyck and Baydack 2004; Andersen and Aars 2005). Polar bear responses to disturbance are highly variable and are influenced by an individual bear's

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previous experiences and tolerance level. Polar bears are most likely to respond to the majority of seismic survey activities with short-term behavioral and physiological responses such as avoidance, increased vigilance, increased heart rate, and other stress responses. Disturbance during resting may result in increased energy expenditure or adverse physiological responses (Watts et al. 1991), but short-term reactions like these will rarely affect the health or survival of individual animals or the population. The effects of fleeing from aircraft may be minimal if the event is short and the animal is otherwise healthy and unstressed. However, on a warmer day, a short run may be enough to overheat a well-insulated polar bear. The effect of fleeing an aircraft or ground vehicle on polar bear cubs, particularly cubs of the year, would likely be the use of energy that otherwise would be needed for survival during a critical time in a polar bear's life, and potentially separation from the female. If the exposure and separation, or both, were brief and singular then the effect would most likely be minimal. Chronic disturbances, extreme reactions, disruption of key behaviors such as feeding or denning, or separation of dependent cubs from the female are more likely to affect health or survival. Polar bears directly interacting with seismic survey activities increase the risk of human-bear encounters, conflicts, and injury or death of polar bears.

Seismic survey activities disturbing female polar bears at maternal den sites are of great concern. Minimizing disturbance while bears are in dens is important because timing of den emergence is significantly related to cub survival (Rode et al. in review). Female polar bears entering dens and females in dens with cubs are more sensitive to noises than other age and sex groups. Disturbance during the early stages of denning may cause a female polar bear to abandon the den site in search of another one. A female polar bear may locate another suitable den site and continue her reproductive process Denning female bears may abandon their dens early in response to stress (Amstrup 1993). Amstrup (1993) reported most polar bears in dens continue to occupy the dens after close approaches by aircraft. Although the snow attenuates some aircraft noise (Blix and Lentfer 1992), repeated overflights may cause polar bears to abandon or depart their dens. Premature den site abandonment after the birth of cubs, or if the female abandons the cubs after they emerge from the den, will result in cub mortality. The potential for disturbance increases once the female emerges from the den. She is more vigilant against perceived threats and easier to disturb.

Though human activities (e.g. industrial, subsistence) are expected to exert a smaller influence on polar bear populations than the loss of sea ice habitat (Atwood et al. 2015; Regehr et al. 2015), the cumulative effects of seismic survey activity and climate change are not well understood. Habitat loss due to changes in Arctic sea ice is the primary cause of decline in polar bear populations, and the decline of sea ice is expected to continue throughout the polar bear's range for the foreseeable future (73 FR 28212, May 15 2008). Under both stabilized and unabated greenhouse gas emissions models, polar bears are expected to have greatly decreased persistence throughout the region (Atwood et al. 2015). The effects of seismic survey activity in the Arctic Refuge 1002 area combined with the effects of climate change could have unknown effects on the Southern Beaufort Sea population of polar bears.

The requirements of incidental take authorizations under the Marine Mammal Protection Act, such as polar bear interaction plans, training, monitoring, and mitigation measures have proven

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effective at reducing the effects of oil and gas industry activities, including seismic surveys, on polar bears in other areas of northern Alaska. Mitigation measures, including a pre-activity den survey and a 1.6-km (1-mi) operational exclusion zone around known dens help to limit disturbance of denning female polar bears. The current incidental take regulations for oil and gas industry activity in the Beaufort Sea and adjacent areas of northern Alaska, published in the Federal Register on August 5, 2016 (81 FR 52276), include a comprehensive analysis of the effects of oil and gas industry activity to polar bears, as well as mitigation, monitoring, and reporting requirements. A detailed description of mitigation measures that limit the effects of seismic surveys on polar bears is available at title 50 of the Code of Federal Regulations, part 18, subpart J, section 18.128.

4.6.10 Bowhead Whale

Additional literature is needed in order to understand the environmental consequences of the proposed action on bowhead whales.

4.6.11 Bearded and Ringed Seals

Additional literature is needed in order to understand the environmental consequences of the proposed action on bearded and ringed seals.

4.7 Alternative 2 - Social Environment

4.7.1 Cultural Resources

Very little cultural resource investigations or inventories have occurred within the 1002 area. Therefore, pursuant to Section 106 of the National Historic Preservation Act, applications for exploration within the 1002 would be required to include sufficient identification and evaluation of cultural resources to ensure that potential adverse effects could be avoided, minimized or mitigated.

4.7.2 Socioeconomic

Impacts to socioeconomic resources would be considered to be significant if an action resulted in a substantial change in the local or regional population; and housing, community general services, or social conditions from the demands of additional population/population shifts. Impacts would also be considered major if there were a substantial change in the local or regional economy, employment, or spending or earning patterns.

Direct and Indirect Effects: We would expect minor effects in Coldfoot and Wiseman during transport of equipment and personnel. Communities used for staging, likely Prudhoe Bay and/or Kaktovik could expect to see increases in activity during the project. They would see increases in air traffic as equipment and personnel are transshipped to the field. Staging communities would also experience increased activity in hoteling and restaurants to support personnel. Project personnel would be experienced operators from outside the area.

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Cumulative Effects: Minor.

Mitigation: Not expected to be necessary.

4.7.3 Environmental Justice

A Federal agency is required to identify and address, as appropriate, any disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations (Executive Order 12898, February 11, 1994, amended January 30, 1995, by Executive Order 12948). This includes health risks and other impacts for people who rely principally on fish or wildlife for subsistence. Subsistence activities are a way of obtaining food or natural materials and an important mechanism for maintaining cultural values, family traditions, kinships, sharing practices, and relationships to the land.

Direct and Indirect Impacts: There would be no direct or indirect impacts to environmental justice expected from the proposed project.
Cumulative Effects: Negligible

Mitigation: No mitigation would be necessary. Impacts associated with Environmental Justice would be expected to be beneficial.

4.7.4 Subsistence

The Alaska National Interest Lands Conservation Act (ANILCA) Section 810 requires an evaluation of the effects on subsistence uses for any action to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands. A comprehensive ANILCA Section 810 analysis is included in Appendix G.

Direct and Indirect Effects: No impacts expected.

Cumulative Effects: No cumulative impacts expected.

Mitigation: None necessary

4.7.5 Land Use

Factors considered when determining whether an alternative would have a significant impact on land use were evaluated and distinguished by the degree to which the impact would result in:

- Displacement of or adverse effects to relatively large blocks of existing land uses; and
- Development that is inconsistent with adopted laws, regulations, or the long-term goals of approved land use plans or policies.

Direct and Indirect Effects: Neither land nor mineral ownership would change under this alternative. Direct effects would include the presence of personnel and equipment in areas heretofore undisturbed by humans. Operating of equipment could temporarily disturb wildlife.

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Habitats could be disturbed. In order to allow the proposed exploration activities on the Refuge, the Arctic CCP may need to be amended to change the management category from Minimal Management to Moderate Management for areas in the immediate vicinity of the exploration activities. The change to Moderate Management would allow impacts to the naturalness of the areas and distinct evidence of human-caused change. Habitats could be disturbed and their ability to function through natural processes might be impaired

Cumulative Effects: Implementation of the proposed alternative would temporarily increase the total effects on regional land use due to equipment operations and aircraft support. .

Mitigation: As a mitigation measure, project field activities would be scheduled to occur during winter months to avoid the most intensive hunting, fishing, and recreational activity periods.

4.7.6 Recreation and sport hunting

On-shore seismic surveys in the winter would likely be conducted using mobile seismic camps comprised of ski-mounted trailers that are moved every few days to once a week (BLM 2012). Such activities could displace species being sought by hunters in the area, having an impact on their success if they were unable to locate animals due to the disturbance. Any ice roads, ice pads or snow trails would be temporary. Disturbance lasts only while the survey or camp train is passing through. Lighting at the facilities would be visible to any hunters or recreationalists passing nearby. Persistence of compacted snow or ice structures may be encountered by recreationalists in the spring and are unlikely to be a barrier to recreation by foot or boat travel.

Direct and Indirect Impacts: Negligible to moderate, but temporary

Cumulative Impacts: None expected.

Mitigation: As a mitigation measure, project field activities would be scheduled to occur during winter months to avoid the most intensive hunting, fishing, and recreational activity periods.

4.7.7 Noise/Soundscape

Noise from vehicles, generators, aircraft and human presence has the potential to affect both humans and wildlife within the vicinity of seismic survey activities. The disturbance distance depends on the source and strength of noise, but should be negligible outside the immediate vicinity and is only temporary in nature.

Direct and Indirect Effects: Negligible

Cumulative Effects: None expected.

Mitigation: As a mitigation measure, project field activities would be scheduled to occur during winter months to avoid the most intensive hunting, fishing, and recreational activity periods.

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4.7.8 Visual

On-shore seismic surveys on the North Slope are only collected in the winter; therefore, the colors of structures and equipment would be in contrast with the white color of the snow-covered landscape. Lights on equipment would be visible when the equipment is passing through an area. Few travelers would be expected on the Arctic Coastal Plain during the winter, minimizing the numbers of the public that would be affected by localized visual disturbance. Local subsistence users could be traveling on the tundra and observe the seismic activity. The BLM's NPRA EIS (2012) determined that "visual resources could be minimally impacted from the moving camps, aircraft, and human presence. The seismic operations would have a moderate contrast on the landscape character element of line."

Direct and Indirect Effects: Negligible

Cumulative Effects: None expected.

Mitigation: As a mitigation measure, project field activities would be scheduled to occur during winter months to avoid the most intensive hunting, fishing, and recreational activity periods.

4.7.9 Wilderness Values

Wilderness characteristics consist of size, naturalness, wildness, and outstanding opportunities for solitude or primitive and unconfined recreation. They may also include supplemental and symbolic values.

Seismic surveys would be conducted in winter, when there are fewer visitors seeking a wilderness experience come to the Arctic Coastal Plain. Ice roads, ice pads, airstrips, and snow trails would be used for staging winter seismic activities and are temporary in nature. The BLM's NPRA EIS (2012) describes seismic activity as consisting of low-ground-pressure vehicles to minimize potential impacts to the tundra. The typical survey lasts about 100 days. Seismic camps, which generally consist of six camp strings of five ski-mounted trailers, are typically moved every few days to once a week. The presence of this equipment on the Arctic Coastal Plain would have a significant but temporary impact on the wilderness value of the area where seismic surveys are being conducted during the time period of the activity. Impacted wilderness values would include naturalness, outstanding opportunities for solitude or primitive and unconfined recreation, and scenic values resulting from moving camps and associated noise from generators, aircraft, vehicles/trailers and human presence (BLM 2012). Impacts to wilderness values should be negligible once the activity is completed.

Longer lasting impacts to vegetation could result from seismic surveys, which could impact wilderness values of naturalness and scenic values. The color contrast would be minimal from ground view and almost nonexistent from more than a few hundred feet away (BLM 2012). After 8 to 9 years, the evidence of use would be minimal (BLM 2012). Seismic operations by their nature do not follow the same routes every year and the number of miles of survey line run can vary greatly from year to year.

Direct and Indirect Effects: Significant but temporary

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Cumulative Effects: None expected

Mitigation:

5 Cumulative Effects

Much of the current industrial activity on the North Slope occurs from Prudhoe Bay west into the National Petroleum Reserve-Alaska and adjacent nearshore waters. The State of Alaska, Department of Natural Resources, Division of Oil and Gas has prepared the following summary of Alaska North Slope Oil and Gas Activity as of August 2017:

http://dog.dnr.alaska.gov/Documents/Maps/ActivityMaps/NorthSlope/NS_ActivityMap_August2017_KMT.pdf

Across the larger landscape of the North Slope (North Slope Borough), the coastal plain from Point Barrow to Point Demarcation (approximately the U.S. and Canadian border) is increasingly developed. This is especially true of the western end with the National Petroleum Reserve-Alaska (NPRA), Prudhoe Bay and adjoining oilfield from Tarn and Kuparuk on the western end to Point Thompson on the eastern end at the western-most boundary of the Arctic Refuge and 1002 area. With the discovery of oil in the late 1960s came the first explorations, developments and finally production. Following the international oil crisis of 1973, the Trans-Alaska Pipeline Systems (TAPS) was build and spanned Alaska from north to south, Prudhoe Bay to Valdez. The TAPS has been moving oil from the oilfield to transports for 40 years and likely to continue for the long term. Lateral pipelines are under construction or proposed to connect with the TAPS in the near future. The TAPS is approved to operate via DOE permit through 2032.

To accommodate construction, a road was constructed from Fairbanks to Deadhorse to convey personnel and materiel necessary to build and maintain the oilfields, pipeline and support services and allowed overland access to the North Slope year-round. Initially constructed with private funds and for industrial purposes only, the road was eventually turned over to the State of Alaska to maintain. In addition to still be maintained largely for industrial purposes, it is now a popular for vacationers and sport hunter access.

The oil and gas industry continue to expand with one of the most recent developments, the Liberty Project on the Alaska outer continental shelf (BOEM 2017) and the NPRA being opened for oil and gas lease sales, as announced in September 2017. The development of the North Slope, including the coastal plain environs is likely to continue into the foreseeable future (Clement and others 2013).

Increasing mean annual summer temperatures concurrent with projections for less snow cover during winter months will greatly facilitate development of industry, infrastructure, and public access to the North Slope.

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As a means of perspective, the described 1987 *Coastal Plain Report/EIS* full oil and gas production footprint was anticipated to use no more than 12,650 acres among scattered parcels, or 0.84 percent of the total 1.5 million acre 1002 area (Clough and Christiansen 1987). Given advances in the oil and gas state-of-the-industry since the late 1970s through late 1980s: increasing directional drilling capacities; reduced pad sizes; multiple drillings from a single pad; low ground-bearing pressure vehicles; winter site development; buffer zones around critical resources; among other features or best management practices (BMPs), the scope and scape of the exploration, development and production may be expected to be reduced from the initial estimate. All these considerations serve to mitigate direct, indirect and cumulative effects through avoiding, minimizing, rectifying, reducing, and/or compensating the significance of context and intensity for the proposed oil and gas exploration, development, and production activities.

The 29 listed mitigation recommendations of the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987), although now largely dated, provide a basis for updating and augmenting state-of-the-industry advances since (Clough and Christiansen 1987). Specifically, this includes the changes for threatened, endangered and sensitive (TES) species: arctic pennycress (*Noccaea arctica*, formerly *Thlaspi arcticum*), more common than initially determined; the delisting of the American Peregrine Falcon (*Falco peregrinus anatum*) and Arctic Peregrine Falcon (*F.p. tundrius*); and, listing of the polar bear (Ursus maritimus), among other considerations. Cumulative effects including some aspects of climate change, not adequately considered in the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987) are addressed at least up to the time of publication in *Cumulative Environmental Effects of Oil and Gas Activities on the Alaska's North Slope* (NRC 2003). Additionally, biological resources in relation to oilfield developments including: vegetation and biotic communities; caribou, grizzly bear; polar bear; Arctic fox; Pacific Loon; Tundra Swan; Lesser Snow Goose; Common Eider (Pacific Eider); shorebirds; freshwater invertebrates; freshwater fish; anadromous fish; and benthic marine communities are discussed in *The Natural History of an Arctic Oil Field: Development and the Biota* (Truett and Johnson 2000). Finally, parallels from exploration, development and production of oil and gas on the North Slope may be National Petroleum Reserve – Alaska EIS (BLM 2012), which are directly comparable to the coastal plain 1002 area.

As examples of advances in state-of-the-industry, oil and gas environmental impacts can be significantly reduced if these activities occur during winter months, when the tundra is frozen and protected by snow cover, and most wildlife are absent (Gliders and Cronin 2000). In summer, the thawing snow and lengthening days bring millions of shorebirds and waterfowl in search of nesting sites along with caribou migrating from wintering locations in the interior. The oil exploration and production process involves multiple stages that may require several years or even decades to complete for each oil field. New technologies involving reduced well spacing, elimination of reserve pits, directional drilling, winter maintenance and construction from ice pads and roads, aerial support, and the use of baseline and ongoing biological monitoring programs to facilitate decision making have reduced the areal impacts of development. The incorporation of baseline biological studies and monitoring of exploration and field development assists in minimizing impacts to high-value habitats and species. In this manner the oil and gas

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industry reduces encroachment on wildlife habitat and avoids disturbance to wildlife during critical periods (Gliders and Cronin 2000).

As a specific example, denning bears and particularly denning females with young were susceptible to seismic blasting during exploration surveys. Rousing bears, emerging and resettling, required energy reserves that might place individual bears at risk for long-term survival and especially cubs-of-the-year. In part this was because field crews were unaware of denning sites. Bear dens are now more closely monitored due to the threatened status of the polar bear, typically via radiotelemetry. Additionally, traditional blasting has been replaced by vibrators and sensor lines which are far less intrusive to denning bears. As a consequence, the disturbance threat has been greatly reduced through advances in technology (Reynolds and others 1986; McLellan and Shackleton 1988, 1989; Mattson 1990; Blix and Lentfer 1992; Linnell and others 2000).

However, cumulative effects of oil and gas exploration, development and production become problematic for long-term recovery and restoration. Some sites abandoned and rehabilitated to various degrees still show evidence of impacts 40 to 60 years following the activity (Walker and others 1987; Felix and Raynolds 1989; Gliders and Cronin 2000; Kemper and MacDonald 2009; Jorgenson and others 2010; McCarter and others 2017).

As an example of unknowns and uncertainty of climate change in relation to oil and gas exploration, development and production are water resources and their use for industry. While the creation of impoundments for water storage and subsequent use for drilling operations has created habitat and expanded the distribution of such species as the Arctic char (Moulton and George 2000; NRC 2003), it is only with the provision that pumping capacity is capped so that sufficient overwintering habitat is available below the maximum ice depth and large enough to contain dissolved oxygen for the longest period of ice coverage. This is important in a landscape where overwintering habitat for fish is limited (Reynolds 1997).

Climate projections for the North Slope indicate not only warming but drying through the summer months and less precipitation through the winter (ACIA 2004). This situation may lead to lower minimum depths in natural lakes or artificial impoundments where entrapments may increase that may ultimately affect fish species populations, invertebrate food resources and possibly trophic cascade effects (Ims and Fuglei 2005). As aquatic invertebrates are a primary food resource for migratory shorebirds, and reduction in this energy-rich, seasonal resource could greatly affect the survival of adults and nesting efforts (Bart and others 2012; Hof and others 2017).

Even using the largest footprint estimated for development from 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987), this may be scattered across the landscape of 1.5 million acres of the coastal plain 1002 area. As mean annual summer temperature increase, as they have to the present, migrating caribou will seek out the coolest remaining sites, including patches of snow which are used to avoid or reduce biting insects. Oil and gas developments have been demonstrated to affect movement and foraging behavior previously (Ballard and others 2000; Cameron and others 1979, 1989, 2005; Cronin and others 2000; among others). While behavioral

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responses may be individually or herd specific, and have not affected the overall health of North Slope caribou to this time, the point is that with future environmental change, a threshold may be crossed at some point in the future where wildlife resource requirements may come in direct conflict with industry.

Climate Change

As noted, increasing mean high summer temperature, increasing mean low winter temperatures, less precipitation and landscape drying are all projected for the larger North Slope environs over the next 100 years (ACIA 2004). This may be translated to less water for drilling operations including the risk of over-pumping water resources in a landscape with relatively limited open water despite the appearance of abundance. Such drying will affect wetland functions and values for wildlife resources and water quality. Less water and higher temperatures will place some species at risk for continued occupation of preferred habitats, such as overwintering habitat for freshwater fish, freshwater invertebrates, waterfowl and shorebird production, and may create conditions conducive for invasive species (vascular and nonvascular plants, invertebrates and vertebrates, and pathogens) to pioneer and establish populations. As an example the red fox is just now entering the Arctic Refuge which will ultimately compete with native Arctic fox and is a far more plastic and effective predator than native fox or equivalent mesocarnivores. Declines in waterfowl production have been demonstrated in multiple locations where red fox were not previous present. Increasing soil disturbances for development and infrastructure may create pathways for invasive plants and the increased movement of personnel and materiel may create human-subsidized transport of seeds or propagules.

Loss of sea ice will create the potential for increased shore zone erosion during storm or tide surge events. Sea level rise is already causing dislocation and relocation of traditional village sites to higher grounds if available elsewhere in Alaska.

As expressed by local residents and subsistence resource users during scoping for numerous development projects is the fear of displacement of those resources due to increasing fragmentation of the landscape for traditional lifestyles. Equal with this concern is the fear of catastrophic spills that will affect subsistence resources, particularly long-term incidents that may require years (or generations) to restore and rehabilitate to achieve pre-incident conditions.

Uncertainty

The oil and gas industry mitigation and BMPs have evolved based on experience, knowledge and technology. Similarly, understanding and knowledge of biological and water resources has increased over time and with technology. However, foreseeable changes may be acknowledged but uncertainty and lack of knowledge make management of oil and gas exploration, development, and production or natural resources management tenuous in many respects for the long-term (Wilson and others 2013). Only through a collaborative and cooperative effort, particularly through adaptive management, and industry and agency monitoring may positive goals and objectives be explored.

6 List of Preparers, Contributors, and Advisors

This EA was developed by U.S. Fish and Wildlife Service (Service) staff. The Service holds final responsibility for all content. Personnel for each contributing party are listed in Table 6-1.

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Table 6 - 1: Preparers, Contributors, and Advisors

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From:	Ellis, Mitch
To:	Jim Kurth
Cc:	Cynthia Martinez; Shaun Sanchez
Subject:	Fwd: Arctic 1002 Area Environmental Assessment
Date:	Friday, November 17, 2017 6:19:11 AM
Attachments:	20171116_EA_ARC 1002 Reg Change_DRAFTwatermarked (3).docx

I got through half of it last night before dozing off...70 pages. Curious if you think we hit the mark.

Mitch Ellis
Chief of Refuges, Alaska Region
National Wildlife Refuge System
U.S. Fish and Wildlife Service
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---------- Forwarded message ----------
From: **Siekaniec, Greg** <greg_siekaniec@fws.gov>
Date: Thu, Nov 16, 2017 at 8:24 PM
Subject: Arctic 1002 Area Environmental Assessment
To: Jim Kurth <jim_kurth@fws.gov>
Cc: "Ellis, Mitch" <mitch_ellis@fws.gov>, "Fischbach, Tracy" <tracy_fischbach@fws.gov>, Doug Damberg <doug_damberg@fws.gov>, Karen Clark <karen_clark@fws.gov>

Jim,

Attached is the EA version as it stands today. I asked that the document be marked as draft so we can give it a read in the morning for simple formatting and editing. The basic elements that we were asked to expand upon are contained and the team worked closely with the DOI solicitor office here in Anchorage.

Again, this is greatly expanded from the earlier request to provide a basic EA that recognized we will complete a full analysis of any application to conduct seismic investigations on the 1002 area of the Arctic NWR coastal plain. The analysis does bring in some new considerations as we now know much more about the species using the refuge and the endangered and critical habitat designations for polar bear.

Please let me know if you have some additional requirements as to how this is being handled such as placing in DTS for some routing scenario. I trust we will be able to discuss Friday morning as to next steps.

Regards,

Greg

Environmental Assessment for PROPOSED AMENDMENT TO REGULATIONS FOR GEOLOGICAL EXPLORATION OF THE COASTAL PLAIN 1002 AREA

U.S. Fish United States Fish and Wildlife Service
Arctic National Wildlife Refuge, Alaska

DRAFT

16 November 2017

U.S. Fish & Wildlife Service

Environmental Assessment
For the
Proposed Regulation Change for Management of the Coastal Plain 1002 Area of the Arctic National Wildlife Refuge, Alaska

This Environmental Assessment (EA) was prepared in accordance with the U.S. Department of the Interior (DOI) Departmental Manual 516, and is in compliance with the National Environmental Policy Act and the Council on Environmental Quality Regulations (40 CFR 1500-1508).

This EA serves as a public document to briefly provide sufficient evidence and analysis for determining the need to prepare an Environmental Impact Statement (EIS) .

This EA concisely describes the potential environmental impacts of the proposed action and the alternatives. The EA provides a list of the agencies and persons consulted during EA preparation.

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Glossary	
1002 area	identified as such in the map entitled *Arctic National Wildlife Refuge*, dated August 1980 [ANILCA § 1002(b)] (See Figure 1).
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act of 1980
BLM	Bureau of Land Management, U.S. Department of the Interior
CCP	Comprehensive Conservation Plan for National Wildlife Refuges, required by ANILCA
coastal plain	defined as that area shown on the map entitled Arctic National Wildlife Refuge dated August 1980 [ANILCA § 1002(b)], and legally described in 50 CFR Part 37 Appendix I-Legal Description of the Coastal Plain, Arctic National Wildlife Refuge, Alaska [see also 50 CFR § 37.2(d)] (See Figure 1).
cultural resource	defined as any district, site, building, structure, or object significant in American history, architecture, archeology, engineering or culture, as determined in accordance with 36 CFR § 60.6 [see 50 CFR § 37.2(e)]
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior; including BLM, USFWS, USGS
EA	Environmental Assessment, as stipulated under NEPA
EIS	Environmental Impact Statement, as stipulated under NEPA
exploratory activity	defined as surface geological exploration or seismic exploration or both of the coastal plain and all related activities and logistics required for either or both, and any other type of geophysical exploration of the coastal plain which involves or is a component of an exploration program for the coastal plain involving surface use of refuge lands and all related activities and logistics required for such exploration [see 50 CFR § 37.2(i)]
FONSI	Finding of No Significant Impact; Federal agency decision that concludes an EA
NEPA	National Environmental Policy Act of 1970 [40 CFR §§ 1500-1508]
NRC	National Research Council, National Academy of Sciences
NWR	National Wildlife Refuge
ROD	Record of Decision, Federal agency decision that concludes an EIS
USFWS	Fish and Wildlife Service, U.S. Department of the Interior
USGS	Geological Survey, U.S. Department of the Interior

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1 Introduction & Overview

1.1 Purpose and Need

The U.S. Fish and Wildlife Service (Service), proposes to amend the regulations at 50 CFR Part 37 - *Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska*, regarding the dates when an application may be submitted for a permit for a geological and geophysical exploration plan on the Arctic National Wildlife Refuge (Arctic Refuge) lands described in the Alaska National Interest Lands Conservation Act (ANILCA). This action is an update to our regulations to allow opportunities for applications to conduct seismic exploration. Further, the ability to collect new information on oil and gas resources will better inform public policy decisions. We are taking this action in support of Executive Order 13783, Promoting Energy Independence and Economic Growth.

1.2 Key Environmental Requirements & Integration of Other Environmental Statutes & Regulations

The *National Environmental Policy Act of 1969* (NEPA) requires federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions, including a no action alternative. This Environmental Assessment (EA) addresses the administrative action by the Service to permit new exploration plans in the Arctic Refuge. This EA does not evaluate decisions to issue special use permits for specific exploration plans as the details of those plans are unknown at this time. Any analysis by the Service at this time would be speculative in regards to methods, location and timing of specific exploration activities that may occur if the current regulations are amended to provide for additional geological and geophysical exploration.

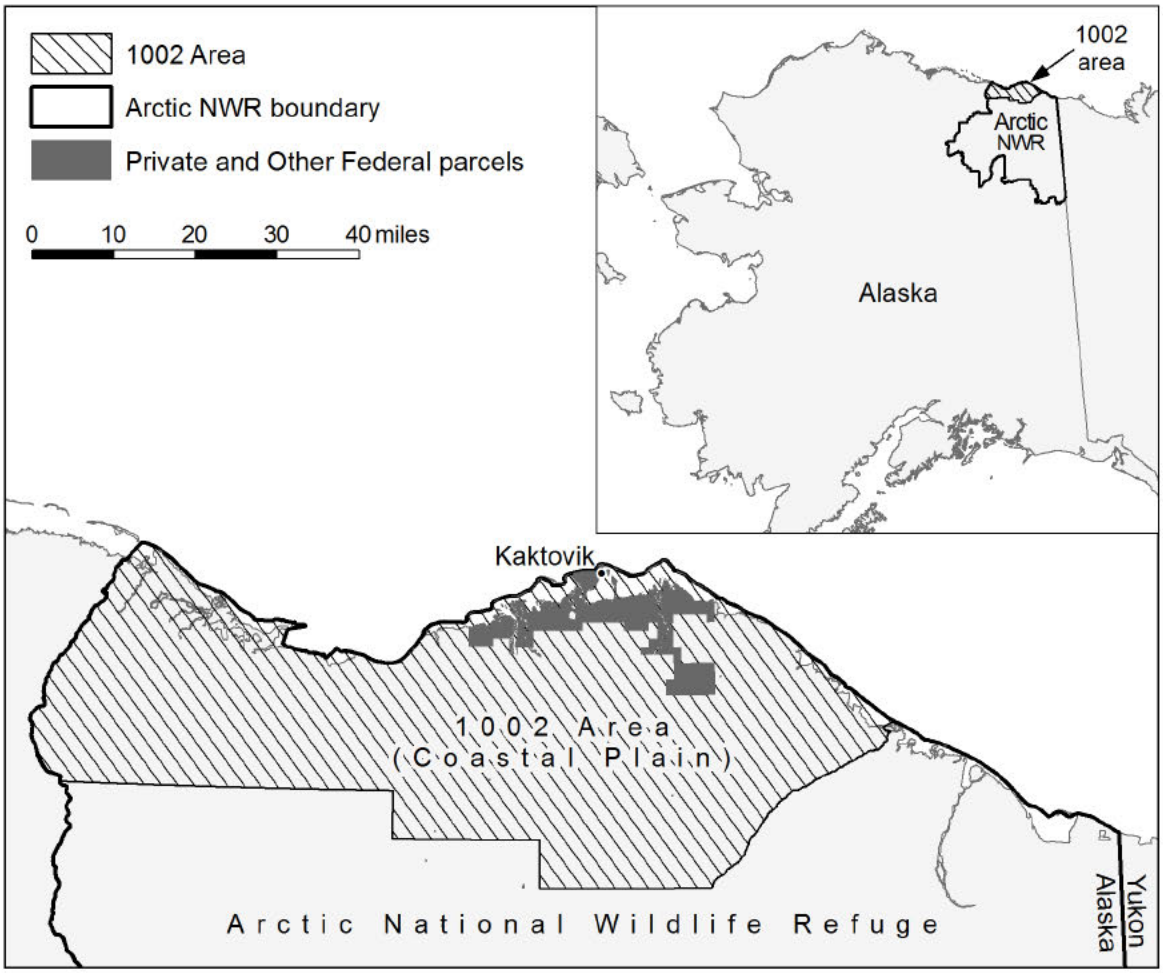
Section 7 of the *Endangered Species Act* (16 U.S.C. 1536) requires the DOI Secretary to ''review other programs administered by him (or her) and utilize such programs in furtherance of the purposes of the Act'' and to ''insure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat . . . .'' Prior to issuance of these regulations, we would consult under section 7 of the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 et seq.), to ensure that any applications for exploration in the coastal plain of the 1002 area of the coastal plain of Arctic Refuge is not likely to jeopardize the continued existence of any species designated as endangered or threatened, or modify or destroy its critical habitat, and that the regulations are consistent with conservation programs for those species. Similar to the NEPA analysis, plan-specific Section 7 reviews would be completed when explorations plans are submitted for review and processing.

The ANILCA is integral to how this proposed regulation change will be evaluated. When ANILCA was passed in 1980 the Act re-designated Arctic Refuge and required the writing of a

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Comprehensive Conservation Plan (CCP) for the Arctic Refuge (Title III), required the identification of federal actions which could have the potential to significantly restrict subsistence users (Title VIII), and required the DOI "to provide for a comprehensive and continuing inventory and assessment of the fish and wildlife resources of the coastal plain of the Arctic Refuge; an analysis of the impacts of oil and gas exploration, development, and production, and to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources" (Title X). The "coastal plain" was defined by a map entitled "Arctic National Wildlife Refuge", dated August 1980 (Figure 1).

Section 106 of the *National Historic Preservation Act of 1966* requires that federal agencies identify and assess the effects its actions may have on historic properties. "Properties" is broadly defined and does not just include built infrastructure. Prior to issuance of any permit given under these regulations, we would ensure that any applications for exploration in the coastal plain of Arctic Refuge are not likely to jeopardize historic properties.



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Figure 1. Arctic National Wildlife Refuge showing the coastal plain 1002 area.

The Arctic Refuge was first established in 1960 through Public Land Order 2214, for the purpose of preserving unique wildlife, wilderness, and recreational values. The original 8.9-million acre Arctic National Wildlife "Range" was withdrawn from all forms of appropriation under public land laws, including mining but not from mineral leasing.

In ANILCA Title III, the Arctic Refuge was expanded to 19-million acres (Figure 1). Under ANILCA § 303(2) the "purposes for which the Arctic National Wildlife Refuge was established and shall be managed include –

(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including participation in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge."

In Title VIII of ANILCA, § 810, Congress recognized the importance of federal lands to local residents of Alaska who had been using those lands to support their subsistence lifestyle for generations. As a result, federal land managers are required to identify whether a proposed land management action has the potential to significantly restrict subsistence opportunities. If so, then the manager is required to consult with local subsistence users and to seek to minimize such restrictions. In Title X of ANILCA, § 1002, Congress provided for a "comprehensive and continuing inventory and assessment of the fish and wildlife resource of the coastal plain of the Arctic Refuge; an analysis of the impacts of oil and gas exploration, development, and production, and to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources."

1.3 BACKGROUND

With the passage of ANILCA, three primary actions were required of the Service and DOI in relation to administration of the Arctic Refuge: (1) a CCP for the Arctic Refuge was to be

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written; (2) the DOI Secretary was to assess wildlife values and oil reserves in an area described in ANILCA § 1002; and, (3) the DOI Secretary was to authorize exploratory activity within the coastal plain "in a manner that avoids significant adverse effects on the fish and wildlife and other resources."

First, ANILCA § 304(g) directed the preparation of a CCP for each refuge in Alaska. Each plan is based on an identification and description of resources of the refuge, including fish and wildlife resources and wilderness values, and must "designate areas within the refuge according to their respective resources and values; specify programs for conserving fish and wildlife and the programs relating to maintaining the identified values proposed to be implemented within each such area; and specify uses within each area which may be compatible with the major purposes of the refuge."

An initial CCP and related EIS were prepared for Arctic Refuge. The Record of Decision (ROD) implemented the minimal management alternative (FWS 1988a, 1988b) which emphasized managing for natural, unaltered landscapes and natural processes. This decision was reiterated in 2015 when the CCP was revised. In this updated CCP and EIS, recommendations for Congressionally-designated Wilderness and four additional Wild and Scenic River designations were also included (FWS 2015a).

Second, under ANILCA § 1002 the DOI Secretary was required to assess the petroleum and wildlife values for a 1.5 million-acre portion of Arctic Refuge coastal plain referred to as the "1002" area (Figure 1). The assessment of the 1002 area of the coastal plain was essential to identifying potential oil and gas reserves and whether development activities would significantly and adversely affect fish, wildlife, habitats or the environment.

Biological studies and geological exploration coordinated by the Service, U.S. Geological Survey (USGS), and Bureau of Land Management (BLM) over a 2-year period on the coastal plain were initiated shortly after the enactment of ANILCA. Studies were to conclude 5 years after enactment of the Act, with final results and recommendations submitted to Congress 9 months later.

In April 1982, the Service completed the initial report summarizing current information regarding fish and wildlife, and their habitats occurring on the Arctic Refuge coastal plain (FWS 1982). Between 1982 and 1987 over 50 separate biological field studies in the 1002 area of the coastal plain have documented baseline conditions, most summarized in annual reports (Garner and Reynolds 1983, 1984, 1985, 1986, 1987). The baseline assessment period ended in 1987 with the submittal of the *Arctic National Wildlife Refuge, Alaska, Coastal Plain Resources Assessment: Report and Recommendation to the Congress of the United States and Final legislative Environmental Impact Statement* (hereafter, *Coastal Plain Report*) (Clough and others 1987). The recommendation to Congress at the time was to open the entire 1002 area of the coastal plain to an orderly oil and gas leasing program and in such circumstances as warranted, avoid unnecessary adverse effects on the environment (DOI Secretary Recommendation pp. 182-192 in Clough and others 1987).

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Baseline biological and water resource assessment in or near the 1002 area of the coastal plain continued from 1988 through 2002, coordinated among the USFWS, USGS, BLM, Alaska Department of Fish and Game, Canadian Wildlife Service, Yukon Department of Renewable Resources, Northwest Territories Department of Resources, Wildlife, and Economic Development, and academic institutions (Truett 1990; McCabe and others 1992; FWS 1994; Douglas and others 2002). Since 2002, biological studies have become increasingly landscape oriented, focusing on ecosystem processes and functions (Martin and others 2009).

Concurrent with the biological studies, oil and gas resource exploration and assessment were ongoing in the 1002 area of the coastal plain but ended with the submission of the 1987 *Coastal Plain Report* (Bird and Magoon 1987; Clough and others 1987; FWS 1990; GAO 1993). The Coastal Plain Report concluded that the 1002 area of the coastal plain was potentially rich in oil and gas resources. Based on the findings, there is a 95 percent chance the 1002 area of the coastal plain contains more than 4.8 billion barrels of oil and 11.5 trillion cubic feet of gas in-place (Clough and others 1987). There is a 19 percent chance that economically recoverable oil occurs on the 1002 area of the coastal plain. The average of all estimates of conditional economically recoverable oil resources is 3.2 billion barrels (Clough and others 1987). Finally, in order to conserve the wildlife resources of the area Congress outlined guidance in § 1002(d) for DOI to authorize exploration plans and to develop regulatory guidelines for these geological exploratory activities to ensure these activities do not significantly adversely affect fish and wildlife and their habitats, or the environment. Some of the requirements included a prohibition on the carrying out of exploratory activity during caribou calving and immediate post-calving seasons or during any other period in which human activity may have adverse effects; temporary or permanent closing of appropriate areas to such activity; specification of the support facilities, equipment and related manpower that is appropriate in connection with exploratory activity; and, requirements that exploratory activities be coordinated in such a manner as to avoid unnecessary duplication.

In April 1983, DOI published the final 50 CFR Part 37 guidelines (DOI 1983; FWS 1983). This regulation defines the general provisions for geological and geophysical exploration within the coastal plain of Arctic Refuge, including: purpose and definitions [Subpart A]; general requirements for exploratory activities [Subpart B]; exploration plans and the application process [Subpart C]; environmental protection to avoid significant adverse impacts to natural and cultural resources [Subpart D]; general administration [Subpart E]; and, reporting and data management to preclude unnecessary duplication [Subpart F].

In that rule, three permit application openings were established as described in Table 1. Each application opening allowed either continued work from a previous work session or new work to begin in the upcoming work session. All exploration work, regardless of when it was initiated, was to be completed by May 31, 1986. No new exploration plans have been accepted since 1984 and no new exploration work has occurred since 1986.

Table 1-1. Exploration Work Sessions and Their Respective Application Due Dates as Stipulated in 50 CFR 37.21.

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Type of Exploration Work	Exploration Work Sessions as Allowed in 50 CFR 37.21	Applications Due
Any exploration plans	April 19, 1983 – May 31, 1986	May 20, 1983
Exploration plans other than seismic exploration	June 1, 1984 – May 31, 1986	April 2, 1984
Any exploration plans	October 1, 1984 – May 31, 1986	June 4, 1984

1.4 Agency and Public Involvement

The USFWS is the lead agency in the development of this EA. For a 60-day period following the publication of the proposed rule in the Federal Register, the public may submit comments on both this draft EA and the proposed rule. After considering the comments received, the USFWS will issue a final EA and if it determines that the proposed action will not result in significant impacts it would issue a Finding of No Significant Impact (FONSI) for the EA, thus completing the NEPA analysis for the proposed action.

1.5 Consultation with Federally-Recognized Tribes and Native Corporations

In compliance with Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, federal agencies are required to consult with federally recognized tribal governments during the NEPA process for certain proposed actions, including the development of regulations, that may have a substantial direct effect on the tribes. Pursuant to Public Law 108-199, the Executive Order also applies to Native corporations established under the Alaska Native Claims Settlement Act. Within the USFWS and DOI the Executive Order is implemented by the Department of the Interior policies on Consultation with Indian Tribes (December 2011) and Consultation with ANCSA Corporations (August 2012). The Service has identified tribal governments and ANCSA Corporations potentially substantially affected by the proposed rule change, who are being invited to consult with USFWS on this proposed regulation change. Additional consultation opportunities will be provided prior to issuance of permits for exploration activities on the refuge.

1.6 Summary of Issues

In order to clarify the issues of greatest concern, the following two tables describe the issues being dismissed and further considered in this EA. If an issue has been considered but dismissed from further evaluation, a reason is given in Table 1-3 and the issue will not be discussed further

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in this EA. Issues being further evaluated are listed in Table 1-4. These issues will be further evaluated in Chapter 3 Affected Environment and Chapter 4 Environmental Consequences.

Table 1 - 3: Issues Dismissed from Further Evaluation

AFFECTED ENVIRONMENT	REASON FOR NOT-EVALUATING FURTHER
Geology	Neither the change in regulation nor the resulting exploration activities, which are non-extractive, will change the geology of the area.
Air Quality	With anticipated use of low sulfur fuel it is not expected that emissions concentrations or ice fog from motorized vehicles and equipment would ever reach levels that pose an environmental hazard or cause any significant degradation in air quality.
Steller and spectacled eiders	As migratory birds, neither of these threatened eiders would occupy breeding habitat during the period of winter exploration. Even if there were temporal overlap, only the very NW corner of the 1002 area of the coastal plain is within the breeding range of the spectacled eider, and they only occur there as a rare breeder at very low densities. Steller's eiders do not breed in the 1002 area of the coastal plain and are just a rare visitor along the coast.

Table 1 - 4: Issues Considered for Further Evaluation

AFFECTED ENVIRONMENT	REASON FOR FURTHER EVALUATION
Soils	Although the overall geology of the coastal plain would not be affected, the development of ice roads and ice pads and other associated infrastructure may expose areas to erosion. There is also a risk of fuel spills from equipment being used.
Hydrology	In any proposed winter exploration activity on Arctic Refuge, water withdrawals would be necessary to construct ice roads and other infrastructure that would potentially impact hydrology, aquatic habitats, wetlands and species that depend on them. There is also a risk of fuel spills and release of other contaminants that could impact water quality.
Climate	Although climate will not be affected by either of the alternatives directly, a description of past and present climate is useful in considering cumulative effects of the proposed action to other resources. For this reason a description of climate trends is included in Chapter 3.
Vegetation	In any proposed industrial activity on Arctic Refuge, there is a concern that invasive species will be introduced. We are also concerned about the effects of the development ice roads and ice pads and other associated infrastructure may create.
Wetlands	Depending on the amount of water needed for the development of ice

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	roads and pads, water available for healthy wetlands may be affected.
Fish	Water needed for the development of ice roads and pads, could be withdrawn from aquatic habitat impacting fish populations. Seismic testing over water bodies may also impact fish.
Bald and Golden Eagles	Golden Eagles are rare breeders on the coastal plain, and initiate nesting very early in the spring on the North Slope (earliest of 23 March, with three annual mean initiation dates of 5 April, 14 April, and 22 April); thus, could be affected by "winter" seismic exploration. Bald Eagles are probable, but very rare, breeders on the coastal plain.
Resident Birds	Gyrfalcons are rare breeders on the coastal plain, and initiate nesting very early in the spring; thus, could be affected by seismic exploration. Their primary late winter/early spring prey is rock and willow ptarmigan which are uncommon and common permanent residents, respectively, on the coastal plain.
Migratory Birds	Water needed for the development of ice roads and pads could be withdrawn from aquatic habitat impacting migrating waterfowl and shorebird populations.
Caribou	The coastal plain is within the territory of the Porcupine Caribou Herd which travels north and south and is a primary subsistence resource for many of the Native people who live in and around the Refuge.
Terrestrial Mammals, Not Including Caribou	Both muskox and moose are now rare on the coastal plain; their populations have declined in recent years. Muskox may be particularly sensitive to late winter disturbance given nutritional challenges and calving beginning in mid-April. Bears, wolves, and wolverines all occur on the coastal plain, although they are more abundant in the foothills and mountains. Brown bears emerge from their dens from late March through May; this period could well overlap seismic exploration periods.
Polar Bears	A majority of female polar bears of the Southern Beaufort Sea population now den on the Refuge coastal plain. As a result much of the area has been designated critical habitat.
Bowhead Whale	Now that there is limited sea ice during much of the year, exploration equipment could be transported to the area via barges through a known bowhead whale migration corridor.
Ringed and Bearded Seals	Now that there is limited sea ice during much of the year, exploration equipment could be transported to the area via barges through known bearded and ringed seal habitat.
Cultural Resources	The reverberation created by seismic exploration is known to damage buried artifacts.
Socioeconomic	Exploration activities have the potential to create employment opportunities within communities neighboring the Refuge and may also affect subsistence resource availability.
Environmental Justice	Under EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, federal agencies are

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	required to develop strategies to address environmental justice concerns in their approach to operations.
Subsistence	Exploration activities have the potential to affect resource availability by creating disturbances that change caribou and polar bear movements.
Land Use	The development of any semi-permanent developments in the Coastal Plain may require a change to the land management status from "Minimal" to "Moderate" management.
Noise	Noise from vehicles, generators, aircraft, and human presence has the potential to change the natural soundscape during seismic exploration.
Visual	Due to the relatively flat nature of the landscape, equipment associated with seismic exploration will be noticeable to recreationalists and residents in the vicinity.
Wilderness Values	The resulting exploration activities will require a significant level of industrial activity during the exploration work season in limited areas.

2 Proposed Action and Alternatives

2.1 Alternative 1 (No Action Alternative)

Under the no action alternative, the existing regulation would not be amended or updated. Management of the Coastal Plain, Arctic Refuge, would continue as presently and as stipulated in the ROD for the Arctic Refuge CCP (FWS 2015). There would continue to be no oil and gas exploration on Arctic Refuge.

2.2 Alternative 2 - Proposed Action

The Service proposes to allow opportunities for submission of applications to conduct seismic exploration by amending and updating the regulatory language of 50 CFR Part 37 - *Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska*, specifically § 37.21(b) and (c) as follows:

PART 37 – GEOLOGICAL AND GEOPHYSICAL EXPLORATION OF THE COASTAL PLAIN, ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

Subpart C – Exploration Plans

§ 37.21 Application Requirements.

(a) Prior to submitting an exploration plan, applicants may meet with the Regional Director to discuss their proposed plans and exploratory activities and the requirements of this part.

(b) Any person wanting to conduct exploratory activities may apply for a special use permit by submitting for approval one or more written exploration plans, in triplicate, to the Regional

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Director, Region 7, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503.

(c) In addition to containing the information required in paragraph (d) of this section, any exploration plan submitted shall describe the applicant's plan for carrying out an integrated program of exploratory activities in such a manner as will satisfy the objective and limitations stated in § 37.1. If an applicant submits an exploration plan in any given year with the intention of submitting another exploration plan the following year, the applicant shall describe in its initial plan how its future exploratory activities will be integrated with those proposed under its initial plan. Each exploration plan submitted must be published and be the subject of a public hearing in accordance with requirements of § 37.22(b).

(d) An exploration plan shall set forth in general terms such information as is required by this part and by the Regional Director in determining whether the plan is consistent with this part, including, but not limited to:

(1) The name and address of any person who will conduct the proposed exploratory activities, i.e., the applicant/permittee, and, if that person is an agency, firm, corporation, organization, or association, the names and addresses of the responsible officials, or, if a partnership, the names and addresses of all partners;

(2) The names and addresses of all persons planning at the time of plan submittal to participate in the proposed exploratory activities or share in the data and information resulting therefrom through a cost-sharing or any other arrangement;

(3) Evidence of the applicant's technical and financial ability to conduct integrated and well-designed exploratory activities in an arctic or subarctic environment and of the applicant's responsibility in complying with any exploration permits previously held by it;

(4) A map at a scale of 1:250,000 of the geographic areas in which exploratory activities are proposed and of the approximate locations of the applicant's proposed geophysical survey lines, travel routes to and within the refuge, fuel caches, and major support facilities;

(5) A general description of the type of exploratory activities planned, including alternate exploratory methods and techniques if proposed, and the manner and sequence in which such activities will be conducted;

(6) A description of how various exploratory methods and techniques will be utilized in an integrated fashion to avoid unnecessary duplication of the applicant's own work;

(7) A schedule for the exploratory activities proposed, including the approximate dates on which the various types of exploratory activities are proposed to be commenced and completed;

(8) A description of the applicant's proposed communication techniques;

(9) A description of the equipment, support facilities, methods of access and personnel that will be used in carrying out exploratory activities;

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(10) A hazardous substances control and contingency plan describing actions to be taken to use, store, control, clean up, and dispose of these materials in the event of a spill or accident;
(11) A general description of the anticipated impacts that the proposed exploratory activities may have on the refuge's wildlife, its habitat, the environment, subsistence uses and needs, and cultural resources, and a description of mitigating measures which will be implemented to minimize or avoid such impacts;
(12) A description of the proposed procedures for monitoring the environmental impacts of its operation and its compliance with all regulatory and permit requirements;
(13) A statement that, if authorized to conduct exploratory activities, the applicant shall comply with this part, its special use permit, its approved exploration plan, plan of operation, and all reasonable stipulations, demands and orders issued by the Regional Director;
(14) A description of the applicant's proposed data quality assurance and control program; and
(15) Such other pertinent information as the Regional Director may reasonably require.

If this alternative is selected, it is assumed that the Service will receive and possibly approve applications for seismic exploration activities on the 1002 area of the coastal plain. Proposed 3-D seismic exploration activities in the nearby National Petroleum Reserve - Alaska (NPRA) and analyzed in the BLM EA, DOI-BLM-AKF01000-2017-001-EA and the NPRA Integrated Activity Plan/EIS (2012), give us an understanding of what these activities would generally entail.

Seismic exploration maps the subsurface structure of rock formations by sending energy waves into the ground or water and then recording the reflected energy waves. One of the most common methods for creating these energy waves in the arctic is via vibroseis seismic operations which use truck-mounted vibrators that systematically put variable frequency energy into the earth. Several of these truck-mounted vibrators are located along a line and vibrate in synchrony in order to record energy along a transect. The reflected energy is recorded and the whole line moves ahead.

3-D seismic activities generally occur in the winter with crews beginning to mobilize and build ice roads and pads in December. Full crews arrive in January and commence seismic operations if the ice infrastructure has been completed. Seismic operations continue through most of April, with demobilization finishing by the first part of May. Crews may include 40 -160 people depending on the planned activity with operations occurring 24 hours a day. The camp facility often includes sled-mounted units for preparing and eating meals, sleeping areas, washrooms, offices, shops, medical facilities, generator rooms, and any other support needed. The camp moves along with the exploration work. Any ice roads or pads built during this time are left to melt in place. Any ice bridges built across rivers are removed in order to decrease the chance of ice damming during the melt season. Frozen lakes are often used for landing strips.

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Without a specific exploration plan to evaluate, it is not possible to determine exact locations and timing of all the seismic work and staging. Although we can predict that seismic exploration activities will happen in the winter months, it is less clear what the timing of staging and pre-survey work would be. We can predict that ice roads may be used to stage and transport equipment and materials into the west end of the 1002 area of the coastal plain. Exploration activities further to the east would likely require barge transportation during the summer and fall before the sea ice freezes. Also, unlike the western side of the area, there is no nearby infrastructure on the eastside from which to build, possibly changing the kind and quantity of equipment used.

2.3 Alternatives Considered but Dismissed From Detailed Analysis

No other alternatives were analyzed in detail in this EA, because the proposed change of regulation will allow opportunities for submission of applications to conduct seismic exploration. The Service considered updating the environmental protection requirements of 50 CFR §§ 37.31 and 37.32, but determined that the regulations as currently written provide adequate and appropriate protection of refuge resources and allow the Regional Director to impose additional stipulations to ensure that permittees' activities are conducted in a manner which avoids significant adverse effects on the refuge's wildlife, its habitat, and environment.

3 Affected Environment

Per ANILCA § 1002(c), resource assessment baseline studies within the 1002 area of the coastal plain began shortly after its enactment and, as stipulated, are "continuing." Special emphasis was placed on caribou, wolves, wolverines, grizzly bears, migratory waterfowl, muskox, and polar bears of the coastal plain and their habitat. The purpose of the studies was to "assess the size, range, and distribution of the populations of fish and wildlife; determine the extent, location, and carrying capacity of the habitats of the fish and wildlife; assess the impacts of human activities and natural processes on the fish and wildlife and their habitats; analyze the potential impacts of oil and gas exploration, development, and production on such wildlife and habitats; and analyze the potential effects of such activities on the culture and lifestyles (including subsistence) of affected Native and other people."

The environmental setting, flora and fauna, water resources, cultural resources, and rural lifestyles (including subsistence) of the 1002 area of the coastal plain, Arctic Refuge, are generally defined and described in the *Final EIS and Preliminary Final Regulations: Proposed Oil and Gas Exploration within the Coastal Plain of the Arctic NWR* (DOI 1983), and *Coastal Plain Report* (Clough and others 1987).

Additional natural, water and cultural resource data and assessments are provided in the numerous studies conducted under the Arctic Refuge Coastal Plain Resource Assessment over the past 30 years (FWS 1982; Garner and Reynolds 1983, 1984, 1985, 1986, 1987; McCabe and others 1992; Douglas and others 2002; among others). Cumulative effects of oil and gas activities on the Alaska North Slope were reviewed by National Research Council, as these effects were not adequately integrated into ongoing studies up to that point (NRC 2003).

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Since 1988, the natural and cultural resources, water resources, and lifestyles (including subsistence) in the Arctic Refuge, including the 1002 area of the coastal plain, have been minimally managed by human influence or intrusion, and administered for their wilderness values and natural processes (FWS 1988a, 1988b, 2015a, 2015b).

3.1 PHYSICAL ENVIRONMENT

3.1.1 Soils

Soils in the coastal plain are described in the 2015 Arctic Refuge CCP as including "low terraces and floodplains of streams draining the North Slope of the Brooks Range. Materials underlying soils in this region consist of fluvial sands and silts, with increasing amounts of interstratified marine sediments near the coast. Generally, soils…thaw less than 18 inches in summer and are poorly drained. Loamy textures are common on terraces and floodplains, and organic soils occur in depressions. Locally, peaty materials are buried beneath windblown sand deposits."

3.1.2 Hydrology

Water resources on the coastal plain of the Arctic National Wildlife Refuge consist of streams, lakes, and springs. Streams of the Arctic coastal plain flow north, several forming large alluvial fans as they flow into the Beaufort Sea where they contribute substantial volumes of water and sediment to coastal ecosystems (Arctic CCP). Like other areas of the Arctic, the coastal plain is underlain by continuous permafrost limiting infiltration of surface water and limiting groundwater resources (Lyons and Trawicki 1994). Groundwater that may exist below permafrost is thought to be saline or brackish (Williams 1970). While ninety-nine percent of the 1002 area is classified as wetlands freshwater is limited and confined to the shallow zone above permafrost (Clough et al. 1987). Lakes are not evenly distributed across the coastal plain with concentrations occurring near the mouth of the Canning River and in the region of the Sadlerochit and Jago Rivers with very few lakes occupying the central Katakturuk River region (Trawicki et al. 1991). At Barter Island mean annual precipitation which includes the water equivalent of snow averages 6.3 inches per year, in Umiat east of the 1002 area on the North Slope it is 5.7 inches (Searby and Hunter 1971) emphasizing that climate and permafrost are dominant factors that limit water availability. The non-frozen water found on the coastal plain during the winter months is located in small isolated pools beneath ice hummocks associated with stream drainages , lakes with depths greater than 7 feet, and flowing surface waters associated with springs (Lyons and Trawicki 1994).

<u>Streams and Rivers</u>

The 1002 area has a relatively high density of streams and rivers compared to other areas of the North Slope (Brackney 2008). These habitats support thirteen species of fish, including Dolly

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Varden an important subsistence fish. The hydrography of these systems is strongly influenced by the climate which is characterized by extremely low winter temperatures and short, cool summers with low, desert-like levels of precipitation. Streamflow rapidly declines in most systems shortly after freeze up in September and ceases in most streams by December when they are generally frozen to the stream bed resulting in no flow or flow so low as to not be measureable (Lyons and Trawicki 1994). A few exceptions to this occur where springs result in open reaches and aufeis areas that develop providing important fish overwintering habitat (Arcone 1989). Break up on the Arctic coastal plain occurs during a brief period in late May or early June. Snowmelt begins in the mountains and foothills progressing towards the coastal plain. Rapidly melting water runs over the ground as sheetflow with infiltration limited by permafrost (Lyons and Trawicki 1994). Water in drainages rises rapidly, often flowing over ice covered stream channels. More than half of the annual discharge for these streams can occur during a period of several days to a few weeks (Clough et al. 1987, Sloan 1987). Based on origin, hydrologic regime, and chemical and biological characteristics, Craig and McCart (1975) classified North Slope streams into three categories: mountain, spring-fed, and tundra. Mountain streams are typically fast flowing and fed by varying proportions of snowmelt, glacier meltwater, and spring-fed tributaries. Waters are cold (usually less than 50 °F), occasionally turbid, moderately hard, and support low invertebrate densities. The most common species of fish in mountain streams is Dolly Varden. Mountain streams that receive glacial inputs are unique to the eastern North Slope, in the Jago, Hulahula, and Okpilak watersheds, discharge from glacial sources is the dominant source of flow when precipitation is low and air temperatures are high and transport large volumes of water, sediment and nutrients to downstream ecosystems (Arctic CCP). Spring-fed streams are often tributaries of mountain streams and have relatively stable flows and temperatures throughout the year. Spring-fed waters are characterized by low levels of dissolved solids and very high densities of macroinvertebrates. Many spring-fed streams provide critical spawning and overwintering habitat for Dolly Varden. Tundra streams originate in the Brooks Range Foothills and coastal plain ecoregions, are fed by surface runoff, tend to be meandering systems, and have low to moderate invertebrate densities. Waters are typically warmer and exhibit lower pH and conductivity relative to mountain and spring-fed streams (Arctic CCP). Huryn et al. (2004) found that gradients in freezing probability, nutrient concentrations, and substratum instability control invertebrate communities in these systems. Some projections indicate that glacial inputs could disappear within the next 50 years altering hydrology by reducing instream connectivity and negatively impacting fish migrating to critical overwintering habitat (Nolan et al. 2011). Surface water availability and instream connectivity will potentially be adversely impacted by deepening of the active layer on the coastal plain, increasing duration of the summer season, and increased evapotranspiration rates (Arctic CCP).

Springs and Aufeis Areas

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Six springs are located on the Arctic coastal plain identified through reconnaissance investigation by Childers et al. (1977): Sadlerochit Spring, Red Hill Spring, Katakturuk River tributary Spring, Hulahula River Spring, Okerokovik River Spring, and Aichilik River Spring. During the winter months pressurized water discharges from a spring pushing up through the ice to the surface where it spreads out and freezes forming aufeis areas that can become extensive. These formations melt more slowly than snow, generally persist into the summer and may provide a temporary source of freshwater (Kane and Slaughter 1973). Open water associated with springs provides important winter habitat particularly once surface water runoff ceases due to freezing (Lyons and Trawicki 1994). Most springs in Arctic Refuge have survived since the last glacial maximum (Yoshikawa et al. 2007), suggesting that they will continue to flow and be refugia for aquatic biota in a changing climate.

Lakes

The density of lakes in the Arctic coastal plain is low compared to the rest of the North Slope and as noted earlier their distribution is not uniform, nor is their size and depth (Arctic CCP). Jorgenson and Shur (2007) classified the coastal plain into regions based on lake origin: thaw, depression, riverine, and delta. Depression lake basins are formed in undulating sandy, alluvial marine or eolian deposits, and are the majority found on the coastal plain concentrated in the depression lakes region between the Hulahula and Niguanak rivers. Riverine lakes include oxbow and floodplain lakes along sinuous channels and thaw lakes formed in ice-rich abandoned channels. Riverine lakes are most concentrated along the Jago and Niguanak rivers. Delta lakes include thaw, riverine, and tidal lakes and most are found in deltas of the Hulahula, Jago, Aichilik, and Canning rivers (Arctic CCP). The majority of lakes on the coastal plain are shallow lakes with surface areas ranging from 1,500 acres to less than 10 acres (Trawicki et al. 1991). Recharge of these systems is generally limited to snow melt and direct precipitation in the immediate vicinity of the lake (Lyons and Trawicki 1994). When not connected to larger drainage networks, evaporation has a strong influence on water chemistry and plays an important role in regulating lake water balance (Arctic CCP). Maximum winter ice thickness on lakes in the Arctic is between 6-7 feet (Bilello and Bates 1969, 1971, 1972, and 1975). Clough et al. (1987) reported that most lakes have basins less than 7 feet deep and thus freeze to the substrate. These shallow lakes generally melt from the surface downward in spring. Deeper lakes that do not freeze to substrate may have ice present on the surface well into July. Due to the level of winter freezing, the depth of lakes restricts the presence of fish, Hobbie (1984) found fish present only in lakes with depths greater than 5.6 feet. Shallow lakes generally lack fish because they usually freeze solid but they provide important habitat to emergent vegetation, invertebrates, and migratory birds due to the earlier availability of ice-free areas. Trawicki et al. (1991) identified fish presence in lakes on the coastal plain to be more frequent and widespread than previously suspected. Ninespine stickleback (*Pungitius pungitus*) was found in 34 of 52 lakes surveyed (65%) in 1989. In the past half a century, the duration of ice cover, thermal regimes, and rates of

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primary productivity have likely changed. In the future, changes in temperature, active layer depth, fire frequency and severity, and erosion rates could affect lake distribution, water quality, water levels, size, and connectivity to other habitats (Arctic CCP).

Winter Specific Hydrologic Data

Hydrologic data for the 1002 area are limited, the Service collected short-term (less than five years) of data over two decades ago at 11 stream gage sites on five drainage systems across the coastal plain and conducted an inventory of 119 lake basins to create lake contour maps, water volume calculations and estimates of winter water volume beneath ice cover. These lake basins constituted the majority of larger lake basins found in the 1002 area. These data were collected in large part to address questions regarding winter water availability in the 1002 area in the event of exploration activities. The USGS has collected some additional hydrography data on the Canning and Hulahula Rivers. In the Service stream studies winter water was found to occur over a wide area in most of the major river drainages but it was restricted to small isolated pools beneath ice hummocks scattered throughout the braided portions of these rivers. The volume of water available was estimated to be small, 9 million gallons over the 237 miles of inventoried area (Elliot and Lyons 1990). Total estimated volume of water in the study lakes ranged from 55,382 acre-feet (18 billion gallons) when free of ice to a low of 3,366 acre-feet (1.1 billion gallons) beneath a maximum ice thickness of seven feet. Ninety percent of the available water was contained in just nine of the 119 surveyed lakes, the majority of these were found in the Canning River delta area (up to eighty percent of the total volume), and only two of these lakes were located in the region between the Katakturuk and Sadlerochit rivers (Trawicki et al. 1991).

Climate Change Effects

Historically, in the nearby NPR-A the coastal regions have not thawed until after the second week of June (BLM 2012). By mid-century, these areas are projected to thaw the first week of June. By late century these areas are expected to thaw as early as June 1st. Changes in freeze-up date are predicted to be even greater. Historic data indicates NPR-A water bodies freeze by mid-September. Models indicate freeze-up will not occur until late September in southern regions and early October along the coast. By the end of the century, coastal waterbodies may not freeze until the end of October. These changes will result in a six-week increase in the length of the ice-free season.

Landscape drying trends have been observed in northeastern Alaska (ACIA 2004). Increased temperatures and an extended growing season could increase the evapotranspiration rate, increasing the water deficit (defined as the amount by which evapotranspiration exceeds precipitation) and potentially affecting the annual water balance. The annual water balance represents the water available for plants and animals, streamflow, and groundwater recharge. Shallow water systems, including lakes and wetlands, could decrease in number and extent as the annual water balance experiences an ongoing deficit. Permafrost loss on the Refuge could also result in draining of many shallow water systems; the thawing of ice wedges and ice lenses could

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create more connections between surface water and groundwater systems. If wetlands and lakes continue to dry, an increase in vegetative cover can be expected eventually transitioning to dry meadows and shrublands. This would reduce the amount of habitat available for wetland-dependent species, such as waterfowl.

3.1.3 Climate

The North Slope is defined as the area north of the Brooks Range, including the Beaufort Sea Coastal Plain and the Brooks Range Foothills ecoregions. The climate of the North Slope is classified as arctic: summers are short and cool, and winters are long and cold. The growing season lasts from June to August. Subfreezing temperatures and snow may occur at any time during the year.

The Arctic coast experiences more frequent cloudiness and fog with higher winds; inland, clear skies are more common, winds are variable, and summers are warmer and less cloudy with increasing distance from the coast. At Barter Island on the coast, temperatures average 40 °F in July (warmest month) and -20 °F in February (coldest month) (Table 4-2). Temperatures on the coastal plain and in the northern foothills of the Brooks Range are more similar to those measured at weather stations at Kuparuk and Toolik Lake, ranging from means of 47 to 53 °F in July and -18 to -6 °F in February.

North of the Brooks Range, the Refuge receives little precipitation. The average annual water equivalent precipitation is less than 10 inches (in), most of which falls as summer rainfall, but it includes 32 to 46 in of snowfall. Evaporation rates are low due to low temperatures and a short growing season; the land is underlain by continuously frozen soil, which restricts soil drainage. Therefore, available soil moisture is considerably greater than the low annual precipitation would produce in a more temperate climate, and soils are usually saturated during summer.

Surface winds along the Arctic coast average 9 to 15 miles per hour (mph), with occasional intense storms generating winds exceeding 70 mph. Winds are predominantly from the northeast, although the strongest winds come from the west. September and October are the windiest months on the coast, probably due to maximum amounts of open water (Wendler et al. 2010). During winter, winds are a major force affecting the distribution and amount of snow cover on the coastal plain. Higher, rolling terrain is often blown clear, or nearly so, while dense snow drifts accumulate in sheltered areas along stream banks.

The Arctic is particularly sensitive to warming due to the historically extensive snow and ice cover, where the freezing point marks a critical threshold for stability of the landscape and thus both habitat and infrastructure sustainability. Accelerated melting of multiyear sea ice, reduction of terrestrial snow cover, and permafrost degradation are examples of the observed rapid Arctic-wide response to global warming.

Annual average near-surface air temperatures across Alaska and the Arctic have increased over the last 50 years at a rate more than twice as fast as the global average temperature (Taylor et al. 2017). There is limited meteorological monitoring on the North Slope, and no long term,

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continuous monitoring in the Arctic Refuge. Thus, long term trends are derived primarily from Utqiagvik (Barrow). Especially strong warming has occurred over Alaska's North Slope during autumn. For example, Utqiagvik's (formally Barrow) warming since 1979 exceeds 7°F (3.8°C) in September, 12°F (6.6°C) in October, and 10°F (5.5°C) in November (Wendler et al. 2014).

Our understanding of precipitation trends are limited on the North Slope, in part because the difficulty of collecting rain and snow in windy sites makes historical precipitation data less reliable than temperature data. Overall, the 2016 May Alaska statewide snow coverage was the lowest on record dating back to 1967; the snow coverage of 2015 was the second lowest, and 2014 was the fourth lowest (Taylor et al. 2017). The length of the snow season impacts the timing available for winter exploration activities as well as the timing of wildlife activities, including occupancy of migration and birthing habitats. Snowpack in the Brooks Range, and glacier mass, affect water availability in rivers and lakes for both fish and wildlife habitat and in support of industrial development.

Negative trends in precipitation were observed between 1950 and 1988 at Barter Island, on the Beaufort Sea coast in the center of the Arctic Refuge (Curtis et al. 1998; L'Heureux et al. 2004). Across six decades (1950-2010), researchers also observed a consistent decrease in winter precipitation at Utqiagvik (McAfee et al. 2013), which supported earlier analyses (L'Heureux et al. 2004). The Barter Island station, however, has not reported continuously since the late 1980s, so it cannot confirm recent trends at Barrow. At Bettles, in the western Brooks Range, there appears to be an increase in winter precipitation, with the difference from the Arctic Coastal Plain resulting from the Brooks Range acting as a barrier to moisture transport.

3.2 Biological Environment

3.2.1 Vegetation

North of the Brooks Range, the coastal plain is treeless tundra, composed mainly of hardy dwarf shrubs, sedges, and mosses. Habitats on the North Slope can be grouped into four broad categories: coastal lagoons, lowland wet tundra and lakes, upland moist tundra, and river floodplains with willow shrub thickets. The geography of the 1002 Area differs from the coastal plain further west in that there is generally less low, flat, wet tundra and a greater proportion of rolling, drier terrain. A detailed description of all the habitats on the Refuge can be found in the 2015 Refuge CCP. The following is a summary of the information found there as it pertains to the Refuge coastal plain.

Shrub thicket habitat can be categorized into two types: dry and moist prostrate dwarf shrub. Dry prostrate dwarf shrub occupies dry areas of the coastal plain tundra and on dry, infrequently-flooded river terraces or alluvial fans throughout the refuge. Moist habitats on slightly elevated microsites of the coastal plain are often drier as a result of greater exposure to wind and lack of water from surrounding terrain. Lichen are more common than mosses in these drier habitats. Bare soil as a result of frost action is common in this habitat type. Moist prostrate dwarf shrub contains similar shrub species as dry, but greater winter snow cover and summer soil moisture allows grasses, sedges, and mosses to thrive in the understory.

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The riparian shrub type develops on gravels along rivers and is dominated by the willows *Salix planifolia* and *S. alaxensis*. On the North Slope, this is the tallest vegetation type. Species composition and density is controlled by frequency of flooding, water velocity, and the size of particles deposited during flooding

The very wet graminoid vegetation type occurs on aquatic habitats surrounding large, open bodies of fresh water, very wet habitats that contain numerous small bodies of open water; and coastal marshes frequently inundated with salt water. Surface forms includ low-centered polygons with abundant standing water, thaw lake basins, edges of lakes, and lowbank coastline. There is usually little shrub, forb, or moss cover, except on drier microsites such as polygon rims.

3.2.2 Wetlands

Although the density is low compared to the rest of the North Slope, there are over four thousand lakes covering over 37,000 ac in the Refuge. Most (73 percent) of the lakes are in the coastal plain ecoregion. Most lakes in this region are shallow, freeze to the bottom during winter (Trawicki et al. 1991), and are recharged by snowmelt, overbank flooding, and precipitation. When not connected to larger drainage networks, evaporation has a strong influence on water chemistry and plays an important role in regulating lake water balance. Jorgenson and Shur (2007) classified the coastal plain into regions based on lake origin: thaw, depression, riverine, and delta. Thaw lakes are formed by the degradation of ice-rich sediments and, in the Refuge, are only in great abundance in a small thaw lake plain east of Demarcation Bay. Depression lake basins are formed in undulating sandy, alluvial marine or eolian deposits. Most of the lakes in the Refuge are in the depression lakes region between the Hulahula and Niguanak rivers. Riverine lakes include oxbow and floodplain lakes along sinuous channels and thaw lakes formed in ice-rich abandoned channels. Riverine lakes are most concentrated along the Jago and Niguanak rivers. Delta lakes include thaw, riverine, and tidal lakes and most are found in deltas of the Hulahula, Jago, Aichilik, and Canning rivers. Up to 80 percent of the winter water volume is in lakes in the Canning River delta (Trawicki et al. 1991).

Over 25 percent of the lakes on the North Slope of the Refuge are in the mountains and foothills. Most mountain lakes are of glacial origin and tend to be deeper, have larger surface areas, and store much greater volumes of water than coastal plain Lakes. The largest mountain lakes include Lake Peters (3,226), Lake Schrader (1,689 ac), Elusive Lake (772 ac), and Porcupine Lake (333 ac). With the exception of studies on two large deep glacial lakes, Lakes Peters and Schrader, the limnology of mountain lakes in the Refuge has not been well studied. In the late 1950s, Hobbie (1961) found that Lake Schrader was at the northern limit of thermally stratified lakes; Hobbie (1964) found that 50 percent of the annual primary productivity in Lake Peters occurred when the lake was still covered by ice. In the past half a century, the duration of ice cover, thermal regimes, inputs from glacial meltwater, and rates of primary productivity have likely changed. In the future, changes in temperature, active layer depth, fire frequency and severity, and erosion rates could affect lake distribution, water quality, water levels, size, and connectivity to other habitats.

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Landscape drying trends have been observed in northeastern Alaska. Riordan et al. (2006) reported a reduction in wetland extent and the number and surface area of lakes on parts of the Yukon Flats between 1980 and 2002. Many wetlands on the Yukon Flats Refuge that were once aquatic habitats, such as lakes, now are shrub and wet meadow habitats. Historical aerial photographs from the boreal forest part of Arctic Refuge also show lakes shrinking or disappearing in the past 60 years.

Increased temperatures and an extended growing season could increase the evapotranspiration rate, increasing the water deficit (defined as the amount by which evapotranspiration exceeds precipitation) and potentially affecting the annual water balance. The annual water balance represents the water available for plants and animals, stream flow, and groundwater recharge. Shallow water systems, including lakes and wetlands, would decrease in number and extent as the annual water balance experiences an ongoing deficit. Permafrost loss on the Refuge could also result in draining of many shallow water systems on the Refuge; the thawing of ice wedges and ice lenses could create more connections between surface water and groundwater systems. If wetlands and lakes continue to dry, an increase in vegetative cover can be expected; and they could eventually transition to dry meadows and shrublands. This would reduce the amount of habitat available for wetland-dependent species, such as waterfowl.

3.2.3 Fisheries

Two types of fish habitat dominate the Arctic coastal plain: streams and lakes. Lake habitats may be isolated and without upstream or downstream connections, and may be further defined as deep or shallow. Environmental extremes also dominate fish habitats, between freezing, i.e., below 0°C/32°F during the long winter and flowing waters (above 0°C/32°F) during the short summer months. This combination, along with size, location, and morphology, including chemical and physical characteristics of the numerous lakes and tributaries of the Arctic coastal plain determine the distribution, densities and diversity of fish species (see Affected Environment - Hydrology 3.1.2).

Fish species may be categorized into freshwater residents, diadromous (both marine and freshwater) and marine. About 62 marine and diadromous fish occur in in the Beaufort Sea adjacent to the coastal plain and these species include Arctic char, Arctic cisco, Arctic flounder, boreal smelt, Pacific salmon (pink and chum), and fourhorn sculpin (Craig 1984; Clough and others 1987; Gallaway and Fechhelm 2000; BLM 2012). Nearshore marine environments provide important foraging and spawning habitats while the moving waters of river deltas provide overwintering habitat for some species. About 21 species of freshwater fish, including diadromous species that are predominantly freshwater, occur in the coastal plain and include Arctic lamprey, Arctic grayling, round whitefish, broad whitefish, ninespine stickleback, and burbot (Clough and others 1987; Moulton and George 2000; BLM 2012).

The 3- to 4-month Arctic summer is a critical period for fish to find quality foraging habitats and food resources and reproduce. It may be safely assumed that any fresh waters deeper than 2-2.5

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meters (6-7 feet) deep, or alternatively below the maximum winter ice depth of the coastal plains environs may be suitable wintering habitat for fish (Bilello and Bates 1969, 1971, 1972, 1975 in Lyons and Trawicki 1994; Schmidt and others 1989; Moulton and George 2000). This type of habitat is considered restricted and a limiting factor to overwintering fish survival (Reynolds 1997). Large lakes are generally uncommon in the 1002 area of the coastal plain, and particularly those with overwintering capacity; do not freeze to the bottom during winter months, provide sufficient dissolved oxygen, and/or without salt water intrusion (Clough and others 1987).

Springs are important for spawning, rearing, and overwintering and these sites are generally more abundant and diverse than other waters for aquatic invertebrates as food resources (Glesne and Deschermeier 1984; Clough and others 1987).

The integrity of riparian areas is important for maintenance of water quality and fish populations on the coastal plain, more so at higher elevations where stream meandering during spring snowmelt or summer storm events is less prevalent than at lower elevations (Clough and others 1987).

Grayling are not as tolerant of brackish waters and occur more in riverine systems than char but are in large concentrations are only a few locations. Grayling make extensive migrations to and from spawning, rearing, foraging, and overwintering locations (West and Wiswar 1985; Mecklenburg and others 2002). Major Arctic grayling populations occur in the Canning, Tamayariak, Sadlerochit, Hulahula, Okpilak, and Aichilik Rivers. Arctic char (Dolley Varden) are primarily anadromous but rely on freshwater habitats for spawning, early rearing, and wintering. Therefore, char also migrate with primary movement corridors in the Canning, Aichilik and Hulahula Rivers. The Canning River has the largest char run and the Hulahula is the most important for subsistence purposes.

Smaller fish species which have little interest for sport or subsistence, are important food resources for birds, mammals and other fish.

Seventeen of the most commonly occurring fish species in the coastal plain are important subsistence resources (NRC 2003). Due to difficulty of access and seasonal restrictions, sport fishing may be considered minimal in the coastal plain (Clough and others 1987; BLM 2012). Arctic char is the most important subsistence freshwater fish species followed by Arctic grayling.

3.2.4 Bald and Golden Eagles

Bald eagles are considered a casual visitor on the coastal plain (Arctic Refuge CCP) but recent observations suggest that they may be more accurately considered a very rare possible breeder in the 1002 area of the coastal plain (T. Swem, pers. comm.). Golden eagles, on the other hand are fairly common visitors on the coastal plain, and rare breeders on the inland coastal plain (Arctic Refuge CCP). Across the entire Arctic Coastal Plain, overall golden eagle numbers in spring increased significantly between 1986 and 2012 at an annual rate of 7%; over the last decade of that period the increase was significant at an annual rate of 37% (Stehn et al. 2013). The mean

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annual index for golden eagles over the entire period was 118 birds, but in 2012, the index reached an all-time high of 522 (Stehn et al. 2013).

The 1002 area of the coastal plain is very important for non-breeding golden eagles, particularly subadults, which both scavenge and prey upon caribou during the calving and post-calving period of the Porcupine herd (Mauer 1985). Although none of the nest sites visited by Mauer (1985) and his colleagues were within the 1002 area of the coastal plain, subsequent observations have confirmed them as a breeding species there, including at nest sites within core calving areas (T. Swem, pers.comm.).

Within the refuge, golden eagles breeding north of the crest of the Brooks Range begin nesting very early in spring. Based on a three-year study (1988-1990), nest initiation dates in those golden eagles ranged from 23 March to 11 May, with annual mean nest initiation dates of 22 April, 14 April, and 5 April in 1988, 1989, and 1990, respectively (Young et al. 1995). Those dates would include the last third of the operations phase and the entirety of the demobilization phase of a recently-proposed winter seismic exploration project farther west on the North Slope (BLM CPAI-NPR- A Final Seismic Environmental Assessment, 2016). Elsewhere, disturbance and development correlated with reduction in golden eagle nest success (Kochert et al. 2002); winter seismic activity could have similar result.

3.2.5 Resident Birds

Four species of birds are considered permanent residents of the coastal plain: Willow Ptarmigan, Rock Ptarmigan, Gyrfalcon, and Common Raven (Arctic Refuge CCP). Gyrfalcons are an uncommon resident of the inland coastal plain (Arctic Refuge CCP); eyries are known in the 1002 area of the coastal plain (T. Swem, pers. comm.). Even in the middle of winter, gyrfalcons may be present on their nesting territories; in the coastal Northwest Territories of Canada (at latitudes comparable to, or greater than, those of the 1002 area of the coastal plain), gyrfalcons have been found on territory as early as February (Booms et al. 2008). Both species of ptarmigan are important components of the gyrfalcon diet, particularly in winter and early spring when other prey types are either absent or scarce (Watson et al. 2012). Nest initiation dates range from early April to early June and, aswith the Golden Eagle, early-nesting birds could be disturbed by winter seismic exploration during both the late operation and demobilization phases. Gyrfalcons are known to be disturbed by both fixed-wing aircraft and helicopter overflights; disturbed birds are less likely to use the same site in subsequent year (Booms et al. 2008).

3.2.6 Migratory Birds

In the northern foothills of the Brooks Range, Arctic coastal plain and adjacent marine waters, 158 species have been recorded, including 79 breeding species and 79 species that are migrants, visitors, or vagrants. Birds that use the Refuge have ranges that include all 50 U.S. states and six continents. Thirty-five species of waterfowl have been observed on the Refuge. The geese, except Canada geese, and tundra swans primarily breed on the coastal plain (Arctic CCP 2015).

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Red-throated loons have been identified as a species of Conservation Concern by the Service (2008a), Audubon Alaska (Stenhouse and Senner 2005) and the ADFG (2006). Its highest densities are found on the coastal plain and adjacent marine areas, but a few also breed in the Brooks Range and on the south side of the Refuge.

Twenty-six species of shorebirds breed on the Arctic Refuge, of which 22 breed on the coastal plain. Another species, the red knot, occurs as a migrant only. Of these 27 species, 21 are identified as species of Moderate or High Conservation Concern by the U.S. Shorebird Conservation Plan (Brown et al. 2001), Alaska Shorebird Conservation Plan (Alaska Shorebird Group 2008), the Service (2008a), and/or Audubon Alaska (Stenhouse and Senner 2005) because of small or declining populations.

3.2.7 Terrestrial Mammals other than Caribou

As established by ANILCA, the first purpose of the Arctic Refuge is to "conserve fish and wildlife populations and habitats in their natural diversity." Among the wildlife species specifically listed in ANILCA under this purpose are several species of large terrestrial mammals including caribou, Dall sheep, muskox, moose, brown bear, wolf, and wolverine. Caribou will be considered in the next section; Dall sheep do not occur on the coastal plain. Among the five species which do occur in that region, both muskox and moose have experienced marked population declines over the last few decades. After muskox were reintroduced to the North Slope in the Arctic Refuge in 1969 and 1970, the population grew steadily and rapidly from 1978 to 1985 and then remained relatively stable until nearly the end of the century. Beginning in 1998, however, numbers within the refuge dropped dramatically for the next half decade and have remained very low ever since. The overall muskox population in northeast Alaska and northwest Canada peaked in 1993, declined through 2006, and has remained relatively stable since then. Most of that decline was due to losses from the Arctic Refuge. Today, most of the muskox in the area are either west or east of the Arctic Refuge (Arctic Refuge CCP).

Moose populations in northeast Alaska, including the Arctic Refuge, increased rapidly in the third quarter of the 20th century. From 1989-1994, however, moose in this region declined by at least 50%, leading to harvest closures on state lands. By the early 21st century, moose populations west of the refuge had started to increase, and by 2015 there was some indication that moose were beginning to increase within the refuge.. However moose continue to occur at low density east of the Canning River on the coastal plain and in the northern foothills of the refuge. Because of concerns about the small population size, harvest restrictions have been implemented (Arctic Refuge CCP).

Of the two species, muskox may be more vulnerable to potential disturbance on the coastal plain. Female muskox don't breed until they are four or five years old, most only breed every other year (or less frequently), and produce just a single calf. They subsist on generally poor quality forage in the winter time, and to compensate, they conserve energy by reducing their winter activity. In addition, calves are born between mid-April and mid-May, 4-6 weeks before snowmelt and subsequent green-up produce nutritious forage. As a result, late winter is a time of

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high vulnerability, and if any muskox were in the vicinity of seismic exploration camps and activity, disturbance could dangerously impact their energy balance (Arctic Refuge CCP).

Grizzly bears, wolves, and wolverines all occur on the coastal plain, but are more common inland in the foothills and mountains of the Brooks Range. Among the three, bears may be the most vulnerable to disturbance. Throughout the Arctic, brown bears have low rates of reproduction. They exhibit a delayed age at first reproduction (nine years of age in the Arctic Refuge), mean litter size of two, high first-year mortality, and an interval between successful litters of greater than three years. In addition, they emerge from their dens from late March through May; females with cubs usually emerge later thanadult males (Arctic Refuge CCP). The den emergence period overlaps the late operation and entire demobilization phases of hypothetical winter seismic exploration. Human-bear conflicts would be possible at this time as recently-emerged and hungry bears are ranging widely in search of early spring food.

3.2.8 Caribou

Caribou are the most abundant large mammal in Arctic Refuge and are an important subsistence species for Iñupiat and Athabascan (Gwich'in) hunters. Caribou are also hunted and viewed by other visitors to the Refuge and are prey for brown bears and wolves.

Caribou have been present in northeastern Alaska and the northern Yukon since the early Pleistocene. Human use of caribou in the region may date back thousands of years. Remnants of caribou fences and corral structures used by the Gwich'in people are found throughout the current southern range of the Porcupine caribou herd (Warbelow et al. 1975).

Large caribou herds tend to migrate over long distances using seasonally available forage resources that are often widely distributed. Caribou move in response to changing weather conditions, biting and parasitic insect harassment, and predators. In arctic areas, caribou reproduction is highly synchronous and the majority of calving occurs in a two- to three-week period. Most adult females give birth to a single calf. Caribou calves are precocious, being able to stand and nurse within one hour after birth and follow their mothers within a few hours. The first 24 hours of life are critical, when a behavioral bond is formed between the calf and its mother. Disturbance of maternal groups on the calving grounds may interfere with bond formation and can increase calf mortality. After calving, small bands of cows with newborn calves gradually merge into larger groups and are joined by yearlings, barren females, and bulls arriving from wintering areas.

Summer weather conditions promote the emergence of mosquitoes, nose bots, warble flies, and other biting insects. Insect harassment drives caribou into densely packed groups. These post-calving aggregations often move toward the Arctic coast or to higher elevations in the mountains to find relief from insects.

By August, large aggregations gradually dissolve into widely dispersed small groups that move slowly toward winter ranges. Breeding takes place en route, and by mid-November, caribou arrive in areas where they will spend the winter.

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Four caribou herds live in northern Alaska. Two of these, the Porcupine and Central Arctic herds, consistently use Arctic Refuge seasonally or throughout the year. Caribou would be most susceptible to interaction and potential disturbance from winter exploration activities during their spring migration to calving grounds within the 1002 area of the coastal plain and for those that overwinter in that area, including members of the Teshekpuk Herd.

Porcupine Caribou Herd

An iconic symbol of Arctic Refuge, this herd migrates hundreds of miles from wintering grounds to give birth on the coastal plain and northern foothills of Arctic Refuge and nearby Yukon Territory in Canada. Residents of Arctic Village and, to a lesser extent, Kaktovik, hunt Porcupine caribou. Many visitors come to Arctic Refuge during early summer with hopes of seeing large numbers of caribou.

During the 1960s and 1970s, the Porcupine caribou herd was relatively stable at about 100,000 animals. Numbers steadily increased after 1978, peaked at 178,000 in 1989, and declined to 123,000 caribou in 2001 (Lenart 2007). Between 2002 and 2009, no estimates of abundance were available. During this period, caribou left the coastal plain and northern foothills of Arctic Refuge earlier and did not form large post-calving aggregations, or weather conditions precluded flights to photograph groups (E. Lenart, wildlife biologist, ADFG, pers. comm.). In 2010, 169,000 caribou were counted in a photocensus of the Porcupine caribou herd (Caikoski 2011). Between 2001 and 2013 the herd increased to levels not seen since monitoring began in 1977, with an estimated population of 197,000 (ADFG 2017b).

The Porcupine caribou herd ranges over 130,000 square mi (337,000 square km) of wild lands in northeastern Alaska and northwestern Canada (Lenart 2007). The entire Arctic Refuge coastal plain is key calving and post-calving habitat for Porcupine caribou (Griffith et al. 2002). Foothills and mountains of Arctic Refuge are also important summer, fall, and winter habitats, as well as spring and fall migration routes. As the summer progresses and willows (Salix sp.) emerge, caribou also use riparian habitats. The Porcupine caribou herd generally overwinters south of the Brooks Range in Arctic Refuge and in the Richardson and Ogilvie mountains of the Yukon Territory, Canada. Winter distribution varies by year but is primarily south of the Brooks Range (Caikoski 2011).

Spring migration to calving grounds begins in mid-April and continues through May. Pregnant caribou move northward from wintering areas toward calving grounds, where they give birth during the first week in June. Timing and routes of migration vary annually depending on where they overwintered, snow conditions, and timing of the onset of spring weather. Caribou wintering in Alaska often follow a northeasterly route to calving grounds, crossing the southern flanks and valleys of the Brooks Range, and eventually entering Canada near the Firth River. Caribou wintering in Canada also converge in this region. Some caribou wintering in Alaska move in a more northerly direction, crossing the eastern Brooks Range and traveling more directly toward calving grounds. As snowmelt progresses, caribou in the foothills spread northwestward along a broad front, primarily following the major river corridors and associated terraces where snow melt has advanced.

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For the past few decades, the Porcupine caribou herd has calved in a region encompassed the Arctic foothills and the coastal plain from the Canning River in Arctic Refuge to the Babbage River in Canada, an area of nearly 8.9 million ac (3.6 million ha) (Griffith et al. 2002). During the calving season in early June, Porcupine caribou selected areas of wet sedge, herbaceous tussock tundra and riparian vegetation types (Griffith et al. 2002). Emerging tussock cotton grass (*Eriophorum vaginatum*) flowers were an important source of high quality forage in areas used by calving caribou (Jorgenson et al. 2002). This plant species had greater biomass and forage quality in tussock tundra compared with other vegetation types. The distribution of tussock tundra and moist sedge-willow tundra was greater in calving areas in the Arctic Refuge 1002 area of the coastal plain than in areas further south and east (Jorgenson et al. 2002).

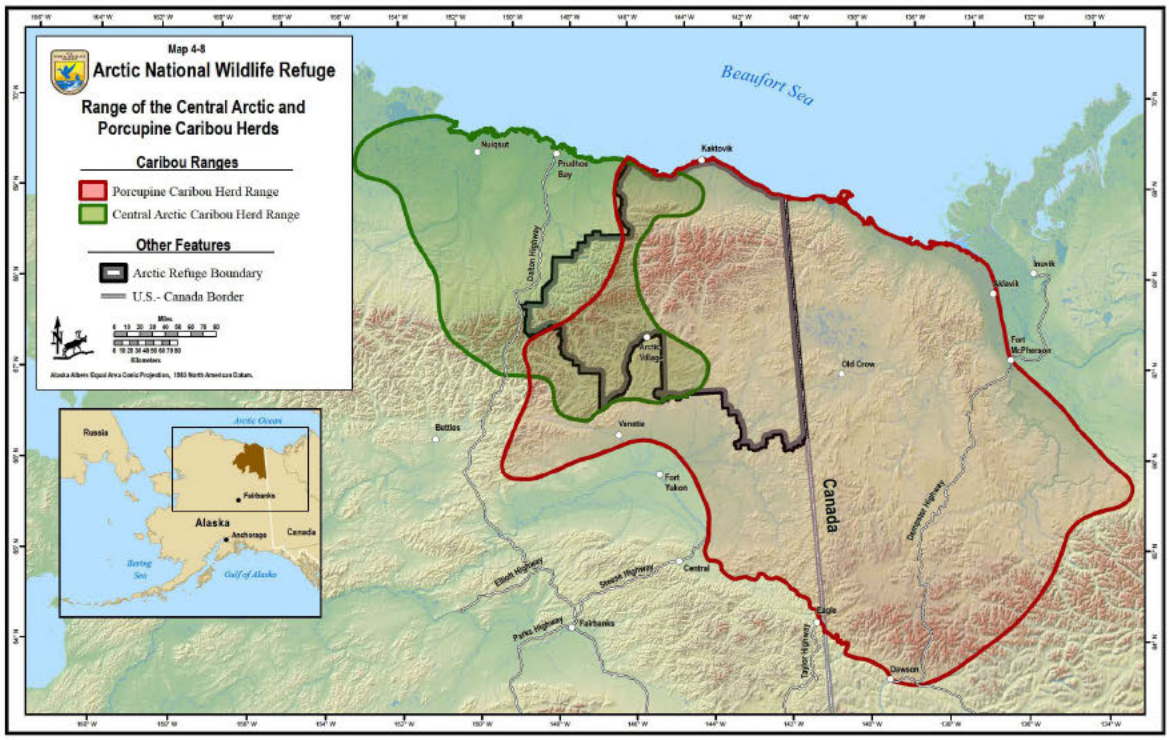
Central Arctic Caribou Herd

The annual range of the Central Arctic caribou herd overlaps that of the Porcupine caribou herd. Two main calving concentration areas have been identified for the Central Arctic caribou herd: a western area between the Kuparuk and Colville rivers, and an eastern area between the Sagavanirktok and Canning rivers. The eastern area includes the Canning River delta region in northwest Arctic Refuge.

During most winters, scattered groups of animals range throughout the coastal plain west of the Katakturuk River and adjacent uplands to the south. Between 2002 and 2009, the winter distribution of the Central Arctic caribou was north and south of the Brooks Range in Arctic Refuge. In some years, they mixed with Porcupine caribou wintering in the same region. In 2010, almost all Central Arctic caribou wintered on the south side of the Brooks Range in Alaska, as did Porcupine caribou.

This herd had about 5,000 caribou in the mid-1970s when it was first identified as a distinct herd (Cameron and Whitten 1979). By the early 1980s, it had grown to almost 13,000 and by the late 1990s, when net calf production was greater than 70 percent calves per female, it increased to over 25000 (Cameron et al. 2002). A photo census in 2010 counted more than 70000 caribou in the Central Arctic herd, but a late spring in 2013 resulted in high mortality and the population dropped to 50,000 animals (ADFG 2017a). A 2016 estimate showed further dramatic declines, and the population estimate decreased an additional 50% and is at less than 23,000 caribou. The declines are attributed to both high adult female mortality and mixing of the Central, Teshekpuk and Porcupine herds.

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3.2.9 Polar Bear

Of the two polar bear subpopulations (or stocks) found in the United States, polar bears in the Southern Beaufort Sea (SBS) subpopulation are the most likely to occur in the 1002 area of the coastal plain. The subpopulation is shared by the U.S. and Canada and is listed as Threatened under the Endangered Species Act. Critical habitat was established in 2010. The boundary of the SBS subpopulation, as recognized by the Polar Bear Specialists Group, is Icy Cape, Alaska to the west and south of Banks Island and east of the Baillie Islands, Canada to the east (Obbard et al. 2010). The SBS subpopulation had an estimated population size of approximately 900 bears in 2010 (Bromaghin et al. 2015). This estimate represents a significant reduction from previous estimates of approximately 1,800 in 1986 (Amstrup et al. 1986), and 1,526 in 2006 (Regehr et al. 2006). Although there was some evidence in the 2010 estimate that the population might be showing signs of the subpopulation beginning to increase (Bromaghin et al. 2015). Analyses of over 20 years of data on the size and body condition of bears in this subpopulation demonstrated declines for most sex and age classes (Rode et al. 2010, 2014).

Population declines and the size and body condition of bears in the SBS subpopulation have been linked to declining sea ice conditions in the Beaufort Sea (Regehr et al. 2006; Rode et al. 2010, 2014, in press; Bromaghin et al. 2015). Declining sea ice conditions in the Beaufort Sea have also led to an increase in the proportion of the subpopulation coming onshore in summer and autumn (from 5.8% during 1986-1999 to 20% during 2000-2014) and a 30 day increase in time

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spent on land (Atwood et al. 2016). While on land, polar bears typically do not feed (Rode et al. 2015), although bears in the SBS subpopulation are drawn to bowhead whale remains from subsistence harvest, particularly adjacent to the community of Kaktovik, Alaska (Wilson et al. 2017). These whale remains may be helping offset lost hunting opportunities for bears in the SBS subpopulation due to sea ice loss (Herreman and Peacock 2013, Atwood et al. 2016).

In addition to a higher proportion of the SBS subpopulation occurring on shore during summer and autumn, there is also an increasing trend towards more bears denning on land (Olson et al. 2017). Denning substrate (i.e., sea ice or mainland) is significantly related to where bears occur in autumn. Pregnant polar bears in the SBS subpopulation that spent >25 days on land in autumn all subsequently denned on land (Olson et al. 2017). Between 1985-2013 the percent of bears denning on land in the SBS subpopulation increased from 34 to 55% and is linked to sea ice declines. Designated Critical Denning Habitat overlaps with 77% of the 1002 area of the coastal plain (U.S. Fish and Wildlife Service 2010). There is also 38% more denning habitat available in the coastal plain of the Arctic Refuge than in the region immediately west of the refuge (Durner et al. 2006). Polar bears have been shown to den in the 1002 area of the coastal plain with greater frequency than expected based on available habitat (Amstrup 1993). Based on known den locations from 2000-2010, 22% of dens for bears in the SBS subpopulation occurred within the 1002 area of the coastal plain (Durner et al. 2010). Thus, the 1002 area of the coastal plain has been documented to be an important area for denning by polar bears and will likely increase in importance as the percent of bears denning on land increases with sea ice loss (Olson et al. 2017).

The mean dates of den entrance and emergence for polar bears that den on land in the SBS subpopulation is 11 November and 3 March, respectively (Rode et al. in review). Females observed with cubs in spring emerged 15 days later than females observed without cubs (Rode et al. in review). Land-based denning also appears to be important for polar bears, as bears that den on land have significantly higher reproductive success (Rode et al. in review).

3.2.10 Bowhead Whale

The bowhead whale is classified as endangered under the ESA and as depleted under the Marine Mammal Protection Act. It was listed in 1970, but no critical habitat has been designated. A detailed discussion of the bowhead whale migration and population history is included in the BLM Integrated Action Plan/EIS (2012). The Bering-Chukchi-Beaufort Seas stock of whale is important to the Inupiat peoples of the northern arctic for subsistence. If barging of materials to Kaktovik, Alaska, is required to support exploration of the eastern 1002 area, this population may be affected.

The size of the Bering-Chukchi-Beaufort Seas stock was estimated at 10,400 to 23,000 animals in 1848, before commercial whaling decreased the stock to between 1,000 and 3,000 animals by 1914 (Woodby and Botkin 1993). This stock has slowly increased since 1921 when commercial whaling ended, and in 2001 estimates indicated a population size of about 10,500 whales (George et al. 2004, Zeh and Punt 2005). Separate analyses suggest the mean annual rate of increase from 1978 to 2001 to be between 3.4 and 3.5 percent (George et al. 2004, Brandon and Wade 2004).

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Bowhead whales migrate through the Beaufort Sea while traveling between wintering areas in the Bering Sea and summer feeding grounds in the Canadian Beaufort Sea, although some animals may remain in areas offshore in the Beaufort and Chukchi seas throughout the summer. The spring migration typically begins in the Bering Sea in mid-March to early April, depending on ice conditions. During the spring migration, bowhead whales follow somewhat predictable leads that form along the coast of western Alaska to Point Barrow. From Point Barrow eastward to Amundsen Gulf, the leads and the migration occur farther from shore based largely on satellite telemetry tracks (Alaska Department of Fish and Game, unpublished data19). From April to June, most bowhead whales are distributed along a migration corridor that extends from their Bering Sea wintering grounds to their feeding grounds in the eastern Beaufort Sea (Moore and Reeves 1993). Some bowhead whales migrate westward to feeding grounds in the western Chukchi Sea (Bogoslovskaya et al. 1982, Mel'nikov et al. 1997, Alaska Department of Fish and Game satellite telemetry data). Bowhead whales arrive on their primary summer feeding grounds in the eastern Beaufort Sea from mid-May through June and remain in the Canadian Beaufort Sea and Amundsen Gulf until late August or early September. Some whales may occur regularly in the western Beaufort Sea, particularly near Barrow Canyon, and in the Chukchi Sea along the northwestern Alaskan coast in late summer. These animals may be summer residents but may also be "early autumn" migrants. However, it should be noted that recent telemetry data has suggested that bowhead movements are far more labile within their range than formerly thought (Quakenbush et al. 2010) and 'reverse' migratory behavior has been documented.

Bowhead whales that have summered in the eastern (Canadian) Beaufort Sea begin the fall migration in late August to September and are usually out of the Beaufort Sea by late October (Treacy 1988–1997, 2000, 2002a, 2000b; Moore and Reeves 1993). The fall migration route extends from the eastern Beaufort Sea, along the continental shelf across the Chukchi Sea, and down the coast of the Chukotka Peninsula (Moore and Reeves 1993, Quakenbush et al. 2010b) The extent of ice cover may influence the route, timing, or duration of the fall migration. Moore et al. (2000) noted that bowheads in the U.S. Beaufort Sea tended to be distributed closer to shore during their westward migration in light ice years. Miller et al. (1996) also observed that whales moving from 147° to 150° West longitude in the central Beaufort Sea, migrated closer to shore in light and moderate ice years (median distance offshore 18 to 25 miles), and farther offshore in heavy ice years (median distance offshore 35 to 45 miles).

3.2.11 Ringed & Bearded Seals

Ringed seals (Phoca hispida) are the smallest and most abundant of the Arctic ice seals (seals that use ice to carry out important life history traits) (Smith and Hammill 1981, Kingsley 1986). Ringed seals have a circumpolar distribution, occurring in all areas of the Arctic Ocean north of approximately 35° north latitude (Kelly et al. 2010, King 1983).
A detailed discussion of the ringed seal population and life history is included in the BLM Integrated Action Plan/EIS (2012).

Bearded seals (Erignathus barbatus nauticaus) are a pagophilic (ice-associated) seal present in the Chukchi and Beaufort seas year round. They are generally considered to inhabit areas of

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shallow water (less than 200 meters) that are at least seasonally ice covered (Burns 1970, Kelly 1988b, Cameron et al. 2010). A detailed discussion of the bearded seal population and life history is included in the BLM Integrated Action Plan/EIS (2012).

3.3 Social Environment

3.3.1 Cultural Resources & Historic Background

The Arctic Refuge CCP (2015) describes in detail the known cultural and historic context of the Refuge. When considering development within the Refuge's coastal plain, it is important to note that cultural resources on the North Slope and coastal plain are on or near the surface of the tundra and tend to be oriented along river corridors and coastal beaches. This means that many cultural resource sites on the Refuge are vulnerable to erosion and other natural forces, and to a lesser extent, from public use of Refuge lands and waters. Human use has occurred in the area for more than 10,000 years (Reanier 2003).

Communities surrounding the Arctic coastal plain or that rely on resources, such as caribou, from the coastal plain include Arctic Village, Chalkyitsik, Coldfoot, Deadhorse, Fort Yukon, Kaktovik, Prudhoe Bay,Venetie, and Wiseman. Details of the histories of all communities, except Deadhorse and Prudhoe Bay, are included in the Arctic Refuge CCP (2015). Deadhorse and Prudhoe Bay were not included in the CCP because their residents do not generally use Refuge wildlife resources. These communities are fundamentally support infrastructure for the operational oil fields.

Prudhoe Bay and Deadhorse
Prudhoe Bay was named in 1828 for Baron Prudhoe by British explorer Sir John Franklin. In the 1970s the site was extensively developed to support oil drilling operations. The 800-mile Trans Alaska Pipeline, constructed to transport crude oil from Prudhoe Bay to Valdez, has its northern terminus here. At Valdez oil is loaded into marine tankers for shipment throughout the U.S. Prudhoe Bay is also the unofficial northern terminus of the Pan-American Highway. Deadhorse is a small community which is absorbed into Prudhoe Bay for statistical purposes.

Culture
Prudhoe Bay is a large work camp for the oil industry. All residents are employees of oil-drilling or oil-production and support companies and work long consecutive shifts. Living quarters and food are provided to the workforce, and there are a number of recreational facilities. There are no permanent residents of Prudhoe Bay.

3.3.2 Socioeconomic

Although the communities of Arctic Village, Chalkyitsik, Coldfoot, Fort Yukon, Kaktovik, Venetie, Wiseman, and Prudhoe Bay surround the Refuge, generally only economies of Kaktovik, Coldfoot, Wiseman, and Prudhoe Bay would be directly affected by oil and gas exploration as they are located either in locations where infrastructure could be staged or along

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the Haul Road, the only developed land route into the area. All of the communities would be indirectly affected if caribou, a valuable subsistence resource, was affected due to their proximity to and use of the Porcupine caribou herd.

Table 3 - 2: Demographic Characteristics of the Communities Near Arctic Refuge

Demographic Characteristics	Arctic Village	Chalkyitsik	Cold-foot	Fort Yukon	Kaktovik	Venetie	Wiseman	Prudhoe Bay
Overall 2010 Census Population	152	69	10	583	239	166	14	2174
American Indian and Alaska Native	135	59	1	45	212	152	0	163
White	7	10	9	520	24	3	13	1804
Two or more races	10	0	0	10	3	10	1	41
Other races	0	0	0	8	0	1	0	166
Median age	29	27.5	43	33.7	30.5	30.5	28.5	50
Median household income	$27,250 +/- $9,667	$38,750 +/- $16,617	Not Available	$33,194 +/- $7,432	$58,125 +/- $33,478	$28,333 +/- $21,379	Not Available	94,906 +/- 11,207
Employment in 2016								
Employed (#)	87	48	11	266	125	103	5	1978

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Employed in the Private Sector (#)	14	6	9	113	41	23	5	1978
Employed in local and/or state government (#)	73	42	2	153	84	80	0	0
Employed in all 4 Quarters (#)	31	27	9	138	93	40	0	1891

3.3.3 Environmental Justice

Some of the communities potentially affected by the Proposed Action are predominantly Alaska Native, with lower incomes than Alaska and U.S. averages. As a result of these socioeconomic characteristics, the analysis of environmental consequences of the Proposed Action and Alternatives in Chapter 4 will determine whether there are disproportionate adverse impacts on these communities as a result of the proposed project.

3.3.4 Subsistence

Section 803 of ANILCA defines subsistence uses as: The customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of inedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter or sharing for personal or family consumption; and for customary trade (16 U.S.C. § 3113).

One of the purposes of the Arctic Refuge is to provide the opportunity for continued subsistence uses by local residents in a manner consistent with the purposes of conserving fish and wildlife populations and habitats and fulfilling international treaty obligations with respect to fish and wildlife (USFWS 2015). With the exception of Prudhoe Bay, each of the affected communities within the proposed project area is characterized by active participation in subsistence fishing, hunting, and trapping on federal, state, and Native corporation lands.

Subsistence Harvest Practices In or Near the Refuge

According to the Arctic Refuge CCP (2015) Arctic Village, Chalkyitsik, Fort Yukon, Kaktovik, Venetie, and Wiseman use the Refuge for subsistence purposes. Due to their close proximity Arctic Village, a Gwich'in community, and Kaktovik, a Inupiat community, use the Refuge most frequently. The subsistence way of life encompasses much more than just a way of obtaining food or natural materials. It involves traditions that are important mechanisms for maintaining cultural values, family traditions, kinships, and passing on those values to younger generations. It is considered a way of life, rather than just an activity. (Alaska Federation of Natives 2010).

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Not only are subsistence opportunities critical to the cultural identities of these communities, the resources gained provide needed sustenance for residents. There are very few year-round employment opportunities and food costs are high due to the cost of air transportation.

Although both Arctic Village and Kaktovik rely heavily on the Refuge for subsistence resources, the resources used are significantly different. Subsistence harvest in Arctic Village was 10,000 to 21,000 pounds with moose and caribou constituting 90 percent of the harvest in each year, according to the State of Alaska's Community Subsistence Information System (1993-1997) and data collected by the Council of Athabascan Tribal Governments in 2001 and 2002. The harvested caribou from these surveys come primarily from the migrating Porcupine caribou herd. Because of this, the Gwich'in people consider the Porcupine caribou herd's calving grounds on the coastal plain as sacred ground, a birthing place for thousands of caribou each year (Gwich'in National 1988).

Kaktovik is an Inupiat community located on Barter Island on the shore of the Beaufort Sea. The Kaktovikmiut's way of life continues to be heavily dependent on subsistence harvest of marine and terrestrial animals and fish. Caribou hunting occurs throughout most of the year, while bowhead whaling occurs from late August to early October. When the community harvests a whale, marine resources composed 59 to 68 percent of their total subsistence harvest (Minerals Management Service 2003). In addition to whales, Kaktovik residents also harvest a considerable number of Dall's sheep and caribou, contributing 17 to 30 percent of the annual harvest by weight.

3.3.5 Land Use

There are currently no permanent developments in the coastal plain. The area is used by recreationists and local residents for fishing, wildlife viewing, hunting, hiking, bird-watching, and photography. The coastal plain is currently managed as a minimal management area. Minimal management is designed to maintain Refuge environments with minimal or no evidence of human modifications or changes. Public uses, economic activities or uses, and facilities are managed to minimize disturbances to habitats and resources. Ground-disturbing activities are avoided whenever possible.

3.3.6 Recreation

The coastal plain is located on lands within ADF&G Game Management Unit (GMU) 26C. ADF&G regulates the seasons, licenses, and bag limits (ADF&G 2015h). Access to prime hunting areas is typically by chartered aircraft, boat, or foot. Two guide use areas could be affected by exploration activities. Nonresident brown bear and Dall sheep hunters must be accompanied in the field by a big game guide authorized to operate in the area (USFWS 2014a).

There are two registration brown bear hunting seasons in GMU 26C. They are held from January 1 to May 31 and August 25 to May 31. In 2016, of the 27 permits issued 12 people reported going hunting (ADF&G website 2017). Caribou hunting is also popular and the hunt is open year round. No permit statistics were available to quantify caribou hunting pressure.

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3.3.7 Noise

Sound is defined as a particular auditory effect produced by a given source, for example the sound of rain on the roof, and is measured in decibels (dB). A-weighted sound level measurements (dBA) are a measure of how the human ear hears sound and is used to characterize sound levels. Table 3-4 shows dBA levels for sounds associated with the area and equipment being proposed for use in the action alternatives.

Table 3 - 4: dBA Levels

Source of Noise	dBA Level
Ambient sound without human influence	20 – 30 dBA
Ground wind 5-10 miles per hour	35 – 45 dBA
Ground wind 20 – 30 miles per hour	55 – 65 dBA
Single engine plane fly over at 1,000 ft	88 dBA
Cessna 206	79 dBA
Bell Huey 204	88 dBA
R-66	82 dBA
Propane generator at 500 ft away	30-35 dBA
(Bolin 2006, Illingworth and Rodkin 2006, Schulten 1997, ICAO Annex 2006, US Coast Guard 2010)	

Currently there is no source of non-ambient noise on the coastal plain, aside from ground wind and the occasional aircraft, high overhead. Generally, noise levels on the Refuge are expected to be between 20 and 30 dBA in calm winds and up to 40 to 50 dBA in moderate to strong winds.

3.3.8 Visual

Visual resources are often described in relation to landscape character or the overall impression created by an area's unique combination of features, such as land, vegetation, water, and existing structures (cultural modification). Viewsheds are the geographical areas that are visible from given locations. They include all surrounding points that are in line-of-sight with a given location and exclude points that are beyond the horizon or obstructed by terrain and other features.

The landscape character of the coastal plain is of a landscape that is relatively flat, yet interspersed with low ridges and depressions. Tall, linear lined objects would be an unusual characteristic. Viewsheds on the coastal plain are virtually free from indications of human activities except where subsistence structures are located.

3.3.9 Wilderness Values

The Arctic Refuge, including the coastal plain, was initially proposed as "The Last Great Wilderness" and wilderness values were highly prominent in its initial establishment as the Arctic National Wildlife Range. The Refuge's 2015 CCP recommended the 1002 area for Wilderness designation because it exemplifies the wilderness qualities of natural condition, natural quiet, scenery, wild character, and ecological wholeness. The area's diverse wildlife

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species are particularly valued because they exist in a wilderness context, with their natural behaviors, interactions, movements, and cycles continuing.

The area offers exceptional opportunities for wilderness oriented recreation—adventure, exploration, solitude, and emersion in the natural world. As well, the area holds high symbolic and existence value for millions of people who don't visit, but find satisfaction, inspiration, even hope in just knowing it exists.

4 Environmental Consequences

NEPA requires the disclosure of environmental impacts associated with the alternatives including the No Action Alternative. This chapter presents the anticipated environmental impacts of Alternative 1 (No Action) and Alternative 3 (Outer Route). These analyses provide the basis for comparing the effects of the alternatives on the Affected Environment. NEPA requires consideration of context, intensity, and duration of direct impacts, indirect impacts, cumulative impacts, and measures to mitigate for impacts.

The direct, indirect, and cumulative impacts are described for each issue (impact topic) and where applicable, by project phase (construction and operation). The impacts for each issue are based on the intensity (magnitude), duration, and context (extent) of the impact. Summary impact levels (negligible, minor, moderate, or major) are given for each issue. Definitions are provided below.

4.1 Definitions of Terms

Direct Effects – Direct effects are impacts that are caused by the alternatives at the same time and in the same place as the action.

Indirect Effects – Indirect effects are impacts caused by the alternatives that occur later in time or farther in distance than the action.

Long-term Effects – Long-term effects are impacts that would occur throughout the life of the project.

Short-term Effects- Short-term effects are impacts that would occur during only the construction phase of this project.

Cumulative Effects – The Council on Environmental Quality (CEQ) defines cumulative effects as impacts on the environment which result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant actions taking place over a period of time (40 CFR 1508.7). Informed decision making is served by consideration of cumulative effects resulting from projects that are proposed, under construction, recently completed, or anticipated to be implemented in the reasonably foreseeable future.

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CEQ guidance in considering cumulative effects states that the first steps in assessing cumulative effects involve defining the scope of the other actions and their interrelationship with a proposed action. The scope must consider other projects whose effects coincide with the location and timetable of a proposed action and other actions. Cumulative effects analyses must also evaluate the nature of interactions among these actions (CEQ 1997). The cumulative effects assessment is based on available information at the time of development of this EA.

To identify cumulative effects, the analysis needs to address two fundamental questions.

1. Does a relationship exist such that affected resource areas of the Proposed Action or alternatives might interact with the affected resource areas of past, present, or reasonably foreseeable future actions?
2. If such a relationship exists, then does an EA reveal any potentially significant effects not identified when the Proposed Action is considered alone?

Mitigation - Mitigation includes special procedures and minimization measures that are implemented to avoid, reduce, or compensate for effects caused by an action. Some mitigation measures are already incorporated into the Proposed Action to avoid and reduce the potential for adverse effects. Other mitigation measures could be characterized as Best Management Practices that further reduce or compensate for adverse effects.

4.2 SIGNIFICANCE CRITERIA

Summaries of the effects on the resources synthesize information about context, intensity, and duration, which are weighed against each other to produce a final assessment. While each summary reflects a determination using best professional judgment regarding the relative importance of the various factors involved, Table 4-1 provides a general guide for how summaries are reached.

Table 4 - 1: Descriptions of Final Assessment Categories

Assessment	Description
Beneficial	Resource improvements would occur and would have a perceptible change to the resource.
Adverse: Negligible	Impacts are generally extremely low in intensity (often they cannot be measured or observed), are temporary, and do not affect unique resources.
Adverse: Minor	Impacts tend to be low intensity or of short duration, although common resources may have more intense, longer-term impacts.
Adverse: Moderate	Impacts can be of any intensity or duration, although common resources are affected by higher intensity, longer impacts while unique resources are affected by medium or low intensity, shorter-duration impacts.
Adverse: Significant	Impacts that in their context and due to their intensity (severity) have the potential to meet the thresholds for significance set forth in CEQ regulations and therefore, warrant heightened attention and examination for potential mitigation in order to fulfill the policies set forth in NEPA.

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4.4 ALTERNATIVE 1 – NO ACTION

Direct and Indirect Effects: Implementation of the No Action Alternative would result in no direct or indirect impacts to any of the considered resources. There would be no new exploration activities allowed on the coastal plain; and therefore no effects due to this project would occur.

Cumulative Effects: No direct or indirect effects to the existing condition of the resources considered would occur under the No Action Alternative; therefore, no cumulative effects would occur on the resources.

4.5 ALTERNATIVE 2 – PHYSICAL ENVIRONMENT

4.5.1 Soils

Additional literature is needed in order to understand the environmental consequences of the proposed action on soils.

4.5.2 Hydrology

It is difficult to fully describe potential environmental consequences when the scope and nature of activities has not been fully outlined. This section is developed to address very general potential activities limited to seismic exploration of unknown scope and attendant infrastructure to accomplish this including development of ice roads. It is clear that because unfrozen water is limited in winter on the Arctic coastal plain, negative effects of water withdrawals on overwintering fish populations, benthic invertebrates, and birds and mammals that feed on those organisms seem likely (West et al. 1992). Water withdrawal and its direct influence on reducing available habitat (wetted space) probably impacts fish populations more than any other winter alteration (Cunjak 1996). Since the distribution of adult and juvenile fish is extremely restricted during the long arctic winter when most of a drainage is frozen solid (Craig and Poulin 1975), water removal , leading to reduced groundwater flow or altering baseflow, ice and temperature regimes has the potential to affect all life stages of some populations. Seismic activity could potentially reduce fish populations, divert fish from their normal locations, or adversely affect fish populations and habitat. Exploration activities bring the potential for fuel spills or other releases of contaminants that could affect water quality.

Seismic Exploration and Thermokarst Activity

Seismic exploration can cause thermokarst, especially when snow is insufficient to protect soil and vegetation (WesternGeco 2003). Removal or damage of the organic mat exposes soils to erosion by wind and water, which could deposit sediment into water bodies resulting in higher turbidity and concentrations of suspended sediment. To cause high turbidity, the peat mat must be sufficiently eroded to expose underlying mineral soils, and the mineral soils must be fine grained (BLM 2012).

Effects of seismic exploration on water resources and aquatic habitats

Seismic surveys can be conducted using dynamite (or other explosives), air guns, or Vibroseis to generate acoustical energy pulses necessary to locate subsurface geological formations that

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might contain oil or gas (BLM 2012). Research has demonstrated that high-intensity acoustic energy can lead to damaged auditory sensory hair cells in fish, effectively reducing the ability to hear (McCauley et al. 2003; Popper 2003; Smith et al. 2004; Popper et al. 2005). The extent of damage and the ability to regenerate these cells is dependent on the intensity and duration of noise and the species of fish. Underwater shock waves can also cause injury to the swim bladder and other organs and tissue (Wright 1982), which could result in a sub-lethal or lethal effects. Fleeing behavior is also a well-documented response by fish to anthropogenic sounds (Popper 2003; Popper et al. 2004). Because of a lack of information regarding the impacts on fish from Vibroseis specifically, winter field tests on the North Slope were conducted in 2000, to measure the sound pressure levels in water that were generated by Vibroseis rigs operating on the ice overhead (Greene 2000; Nyland 2002). The results indicated that these sound pressures were great enough 10 meters from the source to cause avoidance behavior, but no measurements were made directly below the Vibroseis equipment. Fish fleeing behavior was the most obvious effect of Vibroseis during the 2003 Alaska Department of Natural Resources/BLM study (Morris and Winters 2005). Because exploration using Vibroseis occurs in the winter when physiological stress is the greatest for most fish species, a flight response could potentially be detrimental. (BLM 2012)

Use of Explosives

Use of explosives is a major disturbance to fish and wildlife. These are particularly stressful to fish that are captive in overwintering habitats and would likely have a negative impact on terrestrial and aquatic animals that congregate near spring-fed oases during winter as well as presenting potential contamination issues.

Effects of Water Withdrawal from Lakes

In other areas of the North Slope the primary source of water during the winter months for exploration activities is unfrozen water that lies beneath the ice cover of both shallow and deep lakes. This water is somewhat saline because of the exclusion of ions during the freezing of the upper part of the lake. Water from lakes may be used for ice roads, pads and airstrips, and potable water for field crews. Typically the volume of water taken from an individual lake depends on the depth of the lake, volume of unfrozen water in the lake, and the presence and type of fish documented (BLM 2012).

Water withdrawal affects the available habitat for fish species if they are present, macroinvertebrates and can otherwise impact aquatic habitat by further altering water quality and reducing the water available when breakup occurs potentially affecting spring recharge and lake levels.

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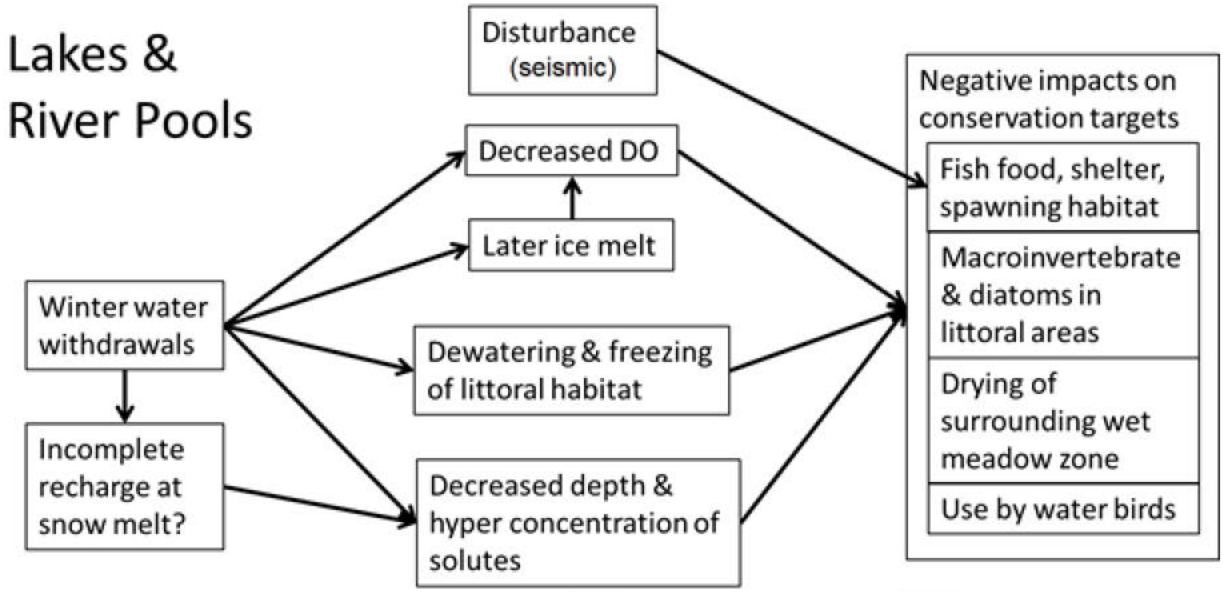


Figure X. Potential impacts of seismic exploration on lakes and rivers

Removal or compaction of snow can increase the depth of freezing on lakes, sometimes by one foot or more. As a result, the water quantity available in a lake during the winter months can be greatly reduced, and the salinity of the water beneath the ice can be increased further. Maintaining the natural hydrologic regime may not be possible under various pumping scenarios. To reduce impacts to the natural hydrologic regime, regulations typically prohibit snow compaction on fish-bearing lakes, but snow compaction is unavoidable when ice aggregates are removed from lakes (BLM 2012).

There are no studies assessing the effects of permitted withdrawals on lake water chemistry on the North Slope of Alaska. Hinzman et al. (2006) conducted a study to assess the effects of what turned out to be relatively small water withdrawals on water chemistry and lake-recharge. This work was funded by the Department of Energy and oil field companies, and did not undergo a standard peer-review process, yet it is widely cited by the BLM and DOE. Unfortunately, only a small fraction of the permitted withdrawal volume was actually pumped from the study lakes, the study design had almost no ability to detect change, and the researchers were unable to get their dissolved oxygen sensors functioning to conduct any relevant measurements in pumped lakes. Thus, we have no information on potential impacts of heavy pumping that is currently allowed by water withdrawal permits on the North Slope of Alaska. Despite the low ability to detect change, Hinzman et al. (2006) did find that one of four pumped lakes did not fully recharge at snow melt. This suggests that water withdrawals far less than permitted volumes can have significant impacts on lake hydrology and the availability of wetted habitat. Canadian studies on ice-covered lakes have found that water withdrawals have a substantial and wide range of negative impacts on aquatic ecosystems (Cott et al. 2008). These include reduction of habitat for fish, waterfowl, and furbearers; reduction in oxygen available to overwintering fish; and dewatering and freezing of littoral habitats which kills plants, invertebrates, and fish eggs. Isolated lakes may be particularly vulnerable as they may not recharge at snowmelt. Organisms

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in small isolated lakes are particularly sensitive to water withdrawals. The effects of water withdrawals on wet meadow zones surrounding lakes are unknown, but would likely be great if lakes are not fully recharged at snowmelt. This would result in a reduction in habitat for waterfowl and shorebirds that use these lakes during the summer.

Effects during exploration on water chemistry from water withdrawals could be short term if lakes are fully recharged during spring. Impacts to overwintering fish and littoral zone communities will likely be more substantial and longer-term, especially in isolated lakes.

Effects of Ice Roads, Ice Pads and Ice Bridges

Ice roads and ice pads are used extensively during the winter season for access and for seismic exploration. Ice roads require about 1 million to 1.5 million gallons of water per linear mile and generally can be built at a rate of about 1.5 inches of thickness per day (BLM 1998). Ice pads can require up to 5 million gallons of water to build and range in size from 3 to 10 acres. Floating ice bridges may be necessary to cross large rivers and must be of sufficient thickness to handle heavy truck traffic. Smaller rivers require ice bridges, which are often constructed of aggregate chips and water and placed on grounded ice. Ice roads and bridges can cause additional freeze-down, reducing the already limited overwinter water volume available for fish habitat and affecting water quality. During snow melt ice bridges can create ice dam flooding if not removed properly.

4.6 ALTERNATIVE 2 - BIOLOGICAL ENVIRONMENT

4.6.1 Vegetation

The level of impact on vegetation is based on (1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource, (2) the proportion of the resource that would be affected relative to its occurrence in the region, (3) the sensitivity of the resource to the proposed activities, and (4) the duration of ecological ramifications. A habitat perspective is used to provide a framework for analysis of general classes of impacts. Impacts to vegetation could include removal of vegetation; loss of available habitat; the introduction of new nonnative, invasive species; dispersal of existing nonnative, invasive species; changes in phenology (i.e., delayed greenup) due to delayed spring melting of ice roads and ice pads; compression or destruction of vegetation if winter travel occurs in areas with insufficient snow cover; changes in moisture and/or nutrient availability due to erosion, soil compaction, melting permafrost, or topographic modifications; or adverse impacts from pollutants that are released from construction operations.

Direct and Indirect Effects: Negligible to Significant

Cumulative Effects: Negligible to Significant

4.6.2 Wetlands

Additional literature is needed in order to understand the environmental consequences of the proposed action on wetlands.

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4.6.3 Fisheries

Direct impacts would include mortality to fish or alterations to habitat by geophysical exploration that make these unacceptable or suboptimal for life history requirements and/or long-term survival, including contaminant spills, failure of sewage or waste-water disposal, blasting, channelization, culverts or barriers to movement, increased turbidity from construction, toxic effects of drilling muds or depletion of dissolved oxygen levels. Over-harvesting of selected fish species may occur if not stipulated as a prohibition to the increased human workforce during exploration or development.

Indirect impacts would fish swept into storage reservoirs during high flows (storm events, spring snowmelt or construction activities) where fish are trapped when water levels return to normal or are pumped out. Such events occur naturally. Additionally, such artificial impoundments may provide alternative overwintering habitat for some species in a region where such habitats are scarce. Access to and from the larger population would be necessary for this to be an effective benefit to fish species. Abandoned deep-water reservoirs have been beneficial for several fish species (Moulton and George 2000).

Early pipeline and development in the Prudhoe Bay area reduced some fish populations due to locations of road crossings, undersized or undercut culverts prior to understanding species-specific swimming needs (Moulton and George 2000).

Those species that do not migrate are not as likely to be affected by impacts related to barriers and some habitat changes. However, wintering areas are essential. Therefore, any factor linked with exploration or development that reduces adequate open water depths during winter months may have the potential to reduce populations at specific locations.

Each Arctic grayling river-population is distinct from others. Therefore, geophysical impacts could have a larger footprint on a landscape scale than a single site. However, the distribution of the Arctic grayling has increased in Prudhoe Bay environs since the development of the the oil-field (NRC 2003).

Direct, indirect, and cumulative effects of geophysical exploration and oil-field development pose little risks to freshwater fisheries and their habitats based on recent evaluations and using best management practices that have evolved since the late 1970s to late 1980s (Moulton and George 2000; NRC 2003; BLM 2012). The use of vibration equipment in lieu of blasting has reduced overpressure mortalities in fish and less intrusive to habitats. Low ground-bearing pressure vehicles reduce soil disturbances and potential for sediment mobilization and associated accumulation to lakes and streams. Capping the amount of water withdrawal from any natural waters may minimize overwinter mortalities or reduction of overwintering habitat for fish.

4.6.4 Bald and Golden Eagles

Additional literature is needed in order to understand the environmental consequences of the proposed action on eagle populations.

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4.6.5 Resident Birds

Additional literature is needed in order to understand the environmental consequences of the proposed action on resident birds.

4.6.6 Migratory Birds

Many species of migratory birds use the coastal plain for nesting or for feeding in preparation for fall migration. These include a variety of waterfowl and shorebirds that are dependent on aquatic and lakeshore habitats for nesting or feeding. If winter water withdrawals impact shoreline vegetation and/or aquatic plants, fish, and invertebrates, these effects could negatively impact waterfowl and shorebirds.

4.6.7 Terrestrial Mammals (Caribou, Muskox, Wolverine, Grizzly Bears)

Impacts to habitat used by terrestrial mammals would be minor, as most seismic activities would occur during the winter on frozen tundra or ice. Potential causes of disturbance to terrestrial mammals from seismic activities would include surface vehicular traffic on frozen tundra or ice and fixed-wing aircraft traffic. In most cases, these activities would cause short-term displacements of and/or disturbance to terrestrial mammals. Where 3-D seismic exploration survey lines are located only 660 to 1,200 feet apart, localized displacement of terrestrial mammals could last for several days or lead to complete abandonment of localized habitat.

Effects on caribou and moose could include temporary habitat displacement and increased energy expenditure associated with increased disturbance movement. Caribou overwintering on the coastal plain would likely be encountered during seismic surveys. It is possible that displacement of caribou by seismic exploration activities during winter could have a negative effect on their energy balance (intake versus expenditure). Because these animals are mobile and the operation would be short in duration (e.g., 2 to 3 days in one area), it is not anticipated that any lasting adverse impacts to caribou would result under most circumstances. However, this assumption has not been scientifically tested and conditions for winter survival vary from year to year. It is possible that this disturbance could have an additive effect on natural winter mortality and could disproportionately impact young of the year and pregnant cows. Caribou have been shown to exhibit panic or violent, running reactions to aircraft flying at elevations of approximately 160 feet and to exhibit strong escape responses (animals trotting or running) to aircraft flying at 150 to 1,000 feet (Calef et al. 1976). Additional effects on caribou nutrition during the calving and post calving periods could occur as a result of delayed green up of vegetation underlying ice roads and pads or areas of compacted snow. The severity of these impacts would be dependent on the extent of the affected areas and by timing of snowmelt during a particular year.

Previous studies of the effects of oil and gas exploration on muskoxen in Alaska and Canada focused on disturbances associated with winter seismic operations. Some muskoxen reacted to seismic activities at distances up to 2.5 miles from the operations; however, reactions were highly variable among individuals (Reynolds and LaPlant 1985). Responses varied from no change in behavior to becoming alert, forming defense formations, or running away (Winters and

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Shideler 1990). The movements of muskoxen away from the seismic operations did not exceed 3 miles and had no apparent effect on muskox distribution (Reynolds and LaPlant 1986). Unlike caribou, muskoxen are not able to travel and dig through snow easily. In the winter, they search out sites with shallow snow, and greatly reduce movements and activity to conserve energy (USDOI U.S. Fish and Wildlife Service 1999). Muskoxen survive the winter by using stored body fat and reducing movement to compensate for low forage intake (Dau 2001). Because of this strategy, muskoxen may be even more susceptible to disturbances during the winter. It is possible that repeated disturbances of the same animals during winter could result in increased energetic costs that could increase mortality rates. Depending upon the location of the seismic exploration, impacts on muskox populations would be non-existent to minor.

Seismic camps could result in localized disturbance and/or displacement of terrestrial mammals for up to a few days. Bears and foxes could also be attracted to camps and conflict could result. Since seismic camps generally move at least once a week and proper handling of wastes would be regulated through permitting, the potential for bears or foxes to be attracted to human food sources would be minor. In addition, most seismic activity would occur when bears were hibernating and not attracted to scents. However, grizzly bears denning on the coastal plain, including females with dependent cubs, would be exposed to disturbance from seismic activities. Disturbance during winter can cause bears to abandon their dens, which increases winter mortality. Mitigations measures, such as those employed in existing oil fields west of the refuge will be required to minimize this disturbance.

The potential effects of seismic activities on wolverines would include disturbance from air and surface vehicle traffic, and increased human presence. Wolverines are considered a shy and secretive species that is present at very low densities and may be sensitive to disturbance.

4.6.8 Caribou

Addressed in previous section

4.6.9 Polar Bears

Terrestrial oil and gas industry seismic survey activities on the North Slope of Alaska typically require between 80 and 160 personnel. Substantial logistical support is required for a seismic survey operation, and also to support the personnel camps, vehicles, security, aircraft operations, restocking of the explosive magazine (if explosives are used), medical support, scientists, marine mammal observers, ice road construction, barge traffic, and many other logistical and support functions.

Polar bears present in the Arctic Refuge 1002 area may be affected by seismic survey activities in various ways. Noise, vibrations, sights, and smells produced by seismic survey activities may elicit a wide range of responses from polar bears. Polar bears respond to the sights and sound of snowmachines, vehicles, vessels, and aircraft; especially helicopters (Watts and Ratson 1989; Dyck 2001; Dyck and Baydack 2004; Andersen and Aars 2005). Polar bear responses to disturbance are highly variable and are influenced by an individual bear's

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previous experiences and tolerance level. Polar bears are most likely to respond to the majority of seismic survey activities with short-term behavioral and physiological responses such as avoidance, increased vigilance, increased heart rate, and other stress responses. Disturbance during resting may result in increased energy expenditure or adverse physiological responses (Watts et al. 1991), but short-term reactions like these will rarely affect the health or survival of individual animals or the population. The effects of fleeing from aircraft may be minimal if the event is short and the animal is otherwise healthy and unstressed. However, on a warmer day, a short run may be enough to overheat a well-insulated polar bear. The effect of fleeing an aircraft or ground vehicle on polar bear cubs, particularly cubs of the year, would likely be the use of energy that otherwise would be needed for survival during a critical time in a polar bear's life, and potentially separation from the female. If the exposure and separation, or both, were brief and singular then the effect would most likely be minimal. Chronic disturbances, extreme reactions, disruption of key behaviors such as feeding or denning, or separation of dependent cubs from the female are more likely to affect health or survival. Polar bears directly interacting with seismic survey activities increase the risk of human-bear encounters, conflicts, and injury or death of polar bears.

Seismic survey activities disturbing female polar bears at maternal den sites are of great concern. Minimizing disturbance while bears are in dens is important because timing of den emergence is significantly related to cub survival (Rode et al. in review). Female polar bears entering dens and females in dens with cubs are more sensitive to noises than other age and sex groups. Disturbance during the early stages of denning may cause a female polar bear to abandon the den site in search of another one. A female polar bear may locate another suitable den site and continue her reproductive process Denning female bears may abandon their dens early in response to stress (Amstrup 1993). Amstrup (1993) reported most polar bears in dens continue to occupy the dens after close approaches by aircraft. Although the snow attenuates some aircraft noise (Blix and Lentfer 1992), repeated overflights may cause polar bears to abandon or depart their dens. Premature den site abandonment after the birth of cubs, or if the female abandons the cubs after they emerge from the den, will result in cub mortality. The potential for disturbance increases once the female emerges from the den. She is more vigilant against perceived threats and easier to disturb.

Though human activities (e.g. industrial, subsistence) are expected to exert a smaller influence on polar bear populations than the loss of sea ice habitat (Atwood et al. 2015; Regehr et al. 2015), the cumulative effects of seismic survey activity and climate change are not well understood. Habitat loss due to changes in Arctic sea ice is the primary cause of decline in polar bear populations, and the decline of sea ice is expected to continue throughout the polar bear's range for the foreseeable future (73 FR 28212, May 15 2008). Under both stabilized and unabated greenhouse gas emissions models, polar bears are expected to have greatly decreased persistence throughout the region (Atwood et al. 2015). The effects of seismic survey activity in the Arctic Refuge 1002 area combined with the effects of climate change could have unknown effects on the Southern Beaufort Sea population of polar bears.

The requirements of incidental take authorizations under the Marine Mammal Protection Act, such as polar bear interaction plans, training, monitoring, and mitigation measures have proven

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effective at reducing the effects of oil and gas industry activities, including seismic surveys, on polar bears in other areas of northern Alaska. Mitigation measures, including a pre-activity den survey and a 1.6-km (1-mi) operational exclusion zone around known dens help to limit disturbance of denning female polar bears. The current incidental take regulations for oil and gas industry activity in the Beaufort Sea and adjacent areas of northern Alaska, published in the Federal Register on August 5, 2016 (81 FR 52276), include a comprehensive analysis of the effects of oil and gas industry activity to polar bears, as well as mitigation, monitoring, and reporting requirements. A detailed description of mitigation measures that limit the effects of seismic surveys on polar bears is available at title 50 of the Code of Federal Regulations, part 18, subpart J, section 18.128.

4.6.10 Bowhead Whale

Additional literature is needed in order to understand the environmental consequences of the proposed action on bowhead whales.

4.6.11 Bearded and Ringed Seals

Additional literature is needed in order to understand the environmental consequences of the proposed action on bearded and ringed seals.

4.7 Alternative 2 - Social Environment

4.7.1 Cultural Resources

Very little cultural resource investigations or inventories have occurred within the 1002 area. Therefore, pursuant to Section 106 of the National Historic Preservation Act, applications for exploration within the 1002 would be required to include sufficient identification and evaluation of cultural resources to ensure that potential adverse effects could be avoided, minimized or mitigated.

4.7.2 Socioeconomic

Impacts to socioeconomic resources would be considered to be significant if an action resulted in a substantial change in the local or regional population; and housing, community general services, or social conditions from the demands of additional population/population shifts. Impacts would also be considered major if there were a substantial change in the local or regional economy, employment, or spending or earning patterns.

Direct and Indirect Effects: We would expect minor effects in Coldfoot and Wiseman during transport of equipment and personnel. Communities used for staging, likely Prudhoe Bay and/or Kaktovik could expect to see increases in activity during the project. They would see increases in air traffic as equipment and personnel are transshipped to the field. Staging communities would also experience increased activity in hoteling and restaurants to support personnel. Project personnel would be experienced operators from outside the area.

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Cumulative Effects: Minor.

Mitigation: Not expected to be necessary.

4.7.3 Environmental Justice

A Federal agency is required to identify and address, as appropriate, any disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations (Executive Order 12898, February 11, 1994, amended January 30, 1995, by Executive Order 12948). This includes health risks and other impacts for people who rely principally on fish or wildlife for subsistence. Subsistence activities are a way of obtaining food or natural materials and an important mechanism for maintaining cultural values, family traditions, kinships, sharing practices, and relationships to the land.

Direct and Indirect Impacts: There would be no direct or indirect impacts to environmental justice expected from the proposed project.
Cumulative Effects: Negligible

Mitigation: No mitigation would be necessary. Impacts associated with Environmental Justice would be expected to be beneficial.

4.7.4 Subsistence

The Alaska National Interest Lands Conservation Act (ANILCA) Section 810 requires an evaluation of the effects on subsistence uses for any action to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands. A comprehensive ANILCA Section 810 analysis is included in Appendix G.

Direct and Indirect Effects: No impacts expected.

Cumulative Effects: No cumulative impacts expected.

Mitigation: None necessary

4.7.5 Land Use

Factors considered when determining whether an alternative would have a significant impact on land use were evaluated and distinguished by the degree to which the impact would result in:

- Displacement of or adverse effects to relatively large blocks of existing land uses; and
- Development that is inconsistent with adopted laws, regulations, or the long-term goals of approved land use plans or policies.

Direct and Indirect Effects: Neither land nor mineral ownership would change under this alternative. Direct effects would include the presence of personnel and equipment in areas heretofore undisturbed by humans. Operating of equipment could temporarily disturb wildlife.

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Habitats could be disturbed. In order to allow the proposed exploration activities on the Refuge, the Arctic CCP may need to be amended to change the management category from Minimal Management to Moderate Management for areas in the immediate vicinity of the exploration activities. The change to Moderate Management would allow impacts to the naturalness of the areas and distinct evidence of human-caused change. Habitats could be disturbed and their ability to function through natural processes might be impaired

Cumulative Effects: Implementation of the proposed alternative would temporarily increase the total effects on regional land use due to equipment operations and aircraft support. .

Mitigation: As a mitigation measure, project field activities would be scheduled to occur during winter months to avoid the most intensive hunting, fishing, and recreational activity periods.

4.7.6 Recreation and sport hunting

On-shore seismic surveys in the winter would likely be conducted using mobile seismic camps comprised of ski-mounted trailers that are moved every few days to once a week (BLM 2012). Such activities could displace species being sought by hunters in the area, having an impact on their success if they were unable to locate animals due to the disturbance. Any ice roads, ice pads or snow trails would be temporary. Disturbance lasts only while the survey or camp train is passing through. Lighting at the facilities would be visible to any hunters or recreationalists passing nearby. Persistence of compacted snow or ice structures may be encountered by recreationalists in the spring and are unlikely to be a barrier to recreation by foot or boat travel.

Direct and Indirect Impacts: Negligible to moderate, but temporary

Cumulative Impacts: None expected.

Mitigation: As a mitigation measure, project field activities would be scheduled to occur during winter months to avoid the most intensive hunting, fishing, and recreational activity periods.

4.7.7 Noise/Soundscape

Noise from vehicles, generators, aircraft and human presence has the potential to affect both humans and wildlife within the vicinity of seismic survey activities. The disturbance distance depends on the source and strength of noise, but should be negligible outside the immediate vicinity and is only temporary in nature.

Direct and Indirect Effects: Negligible

Cumulative Effects: None expected.

Mitigation: As a mitigation measure, project field activities would be scheduled to occur during winter months to avoid the most intensive hunting, fishing, and recreational activity periods.

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4.7.8 Visual

On-shore seismic surveys on the North Slope are only collected in the winter; therefore, the colors of structures and equipment would be in contrast with the white color of the snow-covered landscape. Lights on equipment would be visible when the equipment is passing through an area. Few travelers would be expected on the Arctic Coastal Plain during the winter, minimizing the numbers of the public that would be affected by localized visual disturbance. Local subsistence users could be traveling on the tundra and observe the seismic activity. The BLM's NPRA EIS (2012) determined that "visual resources could be minimally impacted from the moving camps, aircraft, and human presence. The seismic operations would have a moderate contrast on the landscape character element of line."

Direct and Indirect Effects: Negligible

Cumulative Effects: None expected.

Mitigation: As a mitigation measure, project field activities would be scheduled to occur during winter months to avoid the most intensive hunting, fishing, and recreational activity periods.

4.7.9 Wilderness Values

Wilderness characteristics consist of size, naturalness, wildness, and outstanding opportunities for solitude or primitive and unconfined recreation. They may also include supplemental and symbolic values.

Seismic surveys would be conducted in winter, when there are fewer visitors seeking a wilderness experience come to the Arctic Coastal Plain. Ice roads, ice pads, airstrips, and snow trails would be used for staging winter seismic activities and are temporary in nature. The BLM's NPRA EIS (2012) describes seismic activity as consisting of low-ground-pressure vehicles to minimize potential impacts to the tundra. The typical survey lasts about 100 days. Seismic camps, which generally consist of six camp strings of five ski-mounted trailers, are typically moved every few days to once a week. The presence of this equipment on the Arctic Coastal Plain would have a significant but temporary impact on the wilderness value of the area where seismic surveys are being conducted during the time period of the activity. Impacted wilderness values would include naturalness, outstanding opportunities for solitude or primitive and unconfined recreation, and scenic values resulting from moving camps and associated noise from generators, aircraft, vehicles/trailers and human presence (BLM 2012). Impacts to wilderness values should be negligible once the activity is completed.

Longer lasting impacts to vegetation could result from seismic surveys, which could impact wilderness values of naturalness and scenic values. The color contrast would be minimal from ground view and almost nonexistent from more than a few hundred feet away (BLM 2012). After 8 to 9 years, the evidence of use would be minimal (BLM 2012). Seismic operations by their nature do not follow the same routes every year and the number of miles of survey line run can vary greatly from year to year.

Direct and Indirect Effects: Significant but temporary

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Cumulative Effects: None expected

Mitigation:

5 Cumulative Effects

Much of the current industrial activity on the North Slope occurs from Prudhoe Bay west into the National Petroleum Reserve-Alaska and adjacent nearshore waters. The State of Alaska, Department of Natural Resources, Division of Oil and Gas has prepared the following summary of Alaska North Slope Oil and Gas Activity as of August 2017:

http://dog.dnr.alaska.gov/Documents/Maps/ActivityMaps/NorthSlope/NS_ActivityMap_August2017_KMT.pdf

Across the larger landscape of the North Slope (North Slope Borough), the coastal plain from Point Barrow to Point Demarcation (approximately the U.S. and Canadian border) is increasingly developed. This is especially true of the western end with the National Petroleum Reserve-Alaska (NPRA), Prudhoe Bay and adjoining oilfield from Tarn and Kuparuk on the western end to Point Thompson on the eastern end at the western-most boundary of the Arctic Refuge and 1002 area. With the discovery of oil in the late 1960s came the first explorations, developments and finally production. Following the international oil crisis of 1973, the Trans-Alaska Pipeline Systems (TAPS) was build and spanned Alaska from north to south, Prudhoe Bay to Valdez. The TAPS has been moving oil from the oilfield to transports for 40 years and likely to continue for the long term. Lateral pipelines are under construction or proposed to connect with the TAPS in the near future. The TAPS is approved to operate via DOE permit through 2032.

To accommodate construction, a road was constructed from Fairbanks to Deadhorse to convey personnel and materiel necessary to build and maintain the oilfields, pipeline and support services and allowed overland access to the North Slope year-round. Initially constructed with private funds and for industrial purposes only, the road was eventually turned over to the State of Alaska to maintain. In addition to still be maintained largely for industrial purposes, it is now a popular for vacationers and sport hunter access.

The oil and gas industry continue to expand with one of the most recent developments, the Liberty Project on the Alaska outer continental shelf (BOEM 2017) and the NPRA being opened for oil and gas lease sales, as announced in September 2017. The development of the North Slope, including the coastal plain environs is likely to continue into the foreseeable future (Clement and others 2013).

Increasing mean annual summer temperatures concurrent with projections for less snow cover during winter months will greatly facilitate development of industry, infrastructure, and public access to the North Slope.

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As a means of perspective, the described 1987 *Coastal Plain Report/EIS* full oil and gas production footprint was anticipated to use no more than 12,650 acres among scattered parcels, or 0.84 percent of the total 1.5 million acre 1002 area (Clough and Christiansen 1987). Given advances in the oil and gas state-of-the-industry since the late 1970s through late 1980s: increasing directional drilling capacities; reduced pad sizes; multiple drillings from a single pad; low ground-bearing pressure vehicles; winter site development; buffer zones around critical resources; among other features or best management practices (BMPs), the scope and scape of the exploration, development and production may be expected to be reduced from the initial estimate. All these considerations serve to mitigate direct, indirect and cumulative effects through avoiding, minimizing, rectifying, reducing, and/or compensating the significance of context and intensity for the proposed oil and gas exploration, development, and production activities.

The 29 listed mitigation recommendations of the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987), although now largely dated, provide a basis for updating and augmenting state-of-the-industry advances since (Clough and Christiansen 1987). Specifically, this includes the changes for threatened, endangered and sensitive (TES) species: arctic pennycress (*Noccaea arctica*, formerly *Thlaspi arcticum*), more common than initially determined; the delisting of the American Peregrine Falcon (*Falco peregrinus anatum*) and Arctic Peregrine Falcon (*F.p. tundrius*); and, listing of the polar bear (Ursus maritimus), among other considerations. Cumulative effects including some aspects of climate change, not adequately considered in the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987) are addressed at least up to the time of publication in *Cumulative Environmental Effects of Oil and Gas Activities on the Alaska's North Slope* (NRC 2003). Additionally, biological resources in relation to oilfield developments including: vegetation and biotic communities; caribou, grizzly bear; polar bear; Arctic fox; Pacific Loon; Tundra Swan; Lesser Snow Goose; Common Eider (Pacific Eider); shorebirds; freshwater invertebrates; freshwater fish; anadromous fish; and benthic marine communities are discussed in *The Natural History of an Arctic Oil Field: Development and the Biota* (Truett and Johnson 2000). Finally, parallels from exploration, development and production of oil and gas on the North Slope may be National Petroleum Reserve – Alaska EIS (BLM 2012), which are directly comparable to the coastal plain 1002 area.

As examples of advances in state-of-the-industry, oil and gas environmental impacts can be significantly reduced if these activities occur during winter months, when the tundra is frozen and protected by snow cover, and most wildlife are absent (Gliders and Cronin 2000). In summer, the thawing snow and lengthening days bring millions of shorebirds and waterfowl in search of nesting sites along with caribou migrating from wintering locations in the interior. The oil exploration and production process involves multiple stages that may require several years or even decades to complete for each oil field. New technologies involving reduced well spacing, elimination of reserve pits, directional drilling, winter maintenance and construction from ice pads and roads, aerial support, and the use of baseline and ongoing biological monitoring programs to facilitate decision making have reduced the areal impacts of development. The incorporation of baseline biological studies and monitoring of exploration and field development assists in minimizing impacts to high-value habitats and species. In this manner the oil and gas

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industry reduces encroachment on wildlife habitat and avoids disturbance to wildlife during critical periods (Gliders and Cronin 2000).

As a specific example, denning bears and particularly denning females with young were susceptible to seismic blasting during exploration surveys. Rousing bears, emerging and resettling, required energy reserves that might place individual bears at risk for long-term survival and especially cubs-of-the-year. In part this was because field crews were unaware of denning sites. Bear dens are now more closely monitored due to the threatened status of the polar bear, typically via radiotelemetry. Additionally, traditional blasting has been replaced by vibrators and sensor lines which are far less intrusive to denning bears. As a consequence, the disturbance threat has been greatly reduced through advances in technology (Reynolds and others 1986; McLellan and Shackleton 1988, 1989; Mattson 1990; Blix and Lentfer 1992; Linnell and others 2000).

However, cumulative effects of oil and gas exploration, development and production become problematic for long-term recovery and restoration. Some sites abandoned and rehabilitated to various degrees still show evidence of impacts 40 to 60 years following the activity (Walker and others 1987; Felix and Raynolds 1989; Gliders and Cronin 2000; Kemper and MacDonald 2009; Jorgenson and others 2010; McCarter and others 2017).

As an example of unknowns and uncertainty of climate change in relation to oil and gas exploration, development and production are water resources and their use for industry. While the creation of impoundments for water storage and subsequent use for drilling operations has created habitat and expanded the distribution of such species as the Arctic char (Moulton and George 2000; NRC 2003), it is only with the provision that pumping capacity is capped so that sufficient overwintering habitat is available below the maximum ice depth and large enough to contain dissolved oxygen for the longest period of ice coverage. This is important in a landscape where overwintering habitat for fish is limited (Reynolds 1997).

Climate projections for the North Slope indicate not only warming but drying through the summer months and less precipitation through the winter (ACIA 2004). This situation may lead to lower minimum depths in natural lakes or artificial impoundments where entrapments may increase that may ultimately affect fish species populations, invertebrate food resources and possibly trophic cascade effects (Ims and Fuglei 2005). As aquatic invertebrates are a primary food resource for migratory shorebirds, and reduction in this energy-rich, seasonal resource could greatly affect the survival of adults and nesting efforts (Bart and others 2012; Hof and others 2017).

Even using the largest footprint estimated for development from 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987), this may be scattered across the landscape of 1.5 million acres of the coastal plain 1002 area. As mean annual summer temperature increase, as they have to the present, migrating caribou will seek out the coolest remaining sites, including patches of snow which are used to avoid or reduce biting insects. Oil and gas developments have been demonstrated to affect movement and foraging behavior previously (Ballard and others 2000; Cameron and others 1979, 1989, 2005; Cronin and others 2000; among others). While behavioral

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responses may be individually or herd specific, and have not affected the overall health of North Slope caribou to this time, the point is that with future environmental change, a threshold may be crossed at some point in the future where wildlife resource requirements may come in direct conflict with industry.

Climate Change

As noted, increasing mean high summer temperature, increasing mean low winter temperatures, less precipitation and landscape drying are all projected for the larger North Slope environs over the next 100 years (ACIA 2004). This may be translated to less water for drilling operations including the risk of over-pumping water resources in a landscape with relatively limited open water despite the appearance of abundance. Such drying will affect wetland functions and values for wildlife resources and water quality. Less water and higher temperatures will place some species at risk for continued occupation of preferred habitats, such as overwintering habitat for freshwater fish, freshwater invertebrates, waterfowl and shorebird production, and may create conditions conducive for invasive species (vascular and nonvascular plants, invertebrates and vertebrates, and pathogens) to pioneer and establish populations. As an example the red fox is just now entering the Arctic Refuge which will ultimately compete with native Arctic fox and is a far more plastic and effective predator than native fox or equivalent mesocarnivores. Declines in waterfowl production have been demonstrated in multiple locations where red fox were not previous present. Increasing soil disturbances for development and infrastructure may create pathways for invasive plants and the increased movement of personnel and materiel may create human-subsidized transport of seeds or propagules.

Loss of sea ice will create the potential for increased shore zone erosion during storm or tide surge events. Sea level rise is already causing dislocation and relocation of traditional village sites to higher grounds if available elsewhere in Alaska.

As expressed by local residents and subsistence resource users during scoping for numerous development projects is the fear of displacement of those resources due to increasing fragmentation of the landscape for traditional lifestyles. Equal with this concern is the fear of catastrophic spills that will affect subsistence resources, particularly long-term incidents that may require years (or generations) to restore and rehabilitate to achieve pre-incident conditions.

Uncertainty

The oil and gas industry mitigation and BMPs have evolved based on experience, knowledge and technology. Similarly, understanding and knowledge of biological and water resources has increased over time and with technology. However, foreseeable changes may be acknowledged but uncertainty and lack of knowledge make management of oil and gas exploration, development, and production or natural resources management tenuous in many respects for the long-term (Wilson and others 2013). Only through a collaborative and cooperative effort, particularly through adaptive management, and industry and agency monitoring may positive goals and objectives be explored.

6 List of Preparers, Contributors, and Advisors

This EA was developed by U.S. Fish and Wildlife Service (Service) staff. The Service holds final responsibility for all content. Personnel for each contributing party are listed in Table 6-1.

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From: Gieryic, Michael
To: Stephanie Brady
Cc: Tracy Fischbach
Subject: 1002 EA (Part 37)
Date: Friday, November 17, 2017 9:26:05 AM

Stephanie,

Please give me a quick call this morning to discuss the status of the EA that your team was working on yesterday.

Mike Gieryic
Attorney-Adviser
Office of the Regional Solicitor
U.S. Department of the Interior
4230 University Drive, Suite 300
Anchorage, AK 99508
Phone: (907) 271-1420; Fax: (907) 271-4143
mike.gieryic@sol.doi.gov

From:	Brady, Stephanie
To:	Joseph Darnell
Subject:	Fwd: latest version
Date:	Friday, November 17, 2017 10:20:04 AM
Attachments:	Arctic NWR permit application NPRM 10.10.17.docx Arctic NWR permit application NPRM 10.12.17_AK edits clean copy with comments.docx

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here is the word version of the pdf that you sent me yesterday. we had extensive edits to this version - I have attached them for your review - but I guess the edits were not incorporated. Stephanie

stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |
U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska |
907.306.7448

---------- Forwarded message ----------
From: **Wilkinson, Susan** <susan_wilkinson@fws.gov>
Date: Tue, Oct 10, 2017 at 5:58 AM
Subject: latest version
To: "Brady, Stephanie" <stephanie_brady@fws.gov>

Please let me know if you have concerns.

--
Susan Wilkinson
Division of Policy, Performance, and Management Programs
U.S. Fish and Wildlife Service Headquarters
5275 Leesburg Pike, MS: BPHC
Falls Church, VA 22041-3803
703-358-2506

Billing Code: 4333-15

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 37

[Docket No. FWS–R7–NWRS–2017–0072; FF07R00000 1XX FXRS12610700000]

RIN 1018–BC92

Coastal Plain of the Arctic National Wildlife Refuge, Alaska; Geological and Geophysical Exploration Plans; Application Requirements

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule; availability of draft environmental assessment.

SUMMARY: We, the U.S. Fish and Wildlife Service, propose to amend the regulations regarding the dates when an application may be submitted for a permit for a geological and geophysical exploration plan on the Arctic National Wildlife Refuge lands described in the Alaska National Interest Lands Conservation Act. This action is a necessary update to our

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regulations as the dates in the regulations are long past. We are taking this action in support of Executive Order 13783, Promoting Energy Independence and Economic Growth.

DATES: Electronic comments on this proposed rule via http://www.regulations.gov must be submitted by 11:59 p.m. Eastern time on [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]. Comments submitted by mail must be postmarked no later than [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

ADDRESSES: *Document availability:* The draft environmental assessment prepared in support of this proposed rule may be found at http://www.regulations.gov in Docket No. FWS–R7–NWRS–2017–0072. Information and supporting documentation that we receive in response to this proposed rule will be available to you for review at *http://www.regulations.gov*, or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, Alaska Regional Office, 1011 E. Tudor Rd., Mail Stop 211, Anchorage, AK 99503; telephone (907) 306–7448.

Comment submission: You may submit comments on this proposed rule or the draft environmental assessment by one of the following methods:

(1) Electronically: Go to the Federal eRulemaking Portal: *http://www.regulations.gov*. Search for FWS–R7–NWRS–2017–0072, which is the docket number for this rulemaking. You may submit a comment by clicking on "Comment Now!" Please ensure that you have found the correct rulemaking before submitting your comment.

(2) By hard copy: Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R7–NWRS–2017–0072, U.S. Fish and Wildlife Service, MS: BPHC, 5275 Leesburg Pike, Falls Church, VA 22041–3803.

We will not accept email or faxes. We will post all comments on *http://www.regulations.gov*. This generally means that we will post any personal information you provide us. For additional information, see **Request for Comments**, below.

FOR FURTHER INFORMATION CONTACT: Stephanie Brady, National Wildlife Refuge System, Alaska Regional Office, 1011 E. Tudor Rd., Mail Stop 211, Anchorage, AK 99503; telephone (907) 306–7448; fax (907) 786–3976; stephanie_brady@fws.gov.

SUPPLEMENTARY INFORMATION:

Background

The Arctic National Wildlife Refuge (hereafter, Arctic Refuge), located in northeastern Alaska, is administered by the U.S. Fish and Wildlife Service (Service). The Arctic Refuge was first established in 1960 as the Arctic National Wildlife Range through Public Land Order 2214, for the purpose of preserving unique wildlife, wilderness, and recreational values. The original 8.9-million-acre Range was withdrawn from all forms of appropriation under public land laws, including mining, but not from mineral leasing.

The Arctic Refuge was expanded to 19 million acres with the enactment of the Alaska National Interest Lands Conservation Act (ANILCA) (Public Law 96–487; 16 U.S.C. 410hh–3233, 43 U.S.C. 1602–1784). Section 303(2) of Public Law 96–487 set forth that the purposes for which the Arctic Refuge was established and should be managed include:

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(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including participation in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge.

Under ANILCA, the Service was to provide for a comprehensive and continuing inventory and assessment of the fish and wildlife resources of the coastal plain of the Arctic National Wildlife Refuge. This effort was to include an analysis of the impacts of oil and gas exploration, development, and production, and the Service was directed to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources (16 U.S.C. 1342). The "coastal plain" was defined in section 1002 of Public Law 96–487 by a map entitled "Arctic National Wildlife Refuge," dated August 1980 (Figure 1). Biological studies and geological exploration coordinated by the Service, U.S. Geological Survey (USGS), and Bureau of Land Management (BLM) were initiated shortly after enactment of the Act. In April 1982, the Service completed the initial report summarizing known information about fish and wildlife and their habitats occurring on the Arctic Refuge coastal plain (hereafter referred to as "the section 1002 area").

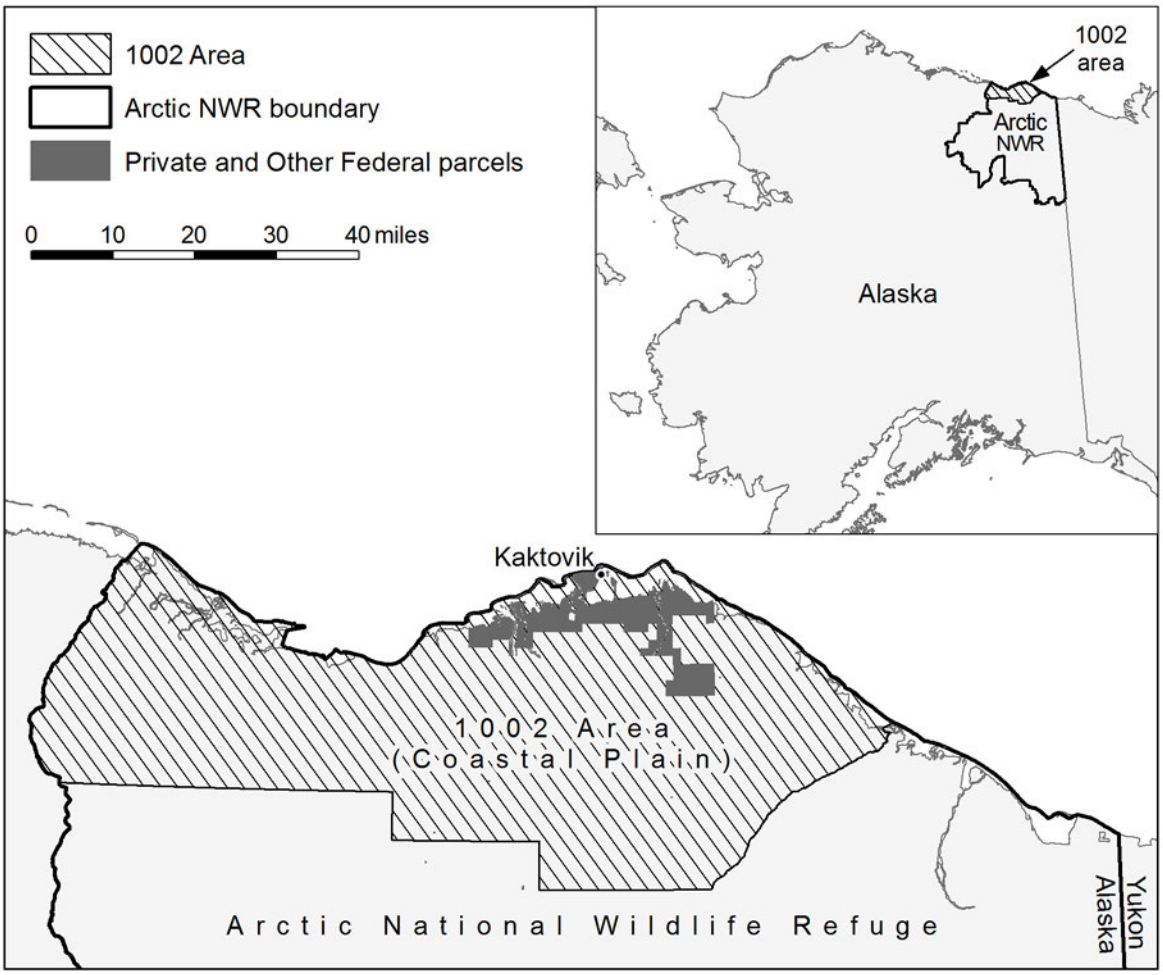


Figure 1. Arctic National Wildlife Refuge showing the coastal plain and section 1002 area.

Section 1002(d) of Public law 96-487 directed the Secretary of the Interior to establish guidelines for exploration through regulations within 2 years after enactment of the Act. In 1982, the Service published a proposed rule to establish guidelines for carrying out exploratory activities on the coastal plain of the Arctic Refuge (47 FR 41060, September 16, 1982). Publication of the proposed regulations had been delayed as a result of the litigation over the decision in March 1981 to transfer responsibility for developing the guidelines from the U.S. Fish and Wildlife Service to the U.S. Geological Survey. *See Trustees for Alaska* v. *Watt*, 524 F. Supp. 1303 (D. Alaska 1981), *aff'd per curium*, 690 F.2d 1279 (9th Cir. 1982). The final rule

with the regulations along with the "Record of Decision for Oil and Gas Exploration Within the Coastal Plain of the Arctic National Wildlife Refuge, Alaska" (ROD) was published April 19, 1983 (48 FR 16858) with the regulations being codified as 50 CFR part 37. The ROD was based upon the Final Environmental Impact Statement, which had been filed with the Environmental Protection Agency on February 23, 1983, and made available to the public on March 4, 1983. The guidelines were subsequently revised to change the deadlines for submission of exploration plans to the Department for consideration. *See* 49 FR 7569 (March 1, 1984).

Plans were submitted to the Service in accordance with the regulations with plans for summer access by helicopter during 1983–85 being then approved. *See* U.S. Dept. of the Interior, Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment: Report and Recommendation to the Congress of the United States and Final Legislative Environmental Impact Statement, Vol. 1 at 3 (April 1987) ("Section 1002 Report"). The summer exploratory activities were limited to field observations, surface measurements, mapping, and collection of rock samples. One helicopter-supported gravity survey permit was issued for the summer of 1983. Winter exploration plans involving mechanized surface transportation to conduct seismic surveys were approved for the winters of 1983–84 and 1984–85. Section 1002 Report. One permittee, representing an industry group of over 20 companies, was issued a permit to collect the seismic data. More than 1,300 line miles of seismic data were acquired as a result of the winter exploratory activities during the two winters. Section 1002 Report. No exploratory activities of this type have occurred in the Arctic Refuge Coastal Plain since 1985.

The Section 1002 Report was submitted to Congress in April 1987. The report recommended that the entire Arctic Refuge coastal plain be made available for oil and gas leasing. Section 1002(h) Report. The submittal was delayed 7 months past the statutory deadline

by a court ruling requiring the Secretary to seek public participation in preparation of the legislative environmental impact statement accompanying the report. *See Trustees for Alaska* v. *Hodel*, 806 F.2d 1378 (9th Cir. 1986).

The Service has historically interpreted the authorization to conduct exploratory activities under section 1002 to have expired with the submittal of the section 1002(h) report to Congress. The legal underpinnings for this position were set out in a January 18, 2001, memorandum to Secretary Bruce Babbitt from Solicitor John Leshy (2001 Memorandum) responding to a letter from Congressman Edward Markey asking what oil and gas related activities are currently allowed or prohibited on the coastal plain of the Arctic Refuge. While opining that the authority expired with submittal of the April 1987 report to Congress, the 2001 Memorandum noted that there were two possible answers to the question because of the wording of section 1002.

The legal interpretation, that the authority to authorize further exploration activities under section 1002 expired in 1987, was tested when the State of Alaska sued the Department of the Interior in 2015. *State of Alaska* v. *Sally Jewell, et al.*, No. 3:14-cv-00048-SLG (D. Alaska). In that suit, the State of Alaska appealed the Service denial of the State's permit request to conduct exploratory work on the Coastal Plain arguing that there was no cutoff of authority in section 1002. In affirming the Service's rejection of the application based upon the interpretation of section 1002 articulated in the 2001 Memorandum, the Court applied the two-step process established by the U.S. Supreme Court in *Chevron U.S.A.* v. *Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984). Applying the first step, the Court concluded that section 1002 was ambiguous as to whether additional exploration work was authorized under section 1002, a position advanced by the United States in its briefing. The Court then considered the Service's interpretation of section 1002 and concluded it was a permissible construction. In so finding, the

court noted that the Service's construction is not the only permissible interpretation or necessarily the Court's.

It is well established that a department is not bound by prior interpretations of statutes and that it may make changes. While the prior interpretations of ANILCA section 1002 focused on the deadline for a report to Congress, with the passage of time we find it increasingly significant that section 1002 did not include a deadline for when exploration plans must be submitted. We interpret the absence of a deadline to mean that the authority of the Service to collect new and more detailed scientific information about all of the resources on the Coastal Plain has not expired.

This continuing authority recognizes that new and better technology is likely to be developed that can and should be put to use to expand human knowledge and understanding of the many natural resources of the Coastal Plain. The ability to collect new scientific information about the Coastal Plain, including its oil and gas resources, will better inform public policy decisions on use and management of the natural resources of the Plain. Without the authority to do further exploration work, the scientific knowledge about the subsurface resources of the Coastal Plain will be limited to what was learned over 30 years ago. Decisions on management and best use of all of the resources on the Coastal Plain will therefore not be informed by the latest and best scientific information.

The long-term national defense and security of the nation is dependent upon reliable and secure sources of domestic energy resources. President Trump in his March 28, 2017, Executive Order, Promoting Energy Independence and Economic Growth, placed specific emphasis on the need to develop energy resources when he stated:

Section 1 Policy. (a) It is in the national interest to promote clean and safe development of the Nation's vast energy resources, while at the same time avoiding regulatory burdens that unnecessarily encumber energy production, constrain economic growth, and prevent job creation. Moreover, the prudent development of these natural resources is essential to ensuring the Nation's geopolitical security.

Central to meeting the goal of developing the country's natural resources in a responsible manner to ensure the Nation's geopolitical security is having and considering the best and latest information about the oil and gas resources of the Coastal Plain that science and technology can provide. There have been many advances in geophysical sciences since the 1980's that can today be utilized to further advance the level of knowledge about the oil and gas resources of the Coastal Plain beyond what was learned from exploration work done over 30 years ago. It would be imprudent to make important decisions for development and implementation of plans for securing oil and gas resources and maintaining energy infrastructure such as the Trans Alaska Pipeline System over the long term without securing and utilizing the knowledge that can be gleaned from new modern exploration work on the Coastal Plain. In addition to informing long-term energy security planning, the availability of this new data will further the Service's resource management of the Coastal Plain.

Proposed Changes

In this document, we propose to change the regulations found at 50 CFR part 37 by removing language that restricts the timeframe in which a special use permit to conduct exploratory activities may be issued.

Request for Comments

You may submit information concerning this proposed rule or the draft environmental assessment by one of the methods listed in **ADDRESSES**. We will not accept comments sent by e-mail or fax or to an address not listed in **ADDRESSES**.

If you submit a comment via *http://www.regulations.gov*, your entire submission — including any personal identifying information, such as your address, phone number, or e-mail address—will be posted on the Web site. If your submission is made via a hardcopy comment that includes personal identifying information, you may request at the top of your document that we withhold this personal identifying information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on *http://www.regulations.gov*.

Endangered Species Act Consideration

Section 7 of the Endangered Species Act (16 U.S.C. 1536) requires the Secretary of the Interior to "review other programs administered by him (or her) and utilize such programs in furtherance of the purposes of the Act" and to "insure that any action authorized, funded, or carried out * * * is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat . . . ." Prior to issuance of these regulations, we would consult under section 7 of the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 et seq.), to ensure that any applications for exploration in the section 1002 area of the Arctic Refuge are not likely to jeopardize the continued existence of any species designated as endangered or threatened, or modify or destroy its critical habitat, and that the regulations are consistent with conservation programs for those species. Consultation under section 7 of the Act for the regulations may cause us to change these proposed regulations. Our biological opinion resulting from the section 7 consultation will be a

public document available from the person listed under **FOR FURTHER INFORMATION CONTACT** or via *http://www.regulations.gov* in Docket No. FWS–R7–NWRS–2017–0072.

Required Determinations

Executive Order 13771—Reducing Regulation and Controlling Regulatory Costs

This proposed rule is considered to be an Executive Order (E.O.) 13771 deregulatory action (82 FR 9339, February 3, 2017) because it would amend regulations that currently restrict the dates when a permit application for an exploration plan for the Arctic Refuge would be allowed.

Regulatory Planning and Review (Executive Order 12866 and 13563)

The Office of Management and Budget (OMB) has determined that this rule is not significant. OMB bases its determination upon the following four criteria:

(a) Whether the rule will have an annual effect of $100 million or more on the economy or adversely affect an economic sector, productivity, jobs, the environment, or other units of the government.

(b) Whether the rule will create inconsistencies with other agencies' actions.

(c) Whether the rule will materially affect entitlements, grants, user fees, loan programs, or the rights and obligations of their recipients.

(d) Whether the rule raises novel legal or policy issues.

The proposed rule would remove the regulations that restrict the dates when a permit application may be submitted for a geophysical exploration plan on the section 1002 area in the Arctic Refuge. Thus, this rule would open the process to accept oil exploration applications for

the section 1002 area. Under the proposed rule as an administrative action, potential costs would be limited to application costs incurred by companies choosing to submit applications and by the Service to process the applications.

This analysis is limited in scope and addresses only the administrative action by the Service to accept and review new exploration plans in the Arctic Refuge. Therefore, this analysis does not evaluate costs and benefits related to the issuance of special use permits for specific exploration plans as the details of those plans are currently unknown, and the analysis would be speculative in regards to methods, location, and timing of the exploration activities. Furthermore, the review and approval process for a special use permit in the Arctic Refuge must undergo a separate process under the National Environmental Policy Act (NEPA). Geological exploration and assessment undertakings under the NEPA process could include a number of activities such as seismic testing, aerial surveying, road construction, and more. These exploratory activities have potential impacts including, but not limited to: polar bear viewing tourism, subsistence hunting (especially caribou) by nonnative and native Alaskans, and cultural use by native Alaskans. Furthermore, "available information indicates that any ANWR oil would be scattered among multiple smaller fields rather than concentrated in a single large field, which would make development more expensive and potentially expand the area in which any environmental effects might occur" (Congressional Research Service 2015).

Measures such as Secretarial Order No. 3352 have occurred to move forward toward energy development in the Arctic Refuge (Department of the Interior May 2017). However, Section 1003 of ANILCA states "production of oil and gas from the Arctic National Wildlife Refuge is prohibited and no leasing or other development leading to production of oil and gas

from the [Refuge] shall be undertaken until authorized by an act of Congress." Therefore, this analysis does not estimate the potential costs and benefits of oil drilling and extraction.

With this proposed rule, we solicit public input on potential economic impacts and the number of businesses affected to help quantify costs and benefits. Please see the **Request for Comments** section at the end of **SUPPLEMENTARY INFORMATION** for further information about submitting comments.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions) (5 U.S.C. 601 et seq.). However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule would not have a significant economic impact on a substantial number of small entities. Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for "significant impact" and a threshold for a "substantial number of small entities." See 5 U.S.C. 605(b). SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule would not have a significant economic impact on a substantial number of small entities.

The U.S. Small Business Administration (SBA) defines a small business as one with annual revenue or employment that meets or is below an established size standard. To assess the effects of the proposed rule on small entities, we focus on businesses that operate and/or develop

oil gas field properties (North American Industry Classification System (NAICS) 211) that have fewer than 500 employees. According to the U.S. Census Bureau, there are 8,064 businesses under NAICS 211, of which over 99 percent qualify as small businesses (2012). Thus, we expect that most entities that may apply for a special use permit would be considered small as defined by the SBA.

Under the proposed rule, individual businesses would have the opportunity to submit applications for a geological and geophysical exploration plan on the section 1002 area in the Arctic Refuge. Although estimating the number of potential future applicants would be speculative, the last seismic survey (completed in 1985) was conducted by 27 companies under 1 permit. If 27 individual companies applied for separate special use permits under the proposed rule, this would represent less than 1 percent of small businesses.

We therefore certify that this proposed rule would not have a significant economic effect on a substantial number of small entities as defined under the Regulatory Flexibility Act (5 U.S.C. 601 et seq.). A Regulatory Flexibility Analysis is not required. Accordingly, a Small Entity Compliance Guide is not required.

Small Business Regulatory Enforcement Fairness Act

This proposed rule is not a major rule under 5 U.S.C. 804(2), the Small Business Regulatory Enforcement Fairness Act. This rule:

a. Would not have an annual effect on the economy of $100 million or more.

b. Would not cause a major increase in costs or prices for consumers; individual industries; Federal, State, tribal, or local government agencies; or geographic regions.

c. Would not have significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of U.S.-based enterprises to compete with foreign-based enterprises.

Unfunded Mandates Reform Act

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.), we have determined the following:

a. This rule would not ''significantly or uniquely'' affect small governments. A small government agency plan is not required. Actions under the proposed rule would not affect small government activities in any significant way.

b. This rule would not produce a Federal mandate of $100 million or greater in any year. It would not be a ''significant regulatory action'' under the Unfunded Mandates Reform Act.

Takings (Executive Order 12630)

In accordance with E.O. 12630, this proposed rule would not have significant takings implications. A takings implication assessment is not required. This proposed rule does not contain a provision for taking of private property.

Federalism (Executive Order 13132)

This proposed rule does not have sufficient Federalism effects to warrant preparation of a federalism summary impact assessment under E.O. 13132. It would not interfere with the ability of States to manage themselves or their funds. This proposed rule, if adopted, would affect the

geological exploration of the coastal plain of the Arctic Refuge, which is managed by the Service in Alaska, and would not have a substantial direct effect on State or local governments in Alaska.

Civil Justice Reform (Executive Order 12988)

In accordance with E.O. 12988, the Office of the Solicitor has determined that this proposed rule does not unduly burden the judicial system and meets the requirements of sections 3(a) and 3(b)(2) of E.O. 12988.

Paperwork Reduction Act

This rule does not contain any new collection of information that require approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). OMB has previously approved the information collection requirements associated with Service Special Use Permit Applications (FWS Form 3–2469) and assigned OMB Control Number 1018–0162 (expires December 31, 2019). An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act

Our draft environmental assessment is part of the administrative record for this proposed rule. In accordance with the National Environmental Policy Act (NEPA, 42 U.S.C. 4321 et seq.) and part 516 of the U.S. Department of the Interior Manual (516 DM), the Service proposes amending the existing language in 50 CFR Part 37—Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska, related to exploration plans [50 CFR

37.21(b) and (c)], to remove the date restrictions now in place for those plans. Our draft environmental assessment sets forth that the proposed action to change the regulatory language as described in the rule portion of this document will have no significant impacts on the environment.

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we have evaluated potential effects on federally recognized Indian Tribes and have determined that there are no potential effects. This rule would not interfere with the ability of Tribes to manage themselves or their funds or to regulate exploration activities on Tribal lands. However, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis, and we are seeking their input to evaluate this proposed rule. In addition, we have evaluated this proposed rule under Alaska Native Claims Settlement Act corporation policies. We are consulting with Alaska Native tribes and Alaska Native corporations regarding the proposed changes in this rule for the Arctic Refuge.

Energy Supply, Distribution, or Use (Executive Order 13211)

Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking actions that could have significant adverse effects on energy supply, distribution, or use. We believe that the rule could have positive effects on energy supplies, distribution, or use.

Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.

Clarity of This Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

(a) Be logically organized;

(b) Use the active voice to address readers directly;

(c) Use common, everyday words and clear language rather than jargon;

(d) Be divided into short sections and sentences; and

(e) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in **ADDRESSES**, above. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that you find unclear, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

List of Subjects in 50 CFR Part 37

Administrative practice and procedure, Alaska, Environmental protection, Historic preservation, Oil and gas exploration, Penalties, Reporting and recordkeeping requirements, Surety bonds, and Wildlife refuges.

Proposed Regulation Promulgation

Accordingly, we propose to amend part 37 of title 50 of the Code of Federal Regulations as set forth below:

PART 37—GEOLOGICAL AND GEOPHYSICAL EXPLORATION OF THE COASTAL PLAIN, ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

1. The authority citation for part 37 is revised to read as follows:

AUTHORITY: 5 U.S.C. 301; 16 U.S.C. 715s and 3142; and 31 U.S.C. 9701.

2. Amend § 37.21 by revising paragraphs (b) and (c) to read as follows:

§ 37.21 Application requirements.

* * * * *

(b) Any person wanting to conduct exploratory activities may apply for a special use permit by submitting for review and processing one or more written exploration plans, in triplicate, to the Regional Director, Region 7, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503.

(c) In addition to containing the information required in paragraph (d) of this section, any exploration plan submitted shall describe the applicant's plan for carrying out an integrated program of exploratory activities in such a manner as will satisfy the objective and limitations stated in § 37.1. If an applicant submits an exploration plan in any given year, with the intention of submitting another exploration plan the following year, the applicant shall describe in its initial plan how its future exploratory activities will be integrated with those proposed under its initial plan. Each exploration plan submitted must be published and be the subject of a public hearing in accordance with requirements of § 37.22(b).

* * * * *

§ 37.52 [Amended]

3. Amend § 37.52 by:

a. In the first sentence, removing the period and adding in its place a comma and the words "for 3 years from the date the permittee submits the data and information to the Regional Director pursuant to § 37.53."; and

b. In the second sentence, removing the words "Until September 2, 1989, the" and adding in their place the word "The".

Dated: _____.

_____

Principal Deputy Assistant Secretary for Fish and Wildlife and Parks.

Billing Code: 4333-15

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 37

[Docket No. FWS–R7–NWRS–2017–0072; FF07R00000 1XX FXRS12610700000]

RIN 1018–BC92

Coastal Plain of the Arctic National Wildlife Refuge, Alaska; Geological and Geophysical Exploration Plans; Application Requirements

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule; availability of draft environmental assessment.

SUMMARY: We, the U.S. Fish and Wildlife Service, propose to amend the regulations regarding the dates when an application may be submitted for a permit for a geological and geophysical exploration plan on the Arctic National Wildlife Refuge lands described in the Alaska National Interest Lands Conservation Act. This action is an update to our regulations to

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allow opportunities for applications to conduct seismic exploration. Further, the ability to collect new information on oil and gas resources will better inform public policy decisions. We are taking this action in support of Executive Order 13783, Promoting Energy Independence and Economic Growth.

DATES: Electronic comments on this proposed rule via http://www regulations.gov must be submitted by 11:59 p m. Eastern time on [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]. Comments submitted by mail must be postmarked no later than [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

ADDRESSES: *Document availability:* The draft environmental assessment prepared in support of this proposed rule may be found at http://www regulations.gov in Docket No. FWS–R7–NWRS–2017–0072. Information and supporting documentation that we receive in response to this proposed rule will be available to you for review at *http://www.regulations.gov*, or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, Alaska Regional Office, 1011 E. Tudor Rd., Mail Stop 211, Anchorage, AK 99503; telephone (907) 306–7448.

Comment submission: You may submit comments on this proposed rule or the draft environmental assessment by one of the following methods:

(1) Electronically: Go to the Federal eRulemaking Portal: *http://www.regulations.gov*. Search for FWS–R7–NWRS–2017–0072, which is the docket number for this

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Commented [BS3]: This makes is seem as tho this was just a regulatory oversight – not changed by the Departments view of the law

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Plus the current regs confine the dates by which an applicant can apply to conduct seismic exploration

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rulemaking. You may submit a comment by clicking on "Comment Now!" Please ensure that you have found the correct rulemaking before submitting your comment.

(2) By hard copy: Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R7–NWRS–2017–0072, U.S. Fish and Wildlife Service, MS: BPHC, 5275 Leesburg Pike, Falls Church, VA 22041–3803.

We will not accept email or faxes. We will post all comments on *http://www.regulations.gov*. This generally means that we will post any personal information you provide us. For additional information, see **Request for Comments**, below.

FOR FURTHER INFORMATION CONTACT: Stephanie Brady, National Wildlife Refuge System, Alaska Regional Office, 1011 E. Tudor Rd., Mail Stop 211, Anchorage, AK 99503; telephone (907) 306–7448; fax (907) 786–3976; stephanie_brady@fws.gov.

SUPPLEMENTARY INFORMATION:

Background

The Arctic National Wildlife Refuge (hereafter, Arctic Refuge), located in northeastern Alaska, is administered by the U.S. Fish and Wildlife Service (Service). The Arctic Refuge was first established in 1960 as the Arctic National Wildlife Range through Public Land Order 2214, for the purpose of preserving unique wildlife, wilderness, and recreational values. The original 8.9-million-acre Range was withdrawn from all forms of appropriation under public land laws, including mining, but not from mineral leasing.

The Arctic Refuge was expanded to 19 million acres with the enactment of the Alaska National Interest Lands Conservation Act (ANILCA) (Public Law 96–487; 16 U.S.C. 410hh–

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3233, 43 U.S.C. 1602–1784). Section 303(2) of Public Law 96–487 set forth that the purposes for which the Arctic Refuge was established and should be managed include:

(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including participation in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge.

Under ANILCA, the Service was to provide for a comprehensive and continuing inventory and assessment of the fish and wildlife resources of the coastal plain of the Arctic Refuge. This effort was to include an analysis of the impacts of oil and gas exploration, development, and production, and the Service was directed to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources (16 U.S.C. 1342). The "coastal plain" was defined in section 1002 of Public Law 96–487 by a map entitled "Arctic National Wildlife Refuge," dated August 1980 (Figure 1). Biological studies and geological exploration coordinated by the Service, U.S. Geological Survey (USGS), and Bureau of Land Management (BLM) were initiated shortly after enactment of the Act. In April 1982, the Service completed the initial report summarizing

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known information about fish and wildlife and their habitats occurring on the Arctic Refuge coastal plain (hereafter referred to as “the section 1002 area”).

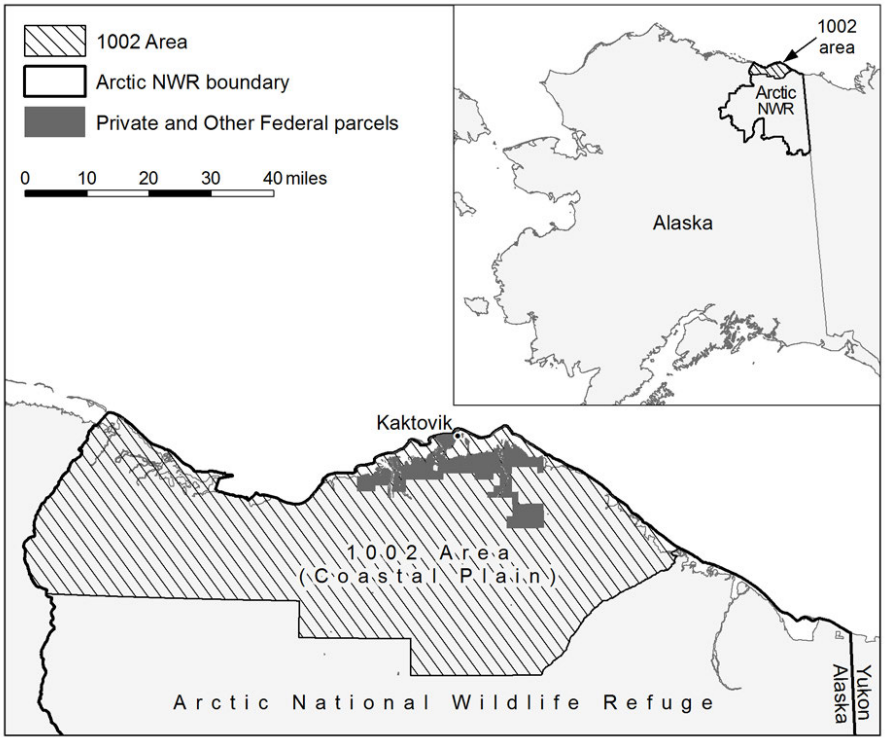


Figure 1. Arctic National Wildlife Refuge showing the coastal plain and section 1002 area.

Section 1002(d) of Public law 96-487 directed the Secretary of the Interior to establish guidelines for exploration through regulations within 2 years after enactment of the Act. In 1982, the Service published a proposed rule to establish guidelines for carrying out exploratory activities on the coastal plain of the Arctic Refuge (47 FR 41060, September 16, 1982). Publication of the proposed regulations had been delayed as a result of the litigation over the decision in March 1981 to transfer responsibility for developing the guidelines from the Service

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to the USGS. *See Trustees for Alaska* v. *Watt*, 524 F. Supp. 1303 (D. Alaska 1981), *aff'd per curium*, 690 F.2d 1279 (9th Cir. 1982). The final rule with the regulations along with the "Record of Decision for Oil and Gas Exploration Within the Coastal Plain of the Arctic National Wildlife Refuge, Alaska" (ROD) was published April 19, 1983 (48 FR 16858) with the regulations being codified as 50 CFR part 37. The ROD was based upon the Final Environmental Impact Statement, which had been filed with the Environmental Protection Agency on February 23, 1983, and made available to the public on March 4, 1983. The guidelines were subsequently revised to change the deadlines for submission of exploration plans to the Department for consideration. *See* 49 FR 7569 (March 1, 1984).

Plans were submitted to the Service in accordance with the regulations with plans for summer access by helicopter during 1983–85 being then approved. *See* U.S. Dept. of the Interior, Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment: Report and Recommendation to the Congress of the United States and Final Legislative Environmental Impact Statement, Vol. 1 at 3 (April 1987) ("Section 1002 Report"). The summer exploratory activities were limited to field observations, surface measurements, mapping, and collection of rock samples. One helicopter-supported gravity survey permit was issued for the summer of 1983. Winter exploration plans involving mechanized surface transportation to conduct seismic surveys were approved for the winters of 1983–84 and 1984–85(Section 1002 Report). One permittee, representing an industry group of over 20 companies, was issued a permit to collect the seismic data. More than 1,300 line miles of seismic data were acquired as a result of the winter exploratory activities during the two winters (Section 1002 Report). No exploratory activities of this type have occurred in the Arctic Refuge Coastal Plain since 1985.

The Section 1002 Report was submitted to Congress in April 1987. The report recommended that the entire Arctic Refuge coastal plain be made available for oil and gas leasing (Section 1002(h) Report). The submittal was delayed 7 months past the statutory deadline by a court ruling requiring the Secretary to seek public participation in preparation of the legislative environmental impact statement accompanying the report. *See Trustees for Alaska* v. *Hodel*, 806 F.2d 1378 (9th Cir. 1986).

The Service has historically interpreted the authorization to conduct exploratory activities under section 1002 to have expired with the submittal of the section 1002(h) report to Congress. The legal underpinnings for this position were set out in a January 18, 2001, memorandum to Secretary Bruce Babbitt from Solicitor John Leshy (2001 Memorandum) responding to a letter from Congressman Edward Markey asking what oil and gas related activities are currently allowed or prohibited on the coastal plain of the Arctic Refuge. While opining that the authority expired with submittal of the April 1987 report to Congress, the 2001 Memorandum noted that there were two possible answers to the question because of the wording of section 1002.

The legal interpretation, that the authority to authorize further exploration activities under section 1002 expired in 1987, was tested when the State of Alaska sued the Department of the Interior in 2015. *State of Alaska* v. *Sally Jewell, et al.*, No. 3:14-cv-00048-SLG (D. Alaska). In that suit, the State of Alaska appealed the Service denial of the State's permit request to conduct exploratory work on the Coastal Plain arguing that there was no cutoff of authority in section 1002. In affirming the Service's rejection of the application based upon the interpretation of section 1002 articulated in the 2001 Memorandum, the Court applied the two-step process established by the U.S. Supreme Court in *Chevron U.S.A.* v. *Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984). Applying the first step, the Court concluded that section 1002 was

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ambiguous as to whether additional exploration work was authorized under section 1002, a position advanced by the United States in its briefing. The Court then considered the Service's interpretation of section 1002 and concluded it was a permissible construction. In so finding, the court noted that the Service's construction is not the only permissible interpretation or necessarily the Court's.

It is well established that a department is not bound by prior interpretations of statutes and that it may make changes. Prior interpretations of ANILCA section 1002 focused on the deadline for a report to Congress

This continuing authority recognizes that new and better technology is likely to be developed that can be put to use to expand human knowledge and understanding of the many natural resources of the Coastal Plain. The ability to collect new scientific information about the Coastal Plain, including its oil and gas resources, will better inform public policy decisions on use and management of the natural resources of the Coastal Plain. Without the authority to do further exploration work, the scientific knowledge about the subsurface resources of the Coastal Plain will be limited to what was learned over 30 years ago. Decisions on management and best use of all of the resources on the Coastal Plain will therefore not be informed by the latest and best scientific information.

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The long-term national defense and security of the nation is dependent upon reliable and secure sources of domestic energy resources. President Trump in his March 28, 2017, Executive Order, Promoting Energy Independence and Economic Growth, placed specific emphasis on the need to develop energy resources when he stated:

Section 1 Policy. (a) It is in the national interest to promote clean and safe development of the Nation's vast energy resources, while at the same time avoiding regulatory burdens that

unnecessarily encumber energy production, constrain economic growth, and prevent job creation. Moreover, the prudent development of these natural resources is essential to ensuring the Nation's geopolitical security.

Central to meeting the goal of developing the country's natural resources in a responsible manner to ensure the Nation's geopolitical security is having and considering the best and latest information about the oil and gas resources of the Coastal Plain that science and technology can provide. There have been many advances in geophysical sciences since the 1980's that can today be utilized to further advance the level of knowledge about the oil and gas resources of the Coastal Plain beyond what was learned from exploration work done over 30 years ago. It would be imprudent to make important decisions for development and implementation of plans for securing oil and gas resources and maintaining energy infrastructure such as the Trans Alaska Pipeline System over the long term without securing and utilizing the knowledge that can be gleaned from new modern exploration work on the Coastal Plain. In addition to informing long-term energy security planning, the availability of this new data will further the Service's resource management of the Coastal Plain.

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public document available from the person listed under **FOR FURTHER INFORMATION CONTACT** or via *http://www.regulations.gov* in Docket No. FWS–R7–NWRS–2017–0072.

Required Determinations

Executive Order 13771—Reducing Regulation and Controlling Regulatory Costs

This proposed rule is considered to be an Executive Order (E.O.) 13771 deregulatory action (82 FR 9339, February 3, 2017) because it would amend regulations that currently restrict the dates when a permit application for an exploration plan for the Arctic Refuge would be allowed.

Regulatory Planning and Review (Executive Order 12866 and 13563)

The Office of Management and Budget (OMB) has determined that this rule is not significant. OMB bases its determination upon the following four criteria:

(a) Whether the rule will have an annual effect of $100 million or more on the economy or adversely affect an economic sector, productivity, jobs, the environment, or other units of the government.

(b) Whether the rule will create inconsistencies with other agencies' actions.

(c) Whether the rule will materially affect entitlements, grants, user fees, loan programs, or the rights and obligations of their recipients.

(d) Whether the rule raises novel legal or policy issues.

The proposed rule would remove the regulations that restrict the dates when a permit application may be submitted for a geophysical exploration plan on the section 1002 area in the Arctic Refuge. Thus, this rule would open the process to accept oil exploration applications for

the section 1002 area. Under the proposed rule as an administrative action, potential costs would be limited to application costs incurred by companies choosing to submit applications and by the Service to process the applications.

This analysis is limited in scope and addresses only the administrative action by the Service to accept and review new exploration plans in the Arctic Refuge. Therefore, this analysis does not evaluate costs and benefits related to the issuance of special use permits for specific exploration plans as the details of those plans are currently unknown, and the analysis would be speculative in regards to methods, location, and timing of the exploration activities. Furthermore, the review and approval process for a special use permit in the Arctic Refuge must undergo a separate process under the National Environmental Policy Act (NEPA). ~~Geological exploration and assessment undertakings under the NEPA process could include a number of activities such as seismic testing, aerial surveying, road construction, and more.~~ These exploratory activities have potential impacts including, but not limited to: polar bear viewing tourism, subsistence hunting (especially caribou) by residents, and cultural use by Alaska Natives. Furthermore, "available information indicates that any ANWR oil would be scattered among multiple smaller fields rather than concentrated in a single large field, which would make development more expensive and potentially expand the area in which any environmental effects might occur" (Congressional Research Service 2015).

Measures such as Secretarial Order No. 3352 have occurred to move forward toward energy development in the Arctic Refuge (Department of the Interior May 2017). However, Section 1003 of ANILCA states "production of oil and gas from the Arctic National Wildlife Refuge is prohibited and no leasing or other development leading to production of oil and gas

Commented [BS10]: We are speculating what activities would be proposed – we think this should be removed

Commented [LS11]: Should we put (Arctic Refuge) behind this? First time ANWR is used in this doc

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from the [Refuge] shall be undertaken until authorized by an act of Congress." Therefore, this analysis does not estimate the potential costs and benefits of oil drilling and extraction.

With this proposed rule, we solicit public input on potential economic impacts and the number of businesses affected to help quantify costs and benefits. Please see the **Request for Comments** section at the end of **SUPPLEMENTARY INFORMATION** for further information about submitting comments.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions) (5 U.S.C. 601 et seq.). However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule would not have a significant economic impact on a substantial number of small entities. Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for "significant impact" and a threshold for a "substantial number of small entities." See 5 U.S.C. 605(b). SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule would not have a significant economic impact on a substantial number of small entities.

The U.S. Small Business Administration (SBA) defines a small business as one with annual revenue or employment that meets or is below an established size standard. To assess the effects of the proposed rule on small entities, we focus on businesses that operate and/or develop

oil gas field properties (North American Industry Classification System (NAICS) 211) that have fewer than 500 employees. According to the U.S. Census Bureau, there are 8,064 businesses under NAICS 211, of which over 99 percent qualify as small businesses (2012). Thus, we expect that most entities that may apply for a special use permit would be considered small as defined by the SBA.

Under the proposed rule, individual businesses would have the opportunity to submit applications for a geological and geophysical exploration plan on the section 1002 area in the Arctic Refuge. Although estimating the number of potential future applicants would be speculative, the last seismic survey (completed in 1985) was conducted by 27 companies under 1 permit. If 27 individual companies applied for separate special use permits under the proposed rule, this would represent less than 1 percent of small businesses.

We therefore certify that this proposed rule would not have a significant economic effect on a substantial number of small entities as defined under the Regulatory Flexibility Act (5 U.S.C. 601 et seq.). A Regulatory Flexibility Analysis is not required. Accordingly, a Small Entity Compliance Guide is not required.

Small Business Regulatory Enforcement Fairness Act

This proposed rule is not a major rule under 5 U.S.C. 804(2), the Small Business Regulatory Enforcement Fairness Act. This rule:

a. Would not have an annual effect on the economy of $100 million or more.

b. Would not cause a major increase in costs or prices for consumers; individual industries; Federal, State, tribal, or local government agencies; or geographic regions.

c. Would not have significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of U.S.-based enterprises to compete with foreign-based enterprises.

Unfunded Mandates Reform Act

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.), we have determined the following:

a. This rule would not ''significantly or uniquely'' affect small governments. A small government agency plan is not required. Actions under the proposed rule would not affect small government activities in any significant way.

b. This rule would not produce a Federal mandate of $100 million or greater in any year. It would not be a ''significant regulatory action'' under the Unfunded Mandates Reform Act.

Takings (Executive Order 12630)

In accordance with E.O. 12630, this proposed rule would not have significant takings implications. A takings implication assessment is not required. This proposed rule does not contain a provision for taking of private property.

Federalism (Executive Order 13132)

This proposed rule does not have sufficient Federalism effects to warrant preparation of a federalism summary impact assessment under E.O. 13132. It would not interfere with the ability of States to manage themselves or their funds. This proposed rule, if adopted, would affect the

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geological exploration of the coastal plain of the Arctic Refuge, which is managed by the Service in Alaska, and would not have a substantial direct effect on State or local governments in Alaska.

Civil Justice Reform (Executive Order 12988)

In accordance with E.O. 12988, the Office of the Solicitor has determined that this proposed rule does not unduly burden the judicial system and meets the requirements of sections 3(a) and 3(b)(2) of E.O. 12988.

Paperwork Reduction Act

This rule does not contain any new collection of information that require approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). OMB has previously approved the information collection requirements associated with Service Special Use Permit Applications (FWS Form 3–2469) and assigned OMB Control Number 1018–0162 (expires December 31, 2019). An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act

Our draft environmental assessment is part of the administrative record for this proposed rule. In accordance with the National Environmental Policy Act (NEPA, 42 U.S.C. 4321 et seq.) and part 516 of the U.S. Department of the Interior Manual (516 DM), the Service proposes amending the existing language in 50 CFR Part 37—Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska, related to exploration plans [50 CFR

37.21(b) and (c)], to remove the date restrictions now in place for those plans. Our draft environmental assessment sets forth that the proposed action to change the regulatory language as described in the rule portion of this document will have no significant impacts on the environment.

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we will evaluate the potential effects on federally recognized Alaska Native tribal governments and Alaska Native corporations through a 810 analysis. . This rule would not interfere with the ability of Tribes to manage themselves or their funds or to regulate exploration activities on Tribal lands. However, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis, and we are seeking their input to evaluate this proposed rule. In addition, we have evaluated this proposed rule under Alaska Native Claims Settlement Act corporation policies. We will consult with Alaska Native tribes and Alaska Native corporations regarding the proposed changes in this rule for the Arctic Refuge.

Commented [BS12]: We do not like the wording of this – we have not evaluated the potential effects – we have not completed a 810 analysis -

Commented [BS13]: We have not consulted on this rulemaking -

Energy Supply, Distribution, or Use (Executive Order 13211)

Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking actions that could have significant adverse effects on energy supply, distribution, or use. We believe that the rule could have positive effects on energy supplies, distribution, or use.

Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.

Clarity of This Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

(a) Be logically organized;

(b) Use the active voice to address readers directly;

(c) Use common, everyday words and clear language rather than jargon;

(d) Be divided into short sections and sentences; and

(e) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in **ADDRESSES**, above. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that you find unclear, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

List of Subjects in 50 CFR Part 37

Administrative practice and procedure, Alaska, Environmental protection, Historic preservation, Oil and gas exploration, Penalties, Reporting and recordkeeping requirements, Surety bonds, and Wildlife refuges.

Proposed Regulation Promulgation

Accordingly, we propose to amend part 37 of title 50 of the Code of Federal Regulations as set forth below:

PART 37—GEOLOGICAL AND GEOPHYSICAL EXPLORATION OF THE COASTAL PLAIN, ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

1. The authority citation for part 37 is revised to read as follows:

AUTHORITY: 5 U.S.C. 301; 16 U.S.C. 715s and 3142; and 31 U.S.C. 9701.

2. Amend § 37.21 by revising paragraphs (b) and (c) to read as follows:

§ 37.21 Application requirements.

* * * * *

(b) Any person wanting to conduct exploratory activities may apply for a special use permit by submitting for review and processing one or more written exploration plans, in triplicate, to the Regional Director, Region 7, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503.

(c) In addition to containing the information required in paragraph (d) of this section, any exploration plan submitted shall describe the applicant's plan for carrying out an integrated program of exploratory activities in such a manner as will satisfy the objective and limitations stated in § 37.1. If an applicant submits an exploration plan in any given year, with the intention of submitting another exploration plan the following year, the applicant shall describe in its initial plan how its future exploratory activities will be integrated with those proposed under its initial plan. Each exploration plan submitted must be published and be the subject of a public hearing in accordance with requirements of § 37.22(b).

* * * * *

§ 37.52 [Amended]

3. Amend § 37.52 by:

a. In the first sentence, removing the period and adding in its place a comma and the words “for 3 years from the date the permittee submits the data and information to the Regional Director pursuant to § 37.53.”; and

b. In the second sentence, removing the words “Until September 2, 1989, the” and adding in their place the word “The”.

Dated: _____.

_____

Principal Deputy Assistant Secretary for Fish and Wildlife and Parks.

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From: Reed, Jennifer
To: Roger Kaye
Cc: Joanna Fox
Subject: Jen"s status; Good Morning America polar bear piece just aired.
Date: Friday, November 17, 2017 10:30:16 AM

My Google calendar is updated to show I am teleworking today, but since you're acting I want you to know I'm available by phone/email today, and if you need me at the office for any reason.

Though this national piece just aired, I don't think any calls will come to the Refuge--it did not mention Arctic Refuge's role in PB viewing; just a quick interest piece with no controversial info (that's yet to come with the Nightline piece to air next week...).

Jennifer J. Reed
Arctic National Wildlife Refuge Public Use Manager
101 12th Ave, Rm 236
Fairbanks, AK 99701
Telephone: (907) 455-1835
Fax: (907) 456-0428
Interagency Visitor Use Management Council-USFWS Representative
Interagency Wild & Scenic River Coordinating Council-USFWS Representative

Make Your Splash!



NOTE: This email correspondence and any attachments to and from this sender is subject to the Freedom of Information Act (FOIA) and may be disclosed to third parties.

From:	Helfrich, Devin
To:	Amee Howard
Subject:	Re: "Sen. Murkowski (R-AK) – Confirming acreage measurements for the Arctic Refuge coastal plain ("1002 area").
Date:	Friday, November 17, 2017 11:27:00 AM

I don't know :-(
thank you

Devin Helfrich
Congressional Legislative Affairs Specialist
U.S. Fish and Wildlife Service
Office Direct: (703) 358-2130
Mobile: (202) 365-5971

On Fri, Nov 17, 2017 at 1:23 PM, Amee Howard <amee_howard@fws.gov> wrote:

> Why does the universe like to make Friday's freaky??
>
> I will keep an eye on my phone. Just in case I can help out.
>
> Sent from my iPhone
>
> On Nov 17, 2017, at 9:18 AM, Helfrich, Devin <devin_helfrich@fws.gov> wrote:
>
> > It was! Hopefully it will calm down again
> >
> > **Devin Helfrich**
> > Congressional Legislative Affairs Specialist
> > U.S. Fish and Wildlife Service
> > Office Direct: (703) 358-2130
> > Mobile: (202) 365-5971
> >
> > On Fri, Nov 17, 2017 at 1:16 PM, Amee Howard <amee_howard@fws.gov> wrote:
> >
> > > Happy Friday!!

Hope it is smooth sailing today!

Sent from my iPhone

On Nov 17, 2017, at 9:15 AM, Helfrich, Devin <devin_helfrich@fws.gov> wrote:

awesome thanks

Devin Helfrich
Congressional Legislative Affairs Specialist
U.S. Fish and Wildlife Service
Office Direct: (703) 358-2130
Mobile: (202) 365-5971

On Fri, Nov 17, 2017 at 1:15 PM, Amee Howard <amee_howard@fws.gov> wrote:

I just sent it to you

Sent from my iPhone

On Nov 17, 2017, at 9:06 AM, Helfrich, Devin <devin_helfrich@fws.gov> wrote:

Hi Sara,

I see that Amee is out of the office today, hopefully enjoying herself!

Could you please help us track down the response that the Region gave Sen. Murkowski that is described as "Sen. Murkowski (R-AK) – Confirming acreage measurements for the Arctic Refuge coastal plain ("1002 area").

Thank you!

Devin Helfrich
Congressional Legislative Affairs Specialist
U.S. Fish and Wildlife Service
Office Direct: (703) 358-2130
Mobile: (202) 365-5971

On Fri, Nov 17, 2017 at 12:54 PM, Helfrich, Devin <devin_helfrich@fws.gov> wrote:

> Hi Amee,
>
> Happy Friday
>
> Could you please send us what you sent on to Murkowski/SENR on this request that they had this past week:
>
> "Sen. Murkowski (R-AK) – Confirming acreage measurements for the Arctic Refuge
> coastal plain ("1002 area").
>
> Thank you
>
> **Devin Helfrich**
> Congressional Legislative Affairs Specialist
> U.S. Fish and Wildlife Service
> Office Direct: (703) 358-2130
> Mobile: (202) 365-5971

From: Mitch Ellis
To: Jim Kurth
Subject: Fwd: Regional Solicitor Office Review of 1002 EA - CONTAINS SOLICITOR ADVICE - DO NOT RELEASE
Date: Friday, November 17, 2017 11:40:04 AM
Attachments: ATT00001.htm
20171113_EA_ARC 1002 Reg Change_DRAFT SOL-MG17Nov2017.docx (Withheld in Full - b5-AC)

Just FYI - more advice and edits from Sol in AK.

Sent from my iPhone

Begin forwarded message:

> **From:** "Gieryic, Michael" <mike.gieryic@sol.doi.gov>
> **To:** Stephanie Brady <stephanie_brady@fws.gov>
> **Cc:** Gregory Siekaniec <gregory_siekaniec@fws.gov>, Karen Clark <karen_clark@fws.gov>, Mitch Ellis <Mitch_Ellis@fws.gov>, Tracy Fischbach <tracy_fischbach@fws.gov>, Joseph Darnell <joe.darnell@sol.doi.gov>
> **Subject: Regional Solicitor Office Review of 1002 EA - CONTAINS SOLICITOR ADVICE - DO NOT RELEASE**
>
> Stephanie,
>
> Per our discussion this morning, here are my comments and some suggested edits
> b5-AC [redacted]
>
> [redacted]
>
> b5-AC [redacted]
>
> b5-AC [redacted]
>
> b5-AC [redacted]
>
> [redacted]
>
> [redacted]

b5-AC [redacted]

I will be in my office all day if you would like to discuss.

Mike Gieryic
Attorney-Adviser
Office of the Regional Solicitor
U.S. Department of the Interior
4230 University Drive, Suite 300
Anchorage, AK 99508
Phone: (907) 271-1420; Fax: (907) 271-4143
mike.gieryic@sol.doi.gov

From: Siekaniec, Greg
To: Lor, Socheata; Doug Damberg
Subject: Fwd: Regional Solicitor Office Review of 1002 EA - CONTAINS SOLICITOR ADVICE - DO NOT RELEASE
Date: Friday, November 17, 2017 11:56:49 AM

Short and sweet response to Mitch and me based on the solicitor note this morning.

greg
---------- Forwarded message ----------
From: **Kurth, Jim** <jim_kurth@fws.gov>
Date: Fri, Nov 17, 2017 at 9:44 AM
Subject: Re: Regional Solicitor Office Review of 1002 EA - CONTAINS SOLICITOR ADVICE - DO NOT RELEASE
To: Mitch Ellis <mitch_ellis@fws.gov>
Cc: Gregory Siekaniec <gregory_siekaniec@fws.gov>

b5-AC [redacted]

On Fri, Nov 17, 2017 at 1:39 PM, Mitch Ellis <mitch_ellis@fws.gov> wrote:

> Just FYI - more advice and edits from Sol in AK.
>
> Sent from my iPhone
>
> Begin forwarded message:
>
> **From:** "Gieryic, Michael" <mike.gieryic@sol.doi.gov>
> **To:** Stephanie Brady <stephanie_brady@fws.gov>
> **Cc:** Gregory Siekaniec <gregory_siekaniec@fws.gov>, Karen Clark <karen_clark@fws.gov>, Mitch Ellis <Mitch_Ellis@fws.gov>, Tracy Fischbach <tracy_fischbach@fws.gov>, Joseph Darnell <joe.darnell@sol.doi.gov>
> **Subject: Regional Solicitor Office Review of 1002 EA - CONTAINS SOLICITOR ADVICE - DO NOT RELEASE**
>
> Stephanie,
>
> Per our discussion this morning, here are my comments and some suggested edits b5-AC [redacted]
>
> [redacted]
>
> [redacted]

b5-AC [redacted]

[redacted]

[redacted]

[redacted]

I will be in my office all day if you would like to discuss.

Mike Gieryic
Attorney-Adviser
Office of the Regional Solicitor
U.S. Department of the Interior
4230 University Drive, Suite 300
Anchorage, AK 99508
Phone: (907) 271-1420; Fax: (907) 271-4143
mike.gieryic@sol.doi.gov

From: Jim Kurth
To: Ellis, Mitch
Cc: Gregory Siekaniec
Subject: Re: Regional Solicitor Office Review of 1002 EA - CONTAINS SOLICITOR ADVICE - DO NOT RELEASE
Date: Friday, November 17, 2017 12:01:51 PM

As long as it's perfect

Sent from my iPhone

On Nov 17, 2017, at 2:00 PM, Ellis, Mitch <mitch_ellis@fws.gov> wrote:

> AK time?
>
> _____
> Mitch Ellis
> Chief of Refuges, Alaska Region
> National Wildlife Refuge System
> U.S. Fish and Wildlife Service
> 1011 East Tudor Road
> Anchorage, Alaska 99503
> (907)786-3667 wk
> (907)947-4416 mob
>
> On Fri, Nov 17, 2017 at 1:44 PM, Kurth, Jim <jim_kurth@fws.gov> wrote:
> b5-AC [redacted]
>
> On Fri, Nov 17, 2017 at 1:39 PM, Mitch Ellis <mitch_ellis@fws.gov> wrote:
> Just FYI - more advice and edits from Sol in AK.
>
> Sent from my iPhone
>
> Begin forwarded message:
>
> **From:** "Gieryic, Michael" <mike.gieryic@sol.doi.gov>
> **To:** Stephanie Brady <stephanie_brady@fws.gov>
> **Cc:** Gregory Siekaniec <gregory_siekaniec@fws.gov>, Karen Clark <karen_clark@fws.gov>, Mitch Ellis <Mitch_Ellis@fws.gov>, Tracy Fischbach <tracy_fischbach@fws.gov>, Joseph Darnell <joe.darnell@sol.doi.gov>
> **Subject: Regional Solicitor Office Review of 1002 EA - CONTAINS SOLICITOR ADVICE - DO NOT RELEASE**
>
> Stephanie,
>
> Per our discussion this morning, here are my comments and some suggested edits b5-AC [redacted]

b5-AC

[redacted]

I will be in my office all day if you would like to discuss.

Mike Gieryic
Attorney-Adviser
Office of the Regional Solicitor
U.S. Department of the Interior
4230 University Drive, Suite 300
Anchorage, AK 99508
Phone: (907) 271-1420; Fax: (907) 271-4143
mike.gieryic@sol.doi.gov

From: Gieryic, Michael
To: Stephanie Brady; Tracy Fischbach
Subject: Re: Regional Solicitor Office Review of 1002 EA - CONTAINS SOLICITOR ADVICE - DO NOT RELEASE
Date: Friday, November 17, 2017 12:11:49 PM

Here's a follow up thought b5-AC [redacted]

b5-AC [redacted]

[redacted]

Mike Gieryic
Attorney-Adviser
Office of the Regional Solicitor
U.S. Department of the Interior
4230 University Drive, Suite 300
Anchorage, AK 99508
Phone: (907) 271-1420; Fax: (907) 271-4143
mike.gieryic@sol.doi.gov

On Fri, Nov 17, 2017 at 9:25 AM, Gieryic, Michael <mike.gieryic@sol.doi.gov> wrote:

> Stephanie,
>
> Per our discussion this morning, here are my comments and some suggested edits b5-AC [redacted]
>
> b5-AC [redacted]
>
> [redacted]
>
> [redacted]
>
> [redacted]
>
> [redacted]

b5-AC [redacted]

[redacted]

[redacted]

I will be in my office all day if you would like to discuss.

Mike Gieryic
Attorney-Adviser
Office of the Regional Solicitor
U.S. Department of the Interior
4230 University Drive, Suite 300
Anchorage, AK 99508
Phone: (907) 271-1420; Fax: (907) 271-4143
mike.gieryic@sol.doi.gov

From: Sara Boario
To: Amee Howard
Cc: devin_helfrich@fws.gov; douglas_campbell@fws.gov
Subject: Re: Arctic Refuge - 1002 acreage question
Date: Friday, November 17, 2017 12:17:47 PM

Thanks Amee!

Devin I've been in a meeting all morning but let me know if you need anything else.

Sb

Sent from my iPhone

On Nov 17, 2017, at 9:10 AM, Amee Howard <amee_howard@fws.gov> wrote:

> Hi Devin,
>
> Here is the email thread to Annie Hoefler from SENR.
>
> If you need details on what exactly the fourth township is and its history, give Doug Campbell a call. He can lay it out better than anyone!
>
> Thanks so Much!
> Amee
>
> Sent from my iPhone
>
> Begin forwarded message:
>
> > **From:** Amee Howard <amee_howard@fws.gov>
> > **Date:** November 14, 2017 at 4:19:23 PM AKST
> > **To:** "Hoefler, Annie (Energy)" <Annie_Hoefler@energy.senate.gov>
> > **Subject: Re: Arctic Refuge - 1002 acreage question**
> >
> > Hi Annie,
> >
> > Confirmed by our Realty team. The fourth township is included 1.57+ million acre number.
> >
> > Thanks so much!
> > Amee
> >
> > Sent from my iPhone
> >
> > On Nov 14, 2017, at 3:35 PM, Hoefler, Annie (Energy) <Annie_Hoefler@energy.senate.gov> wrote:

Thank you, our markup begins at 9:00 am eastern, so anything you can get me before that time will be greatly appreciated.

From: Howard, Amee [mailto:amee_howard@fws.gov]
Sent: Tuesday, November 14, 2017 7:34 PM
To: Hoefler, Annie (Energy) <Annie_Hoefler@energy.senate.gov>
Subject: Re: Arctic Refuge - 1002 acreage question

Hi Annie,

That is my understanding, but I will confirm with our Chief of Realty in the morning and get back to you ASAP.

Have a fantastic evening!
Amee

On Tue, Nov 14, 2017 at 2:43 PM, Hoefler, Annie (Energy) <Annie_Hoefler@energy.senate.gov> wrote:

> Thank you! I assume that the fourth township (post ANILCA) is included in the 1.57 figure?
>
> **From:** Howard, Amee [mailto:amee_howard@fws.gov]
> **Sent:** Tuesday, November 14, 2017 6:23 PM
> **To:** Hoefler, Annie (Energy) <Annie_Hoefler@energy.senate.gov>
> **Subject:** Arctic Refuge - 1002 acreage question
>
> Hi Annie,
>
> I confirmed with our Division of Realty that Kaktovik Inupiat Corporation (KIC) conveyed lands are not included in the 1.57+ million acres measured for the 1002 area.
>
> Let me know if you need anything additional.
>
> Thanks so much!
> Amee
>
> --
> *Amee Howard*
> *Congressional and Legislative Affairs*
> U.S. Fish & Wildlife Service

Anchorage, Alaska
Office: (907)786-3509
Mobile: (907)229-8575
https://www.fws.gov/alaska/
"Conservation Begins with Hello"

--
Amee Howard
Congressional and Legislative Affairs
U.S. Fish & Wildlife Service
Anchorage, Alaska
Office: (907)786-3509
Mobile: (907)229-8575
https://www.fws.gov/alaska/
"Conservation Begins with Hello"

From: Ellis, Mitch
To: Jim Kurth
Cc: Gregory Siekaniec
Subject: Re: Regional Solicitor Office Review of 1002 EA - CONTAINS SOLICITOR ADVICE - DO NOT RELEASE
Date: Friday, November 17, 2017 12:34:57 PM

You should have it by 4 or 4:30 today.....Greg will send it. Our staff are making some polishing edits etc b5-AC [redacted] b5-AC [redacted]

Mitch Ellis
Chief of Refuges, Alaska Region
National Wildlife Refuge System
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503
(907)786-3667 wk
(907)947-4416 mob

On Fri, Nov 17, 2017 at 2:17 PM, Jim Kurth <jim_kurth@fws.gov> wrote:

> 10-4
>
> Sent from my iPhone
>
> On Nov 17, 2017, at 2:12 PM, Ellis, Mitch <mitch_ellis@fws.gov> wrote:
>
> > Jim - b5-AC [redacted] Everything may be okay. I'll speak with Greg S and get back to you.
> >
> >
> > Mitch Ellis
> > Chief of Refuges, Alaska Region
> > National Wildlife Refuge System
> > U.S. Fish and Wildlife Service
> > 1011 East Tudor Road
> > Anchorage, Alaska 99503
> > (907)786-3667 wk
> > (907)947-4416 mob
> >
> >
> > On Fri, Nov 17, 2017 at 1:44 PM, Kurth, Jim <jim_kurth@fws.gov> wrote:
> >
> > > b5-AC [redacted]
> > >
> > > On Fri, Nov 17, 2017 at 1:39 PM, Mitch Ellis <mitch_ellis@fws.gov> wrote:
> > >
> > > > Just FYI - more advice and edits from Sol in AK.
> > > >
> > > > Sent from my iPhone
> > > >
> > > > Begin forwarded message:

From: "Gieryic, Michael" <mike.gieryic@sol.doi.gov>
To: Stephanie Brady <stephanie_brady@fws.gov>
Cc: Gregory Siekaniec <gregory_siekaniec@fws.gov>, Karen Clark <karen_clark@fws.gov>, Mitch Ellis <Mitch_Ellis@fws.gov>, Tracy Fischbach <tracy_fischbach@fws.gov>, Joseph Darnell <joe.darnell@sol.doi.gov>
Subject: Regional Solicitor Office Review of 1002 EA - CONTAINS SOLICITOR ADVICE - DO NOT RELEASE

Stephanie,

Per our discussion this morning, here are my comments and some suggested edits b5-AC

[redacted]

I will be in my office all day if you would like to discuss.

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From:	Martin, John
To:	Tracy Fischbach; Brian McCaffery; Stephanie Brady; Nicole Gustine; Ryan Mollnow; Lor, Socheata; Doug Damberg
Subject:	Updated Cumulative Effects Narrative
Date:	Friday, November 17, 2017 1:48:11 PM
Attachments:	Draft EA Cumulative Effects-Foreseeable Future 17Nov2017HIGHNOON.docx

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All

Thanks for the opportunity. Still wish it was better. Many separate topics are condensed into a few salient headers.

Attached for your consideration and inclusion in the EA.

John

Cumulative Effects

Past, Present or Reasonably Foreseeable Actions

Across the larger landscape of the North Slope (North Slope Borough), the coastal plain from Point Barrow to Point Demarcation (approximately the U.S. and Canadian border) is increasingly developed. This is especially true of the western end with the National Petroleum Reserve-Alaska (NPRA), Prudhoe Bay and adjoining oilfield from Tarn and Kuparuk on the western end to Point Thompson on the eastern end at the western-most boundary of the Arctic Refuge and 1002 area. With the discovery of oil in the late 1960s came the first explorations, developments and finally production. Following the international oil crisis of 1973, the Trans-Alaska Pipeline Systems (TAPS) was build and spanned Alaska from north to south, Prudhoe Bay to Valdez. The TAPS has been moving oil from the oilfield to transports for 40 years and likely to continue for the long term. Lateral pipelines are under construction or proposed to connect with the TAPS in the near future. The TAPS is approved to operate via DOE permit through 2032.

To accommodate development and infrastructure construction, a road was constructed from Fairbanks to Deadhorse to convey personnel and materiel necessary to build and maintain the oilfields, pipeline and support services and allowed overland access to the North Slope year-round. Initially constructed with private funds and for industrial purposes only, the road was eventually turned over to the State of Alaska to maintain. In addition to still be maintained largely for industrial purposes, it is now a popular for vacationers and sport hunter access (FWS 2010).

The oil and gas industry continue to expand with one of the most recent developments, the Liberty Project on the Alaska outer continental shelf (BOEM 2017) and the NPRA being opened for oil and gas lease sales, as announced in September 2017. The development of the North Slope, including the coastal plain environs is likely to continue into the foreseeable future (Clement and others 2013; NRC 2014, 2015; Alaska Arctic Policy Commission 2015).

Increasing mean annual summer temperatures concurrent with projections for less snow cover during winter months will greatly facilitate development of industry, infrastructure, and public access to the North Slope.

The proposed full build-out oil and gas development scenario footprint projected to be 2,000 acres or 0.13 percent of the total 1.5 million acre 1002 area as described in the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987). This includes 8 large pads for housing storage, drilling with a heavy-duty large airstrip (estimated 82 acres each); 19 medium-size pads for drilling with light-duty airstrip (estimated 37 acres each); and, 26 small pads for drilling (estimated 11 acres each). Also, 8 gravel pits would established, each about 150 acres. Additionally about 275 miles of pipeline corridor (average 100-foot wide) would be developed with associated construction widths reduced to maintenance and operation, estimated at 3,330 acres. Note that the total footprint based on the estimated acreage annotated here is about 6,175 acres which vastly exceeds the 2,000 acre full build scenario described in the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987) and still does not include road infrastructure, water pumping sites, dock facilities or seawater treatment plants.

It is possible that the differences in the 1987 scenario build-out acreages may be accounted for in the area *directly affected* by oil and gas development, which is estimated at 12,650 acres, or 0.84 percent of the total 1.5 million acre 1002 area (Clough and Christiansen 1987). This would include the actual footprints of scattered pads and all associated construction and maintenance

and operation phases of development through production. Improvements in industry technology since development of the 1987 may greatly reduce pad size or consolidation of separate pads into pads facilitating multiple drilling operations. However, pipelines, gravel pits, and other supporting infrastructure footprint will remain constant.

Advances in the oil and gas state-of-the-industry since the late 1970s through late 1980s include: increasing directional drilling capacities; reduced pad sizes; multiple drillings from a single pad; low ground-bearing pressure vehicles; winter site development; buffer zones around critical resources; among other features or best management practices (BMPs), the scope and scape of the exploration, development and production may be expected to be reduced from the initial estimate. All these considerations serve to mitigate direct, indirect and cumulative effects through avoiding, minimizing, rectifying, reducing, and/or compensating the significance of context and intensity for the proposed oil and gas exploration, development, and production activities.

Concurrently, there have been advances in understanding of mitigation technologies and cumulative effects for many Arctic species and habitats. The 29 listed mitigation recommendations of the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987), although now largely dated, provide a basis for updating and augmenting state-of-the-industry advances since (Clough and Christiansen 1987). Specifically, this includes the changes for threatened, endangered and sensitive (TES) species: arctic pennycress (*Noccaea arctica*, formerly *Thlaspi arcticum*), more common than initially determined; the delisting of the American Peregrine Falcon (*Falco peregrinus anatum*) and Arctic Peregrine Falcon (*F.p. tundrius*); and, listing of the polar bear (*Ursus maritimus*), among other considerations.

Cumulative effects including some aspects of climate change, not adequately considered in the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987) are addressed at least up to the time of publication in *Cumulative Environmental Effects of Oil and Gas Activities on the Alaska's North Slope* (NRC 2003). Additionally, biological resources in relation to oilfield developments including: vegetation and biotic communities; caribou, grizzly bear; polar bear; Arctic fox; Pacific Loon; Tundra Swan; Lesser Snow Goose; Common Eider (Pacific Eider); shorebirds; freshwater invertebrates; freshwater fish; anadromous fish; and benthic marine communities are discussed in *The Natural History of an Arctic Oil Field: Development and the Biota* (Truett and Johnson 2000). Finally, parallels from exploration, development and production of oil and gas on the North Slope may be National Petroleum Reserve – Alaska EIS (BLM 2012), which are directly comparable to the coastal plain 1002 area. Additional information relative to wildlife and water resources and the oil and gas industry may be found in a variety of environmental evaluations, principally through NEPA, and other permitting conditions, for example, the recent Liberty Development Project (BOEM 2017).

As examples of advances in state-of-the-industry, oil and gas environmental impacts can be significantly reduced if these activities occur during winter months, when the tundra is frozen and protected by snow cover, and most wildlife are absent (Gliders and Cronin 2000). In summer, the thawing snow and lengthening days bring millions of shorebirds and waterfowl in search of nesting sites along with caribou migrating from wintering locations in the interior. The oil exploration and production process involves multiple stages that may require several years or even decades to complete for each oil field. New technologies involving reduced well spacing, elimination of reserve pits, directional drilling, winter maintenance and construction from ice pads and roads, aerial support, and the use of baseline and ongoing biological monitoring programs to facilitate decision making have reduced the areal impacts of development. The incorporation of baseline biological studies and monitoring of exploration and field development assists in minimizing impacts to high-value habitats and species. In this

manner the oil and gas industry reduces encroachment on wildlife habitat and avoids disturbance to wildlife during critical periods (Gliders and Cronin 2000).

As a specific example, denning bears and particularly denning females with young were susceptible to seismic blasting during exploration surveys. Rousing bears, emerging and resettling, required energy reserves that might place individual bears at risk for long-term survival and especially cubs-of-the-year. In part this was because field crews were unaware of denning sites. Bear dens are now more closely monitored due to the threatened status of the polar bear, typically via radiotelemetry. Additionally, traditional blasting has been replaced by vibrators and sensor lines which are far less intrusive to denning bears. As a consequence, the disturbance threat has been greatly reduced through advances in technology (Reynolds and others 1986; McLellan and Shackleton 1988, 1989; Mattson 1990; Blix and Lentfer 1992; Linnell and others 20000.

However, cumulative effects of oil and gas exploration, development and production become problematic for long-term recovery and restoration. Some sites abandoned and rehabilitated to various degrees still show evidence of impacts 40 to 60 years following the activity (Walker and others 1987; Felix and Raynolds 1989; Gliders and Cronin 2000; Kemper and MacDonald 2009; Jorgenson and others 2010; McCarter and others 2017).

As an example of unknowns and uncertainty of climate change in relation to oil and gas exploration, development and production are water resources and their use for industry. While the creation of impoundments for water storage and subsequent use for drilling operations has created habitat and expanded the distribution of such species as the Arctic char (Moulton and George 2000; NRC 2003), it is only with the provision that pumping capacity is capped so that sufficient overwintering habitat is available below the maximum ice depth and large enough to contain dissolved oxygen for the longest period of ice coverage. This is important in a landscape where overwintering habitat for fish is limited (Reynolds 1997).

Climate projections for the North Slope indicate not only warming but drying through the summer months and less precipitation through the winter (ACIA 2004). This situation may lead to lower minimum depths in natural lakes or artificial impoundments where entrapments may increase that may ultimately affect fish species populations, invertebrate food resources and possibly trophic cascade effects (Ims and Fuglei 2005). As aquatic invertebrates are a primary food resource for migratory shorebirds, and reduction in this energy-rich, seasonal resource could greatly affect the survival of adults and nesting efforts (Bart and others 2012; Hof and others 2017).

Even using the largest footprint estimated for development from 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987), this may be scattered across the landscape of 1.5 million acres of the coastal plain 1002 area. As mean annual summer temperature increase, as they have to the present, migrating caribou will seek out the coolest remaining sites, including patches of snow which are used to avoid or reduce biting insects. Oil and gas developments have been demonstrated to affect movement and foraging behavior previously (Ballard and others 2000; Cameron and others 1979, 1989, 2005; Cronin and others 2000; among others). While behavioral responses may be individually or herd specific, and have not affected the overall health of North Slope caribou to this time, the point is that with future environmental change, a threshold may be crossed at some point in the future where wildlife resource requirements may come in direct conflict with industry.

Fragmentation

A reconsideration of the full build-out of the proposed 1987 action, with allowances for reductions due to advances in technology, is best considered at a landscape scale. The placement of about 60 drill pads and other facilities across the length and depth of the 1.5 million acres 1002 area, amounting to a total consolidated footprint of less than 1 percent, is minimal. However, additive to this is the pipeline connections for each well, which if not a barrier to movement, at a minimum an encumbrance to species movement for specie that depend on landscape mobility such as caribou and bears.

Further, there is operation and maintenance activities along roadways by vehicles, facility activity and human presence, fixed and rotor-wing aircraft traffic conveying personnel and materiel or conducting surveys among widely distributed sites, and other noise or visual distractions (Gliders and Cronin 2000; Pepper and others 2003). These disturbances may affect the quality of habitat immediately adjacent for foraging or reproduction or other life history events thereby reducing value to wildlife. Some species, while tolerant of period disturbances may eventually abandon areas if the disturbance is continuous. Alternatively, some species are less tolerant or intolerant during specific life history events such as nesting or calving. For example, increased human activity and industrial development are also implicated in the declines of many caribou herds throughout the circumpolar region (CAFF 2010). Compounding these considerations are changes to resources, some naturally-occurring with or without climate change, and others aggravated through human activities. For example, the siting of pads along the coastal plain places caribou seeking cooler, wind-blown areas for insect relief, and/or polar bear movements along shorelines and river deltas may increase the potential for wildlife-human conflict, not limited to life-threatening situations. All of the above may be collectively embraced in the concept of habitat fragmentation, with the result that despite the widely spaced placement of oil and gas activities, the combination of a suite of human-made feature and activities reduces the value of the overall landscape (Franklin and others 2002; Lindenmayer and Fischer 2006).

When wildlife have no other options available, individuals may remain in poor-quality habitat that may lead to higher predation or mortality or low reproduction rates and these types of habitats situations are primarily modified by human activities (Batten 2004). Further, such situations may occur in relatively pristine areas (Batten 2004). By definition, a source population is that which has sufficient numbers in excess over mortality to maintain itself or increase indefinitely, and a sink population is that which has insufficient excess or net loss (mortality) which over time, may decline to eventual extinction at that location. Sources and sinks are increasingly important considerations in human-altered environments. An ecological trap is a situation in which wildlife settle in seemingly optimal habitat, but conditions were either deceptive or change rapidly to suboptimal, threatening survival if the individual remains at that site, or, upon departure if it was unable to gain sufficient body energy reserves for movement or survival. A factor contributing to population sink conditions are subsidized predators – those predators that are tolerant of human presence and tend to increase in association with humans, specifically gulls (*Larus* spp.), Common Raven, and red fox (Truett et al. 1997; Mitchell and Pihl 2005).

For the 1002 area, even slight alterations to water availability and hydrology, species nutrient uptake, survival rates, increased predation, habitat fragmentation, flock/herd social structure, or behavioral stress could contribute to conditions creating a population sink or ecological trap situation (Van Horne 1983; Pulliam 1988; Pulliam and Danielson 1991; Franklin et al. 2002; Battin 2004; Lindenmayer and Fischer 2006; Beale 2007).

As a cautionary note, monitoring of wildlife and their habitats will certainly occur throughout the lifespan of the project. One of the simplest and cost-effective measures is the counting of individuals for density or abundance. This is typically interpreted as an indicator of habitat

quality but caution is recommended as other factors need to be validated to confirm the effects and their significance for the proposed oil and gas exploration, development and production (Van Horne 1983).

Climate Change

As noted in the discussion here, climate changes are difficult address or isolate as a single subject due to its effect on nearly every aspect of Arctic biology, ecology, and physics. Climate change are affecting the Arctic and boreal ecosystems twice as fast as any other region on earth (ACIA 2004; IPCC 2007; NRC 2008; Clement et al. 2013). Using climate projections (ALFRESCO – Alaska Frame-based Ecosystem Code sponsored by Scenarios Network for Alaska Planning – SNAP; http://www.snap.uaf.edu), for 33-, 66-, and 99-year futures based upon temperature and precipitation, ecosystems are likely to change through 3 general avenues: (1) no change, i.e., refugia; (2) jump from existing climax to new (and potentially novel) climax community; or (3) progress through a series of successional seral stages to a new (and potentially novel) climax community (SNAP/EWHALE 2012).

More to the point, future climate projections for the North Slope include increasing mean high summer temperature, increasing mean low winter temperatures, less precipitation, and landscape drying (ACIA 2004; Martin and others 2009; SNAP/EWHALE 2012). This may be translated to less water for drilling operations including the risk of over-pumping water resources in a landscape with relatively limited open water despite the appearance of abundance. Such drying will affect wetland functions and values for wildlife resources and water quality. Less water and higher temperatures will place some species at risk for continued occupation of preferred habitats, such as overwintering habitat for freshwater fish, freshwater invertebrates, waterfowl and shorebird production (ACIA 2004; Tulp and Schekkerman 2008).

Additionally, the projected drying may create conditions conducive for invasive species (vascular and nonvascular plants, invertebrates and vertebrates, and pathogens) to pioneer and establish populations (NRC 2002, 2008; Carlson and Shephard 2007; Crowl and others 2008; Bella 2009; Conn and others 2010; Lassuy, D.R., and P.N. Lewis. 2013). As an example the red fox is just now entering the Arctic Refuge which will ultimately compete with native Arctic fox and is a far more plastic and effective predator than native fox or equivalent mesocarnivores. Declines in waterfowl production have been demonstrated in multiple locations where red fox were not previous present. Increasing soil disturbances for development and infrastructure may create pathways for invasive plants and the increased movement of personnel and materiel may create human-subsidized transport of seeds or propagules.

Loss of sea ice will create the potential for increased shore zone erosion during storm or tide surge events. Sea level rise is already causing dislocation and relocation of traditional village sites to higher grounds if available elsewhere in Alaska.

Uncertainty

As expressed by local residents and subsistence resource users during scoping for numerous development projects is the fear of displacement of those resources due to increasing fragmentation of the landscape for traditional lifestyles (North Slope Borough 2009). Equal with this concern is the fear of catastrophic spills that will affect subsistence resources, particularly long-term incidents that may require years (or generations) to restore and rehabilitate to achieve pre-incident conditions (North Slope Borough 2009).

While the oil and gas industry may take every precaution and opportunity to prevent accidental spills or toxic exposure to humans and the environment, the potential risks will remain throughout the lifespan of exploration, development and production, and until the coastal plain is restored and rehabilitated. Due to the concentration of some species in the coastal plain, which for a few species may include significant proportions of global populations, an inland or marine spill could have significant consequences (Brown and others 2007; CAFF 2010; Dickson and Smith 2013; among others). Remoteness and weather are compounding factors for incident assessment, control and cleanup, in addition to the general lack of water as noted previously.

The oil and gas industry mitigation and BMPs have evolved based on experience, knowledge and technology. Similarly, understanding and knowledge of biological and water resources has increased over time and with technology. However, foreseeable changes may be acknowledged but uncertainty and lack of knowledge make management of oil and gas exploration, development, and production or natural resources management tenuous in many respects for the long-term (Wilson and others 2013).

Some cumulative effects of exploration, development and production may be avoided through careful monitoring and permit stipulations. Therefore, strict adherence to those stipulations will be critically important. Other effects may be mitigated via collaborative and cooperative effort, particularly through adaptive management that is modified as new information or technology becomes available. Industry and agency monitoring must therefore work together so that evolving approaches may be fully explored to meet the needs of natural and physical resouces and industry needs.

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From: Fischbach, Tracy
To: Doug Damberg; Greg Siekaniec; Karen Clark; Stephanie Brady; Socheata Lor
Subject: Friday"s version of the EA and PR
Date: Friday, November 17, 2017 2:02:07 PM
Attachments: 20171117_EA_ARC 1002 Reg Change_DRAFT.docx

Hi all,

Attached are our final versions of these documents.

-Tracy

Arctic NWR permit application NPRM 10.12.17_AK ...

ANWR - 2 Drft Reg.pdf

Tracyann S Fischbach
Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources & Conservation Planning
(907) 786-3369

Hours: Mon - Thurs 9:15 am to 3:15 pm
"Getting right down and smelling the fresh soil is good for any one." - from the 1913 Handbook for Girl Scouts by W. J. Hoxie

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FWS Region 7 Land Mapper (Public version)
Region 7 GeoPDF Map Portal

Environmental Assessment for PROPOSED AMENDMENT TO REGULATIONS FOR GEOLOGICAL EXPLORATION OF THE COASTAL PLAIN 1002 AREA

U.S. Fish and Wildlife Service
Arctic National Wildlife Refuge, Alaska

DRAFT

17 November 2017

U.S. Fish & Wildlife Service

Environmental Assessment
For the
Proposed Regulation Change for Management of the Coastal Plain 1002 Area of the Arctic National Wildlife Refuge, Alaska

This Environmental Assessment (EA) was prepared in accordance with the U.S. Department of the Interior (DOI) Departmental Manual 516, and is in compliance with the National Environmental Policy Act and the Council on Environmental Quality Regulations (40 CFR 1500-1508).

This EA serves as a public document to briefly provide sufficient evidence and analysis for determining the need to prepare an Environmental Impact Statement (EIS) .

This EA concisely describes the potential environmental impacts of the proposed action and the alternatives. The EA provides a list of the agencies and persons consulted during EA preparation.

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Glossary	
1002 area	identified as such in the map entitled *Arctic National Wildlife Refuge*, dated August 1980 [ANILCA § 1002(b)] (See Figure 1).
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act of 1980
BLM	Bureau of Land Management, U.S. Department of the Interior
CCP	Comprehensive Conservation Plan for National Wildlife Refuges, required by ANILCA
coastal plain	defined as that area shown on the map entitled Arctic National Wildlife Refuge dated August 1980 [ANILCA § 1002(b)], and legally described in 50 CFR Part 37 Appendix I-Legal Description of the Coastal Plain, Arctic National Wildlife Refuge, Alaska [see also 50 CFR § 37.2(d)] (See Figure 1).
cultural resource	defined as any district, site, building, structure, or object significant in American history, architecture, archeology, engineering or culture, as determined in accordance with 36 CFR § 60.6 [see 50 CFR § 37.2(e)]
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior; including BLM, USFWS, USGS
EA	Environmental Assessment, as stipulated under NEPA
EIS	Environmental Impact Statement, as stipulated under NEPA
exploratory activity	defined as surface geological exploration or seismic exploration or both of the coastal plain and all related activities and logistics required for either or both, and any other type of geophysical exploration of the coastal plain which involves or is a component of an exploration program for the coastal plain involving surface use of refuge lands and all related activities and logistics required for such exploration [see 50 CFR § 37.2(i)]
FONSI	Finding of No Significant Impact; Federal agency decision that concludes an EA

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NEPA	National Environmental Policy Act of 1970 [40 CFR §§ 1500-1508]
NRC	National Research Council, National Academy of Sciences
NWR	National Wildlife Refuge
ROD	Record of Decision, Federal agency decision that concludes an EIS
USFWS	Fish and Wildlife Service, U.S. Department of the Interior
USGS	Geological Survey, U.S. Department of the Interior

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1 Introduction & Overview

1.1 Purpose and Need

The U.S. Fish and Wildlife Service (Service), proposes to amend the regulations at 50 CFR Part 37 - *Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska*, regarding the dates when an application may be submitted for a permit for a geological and geophysical exploration plan on the Arctic National Wildlife Refuge (Arctic Refuge) lands described in the Alaska National Interest Lands Conservation Act (ANILCA). This action is an update to our regulations to allow opportunities for applicantss to conduct seismic exploration. he ability to collect new information on oil and gas resources will better inform public policy decisions. We are taking this action in support of Executive Order 13783, Promoting Energy Independence and Economic Growth.

1.2 Key Environmental Requirements & Integration of Other Environmental Statutes & Regulations

The *National Environmental Policy Act of 1969* (NEPA) requires federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions, including a no action alternative. This Environmental Assessment (EA) addresses the administrative action by the Service to permit new exploration plans in the Arctic Refuge. This EA does not evaluate decisions to issue special use permits for specific exploration plans as the details of those plans

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are unknown at this time. Any analysis by the Service at this time would be speculative in regards to methods, location and timing of specific exploration activities that may occur if the current regulations are amended to provide for additional geological and geophysical exploration.

Section 7 of the *Endangered Species Act* (16 U.S.C. 1536) requires the DOI Secretary to ''review other programs administered by him (or her) and utilize such programs in furtherance of the purposes of the Act'' and to ''insure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat . . . .'' Prior to issuance of these regulations, we would consult under section 7 of the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 et seq.), to ensure that any applications for exploration in the 1002 area of the coastal plain of Arctic Refuge is not likely to jeopardize the continued existence of any species designated as endangered or threatened, or modify or destroy its critical habitat, and that the regulations are consistent with conservation programs for those species. Similar to the NEPA analysis, plan-specific section 7 reviews would be completed when explorations plans are submitted for review and processing.

ANILCA is integral to how this proposed regulation change will be evaluated. When ANILCA was passed in 1980 the Act re-designated Arctic Refuge and required the writing of a Comprehensive Conservation Plan (CCP) for the Arctic Refuge (Title III), required the identification of federal actions which could have the potential to significantly restrict subsistence users (Title VIII), and required the DOI "to provide for a comprehensive and continuing inventory and assessment of the fish and wildlife resources of the coastal plain of the Arctic Refuge; an analysis of the impacts of oil and gas exploration, development, and production, and to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources" (Title X). The "coastal plain" was defined by a map entitled "Arctic National Wildlife Refuge", dated August 1980 (Figure 1).

Section 106 of the *National Historic Preservation Act of 1966* requires that federal agencies identify and assess the effects its actions may have on historic properties. "Properties" is broadly defined and does not just include built infrastructure. Prior to issuance of any permit given under these regulations, we would ensure that any applications for exploration in the coastal plain of Arctic Refuge are not likely to jeopardize historic properties.

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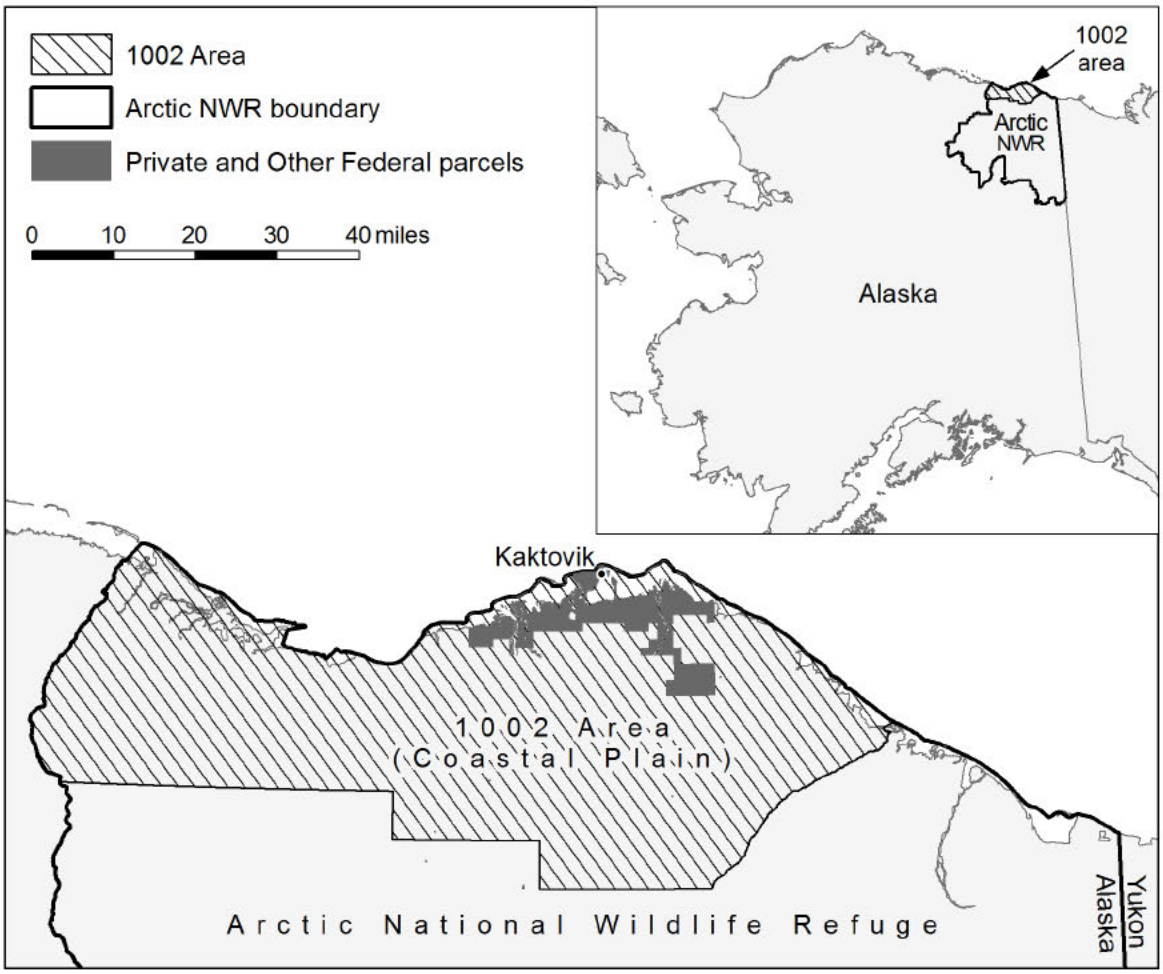


Figure 1. Arctic National Wildlife Refuge showing the coastal plain 1002 area.

The Arctic Refuge was first established in 1960 through Public Land Order 2214, for the purpose of preserving unique wildlife, wilderness, and recreational values. The original 8.9-million acre Arctic National Wildlife "Range" was withdrawn from all forms of appropriation under public land laws, including mining but not from mineral leasing.

In ANILCA Title III, the Arctic Refuge was expanded to 19-million acres (Figure 1). Under ANILCA § 303(2) the "purposes for which the Arctic National Wildlife Refuge was established and shall be managed include –

(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including participation in coordinated ecological studies and management of this herd and the Western

Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge."

In Title VIII of ANILCA, § 810, Congress recognized the importance of federal lands to local residents of Alaska who had been using those lands to support their subsistence lifestyle for generations. As a result, federal land managers are required to identify whether a proposed land management action has the potential to significantly restrict subsistence opportunities. If so, then the manager is required to consult with local subsistence users and to seek to minimize such restrictions. In Title X of ANILCA, § 1002, Congress provided for a "comprehensive and continuing inventory and assessment of the fish and wildlife resource of the coastal plain of the Arctic Refuge; an analysis of the impacts of oil and gas exploration, development, and production, and to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources."

1.3 BACKGROUND

With the passage of ANILCA, three primary actions were required of the Service and DOI in relation to administration of the Arctic Refuge: (1) a CCP for the Arctic Refuge was to be written; (2) the DOI Secretary was to assess wildlife values and oil reserves in an area described in ANILCA § 1002; and, (3) the DOI Secretary was to authorize exploratory activity within the coastal plain "in a manner that avoids significant adverse effects on the fish and wildlife and other resources."

First, ANILCA § 304(g) directed the preparation of a CCP for each refuge in Alaska. Each plan is based on an identification and description of resources of the refuge, including fish and wildlife resources and wilderness values, and must "designate areas within the refuge according to their respective resources and values; specify programs for conserving fish and wildlife and the programs relating to maintaining the identified values proposed to be implemented within each such area; and specify uses within each area which may be compatible with the major purposes of the refuge."

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An initial CCP and related EIS were prepared for Arctic Refuge. The Record of Decision (ROD) implemented the minimal management alternative (FWS 1988a, 1988b) which emphasized managing for natural, unaltered landscapes and natural processes. This decision was reiterated in 2015 when the CCP was revised. In this updated CCP and EIS, recommendations for Congressionally-designated Wilderness and four additional Wild and Scenic River designations were also included (FWS 2015a).

Second, under ANILCA § 1002 the DOI Secretary was required to assess the petroleum and wildlife values for a 1.5 million-acre portion of Arctic Refuge coastal plain referred to as the "1002" area (Figure 1). The assessment of the 1002 area of the coastal plain was essential to identifying potential oil and gas reserves and whether development activities would significantly and adversely affect fish, wildlife, habitats or the environment.

Biological studies and geological exploration coordinated by the Service, U.S. Geological Survey (USGS), and Bureau of Land Management (BLM) over a 2-year period on the coastal plain were initiated shortly after the enactment of ANILCA. Studies were to conclude 5 years after enactment of the Act, with final results and recommendations submitted to Congress 9 months later.

In April 1982, the Service completed the initial report summarizing current information regarding fish and wildlife, and their habitats occurring on the Arctic Refuge coastal plain (FWS 1982). Between 1982 and 1987 over 50 separate biological field studies in the 1002 area of the coastal plain documented baseline conditions, most summarized in annual reports (Garner and Reynolds 1983, 1984, 1985, 1986, 1987). The baseline assessment period ended in 1987 with the submittal of the *Arctic National Wildlife Refuge, Alaska, Coastal Plain Resources Assessment: Report and Recommendation to the Congress of the United States and Final legislative Environmental Impact Statement* (hereafter, *Coastal Plain Report*) (Clough and others 1987). The recommendation to Congress at the time was to open the entire 1002 area of the coastal plain to an orderly oil and gas leasing program and in such circumstances as warranted, avoid unnecessary adverse effects on the environment (DOI Secretary Recommendation pp. 182-192 in Clough and others 1987).

Baseline biological and water resource assessment in or near the 1002 area of the coastal plain continued from 1988 through 2002, coordinated among the USFWS, USGS, BLM, Alaska Department of Fish and Game, Canadian Wildlife Service, Yukon Department of Renewable Resources, Northwest Territories Department of Resources, Wildlife, and Economic Development, and academic institutions (Truett 1990; McCabe and others 1992; FWS 1994; Douglas and others 2002). Since 2002, biological studies have become increasingly landscape oriented, focusing on ecosystem processes and functions (Martin and others 2009).

Concurrent with the biological studies, oil and gas resource exploration and assessment were ongoing in the 1002 area of the coastal plain but ended with the submission of the 1987 *Coastal*

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Plain Report (Bird and Magoon 1987; Clough and others 1987; FWS 1990; GAO 1993). The Coastal Plain Report concluded that the 1002 area of the coastal plain was potentially rich in oil and gas resources. Based on the findings, there is a 95 percent chance the 1002 area of the coastal plain contains more than 4.8 billion barrels of oil and 11.5 trillion cubic feet of gas in-place (Clough and others 1987). There is a 19 percent chance that economically recoverable oil occurs on the 1002 area of the coastal plain. The average of all estimates of conditional economically recoverable oil resources is 3.2 billion barrels (Clough and others 1987). Finally, in order to conserve the wildlife resources of the area Congress outlined guidance in § 1002(d) for DOI to authorize exploration plans and to develop regulatory guidelines for these geological exploratory activities to ensure these activities do not significantly adversely affect fish and wildlife and their habitats, or the environment. Some of the requirements included a prohibition on the carrying out of exploratory activity during caribou calving and immediate post-calving seasons or during any other period in which human activity may have adverse effects; temporary or permanent closing of appropriate areas to such activity; specification of the support facilities, equipment and related manpower that is appropriate in connection with exploratory activity; and, requirements that exploratory activities be coordinated in such a manner as to avoid unnecessary duplication.

In April 1983, DOI published the final 50 CFR Part 37 guidelines (DOI 1983; FWS 1983). This regulation defines the general provisions for geological and geophysical exploration within the coastal plain of Arctic Refuge, including: purpose and definitions [Subpart A]; general requirements for exploratory activities [Subpart B]; exploration plans and the application process [Subpart C]; environmental protection to avoid significant adverse impacts to natural and cultural resources [Subpart D]; general administration [Subpart E]; and, reporting and data management to preclude unnecessary duplication [Subpart F].

In that rule, three permit application openings were established as described in Table 1. Each application opening allowed either continued work from a previous work session or new work to begin in the upcoming work session. All exploration work, regardless of when it was initiated, was to be completed by May 31, 1986. No new exploration plans have been accepted since 1984 and no new exploration work has occurred since 1986.

Table 1-1. Exploration Work Sessions and Their Respective Application Due Dates as Stipulated in 50 CFR 37.21.

Type of Exploration Work	Exploration Work Sessions as Allowed in 50 CFR 37.21	Applications Due
Any exploration plans	April 19, 1983 – May 31, 1986	May 20, 1983

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Exploration plans other than seismic exploration	June 1, 1984 – May 31, 1986	April 2, 1984
Any exploration plans	October 1, 1984 – May 31, 1986	June 4, 1984

1.4 AGENCY AND PUBLIC INVOLVEMENT

The Service is the lead agency in the development of this EA. For a 60-day period following the publication of the proposed rule in the Federal Register, the public may submit comments on both this draft EA and the proposed rule. After considering the comments received, the Service will issue a final EA and if it determines that the proposed action will not result in significant impacts it would issue a Finding of No Significant Impact (FONSI) for the EA, thus completing the NEPA analysis for the proposed action.

1.5 CONSULTATION WITH FEDERALLY-RECOGNIZED TRIBES AND NATIVE CORPORATIONS

In compliance with Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, federal agencies are required to consult with federally recognized tribal governments during the NEPA process for certain proposed actions, including the development of regulations, that may have a substantial direct effect on the tribes. Pursuant to Public Law 108-199, the Executive Order also applies to Native corporations established under the Alaska Native Claims Settlement Act. Within the Service and DOI the Executive Order is implemented by the Department of the Interior policies on Consultation with Indian Tribes (December 2011) and Consultation with ANCSA Corporations (August 2012). The Service has identified tribal governments and ANCSA Corporations potentially substantially affected by the proposed rule change, who are being invited to consult with the Service on this proposed regulation change. Additional consultation opportunities will be provided prior to issuance of permits for exploration activities on the refuge.

1.6 SUMMARY OF ISSUES

In order to clarify the issues of greatest concern, the following two tables describe the issues being dismissed and further considered in this EA. If an issue has been considered but dismissed from further evaluation, a reason is given in Table 1-3 and the issue will not be discussed further in this EA. Issues being further evaluated are listed in Table 1-4. These issues will be further evaluated in Chapter 3 Affected Environment and Chapter 4 Environmental Consequences.

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Table 1 - 3: Issues Dismissed from Further Evaluation

AFFECTED ENVIRONMENT	REASON FOR NOT-EVALUATING FURTHER
Geology	Neither the change in regulation nor the resulting exploration activities, which are non-extractive, will change the geology of the area.
Air Quality	With anticipated use of low sulfur fuel it is not expected that emissions concentrations or ice fog from motorized vehicles and equipment would ever reach levels that pose an environmental hazard or cause any significant degradation in air quality.
Steller and spectacled eiders	As migratory birds, neither of these threatened eiders would occupy breeding habitat during the period of winter exploration. Even if there were temporal overlap, only the very NW corner of the 1002 area of the coastal plain is within the breeding range of the spectacled eider, and they only occur there as a rare breeder at very low densities. Steller's eiders do not breed in the 1002 area of the coastal plain and are rare visitors along the coast.

Table 1 - 4: Issues Considered for Further Evaluation

AFFECTED ENVIRONMENT	REASON FOR FURTHER EVALUATION
Soils	Although the overall geology of the coastal plain would not be affected, the development of ice roads and ice pads and other associated infrastructure may expose areas to erosion. There is also a risk of fuel spills from equipment being used.
Hydrology	In any proposed winter exploration activity on Arctic Refuge, water withdrawals would be necessary to construct ice roads and other infrastructure that would potentially impact hydrology, aquatic habitats, wetlands and species that depend on them. There is also a risk of fuel spills and release of other contaminants that could impact water quality.
Climate	Although climate will not be affected by either of the alternatives directly, a description of past and present climate is useful in considering cumulative effects of the proposed action to other resources. For this reason a description of climate trends is included in Chapter 3.
Vegetation	In any proposed industrial activity on Arctic Refuge, there is a concern that invasive species will be introduced. We are also concerned about the effects of the development ice roads and ice pads and other associated infrastructure may create.
Wetlands	Depending on the amount of water needed for the development of ice roads and pads, water available for healthy wetlands may be affected.
Fish	Water needed for the development of ice roads and pads, could be withdrawn from aquatic habitat impacting fish populations. Seismic testing over water bodies may also

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	impact fish.
Bald and Golden Eagles	Golden Eagles are rare breeders on the coastal plain, and initiate nesting very early in the spring on the North Slope (earliest of 23 March, with three annual mean initiation dates of 5 April, 14 April, and 22 April); thus, could be affected by "winter" seismic exploration. Bald Eagles are probable, but very rare, breeders on the coastal plain.
Resident Birds	Gyrfalcons are rare breeders on the coastal plain, and initiate nesting very early in the spring; thus, could be affected by seismic exploration. Their primary late winter/early spring prey is rock and willow ptarmigan which are uncommon and common permanent residents, respectively, on the coastal plain.
Migratory Birds	Water needed for the development of ice roads and pads could be withdrawn from aquatic habitat impacting migrating waterfowl and shorebird populations.
Caribou	The coastal plain is within the territory of the Porcupine Caribou Herd which travels north and south and is a primary subsistence resource for many of the Native people who live in and around the Refuge.
Terrestrial Mammals, Not Including Caribou	Both muskox and moose are now rare on the coastal plain; their populations have declined in recent years. Muskox may be particularly sensitive to late winter disturbance given nutritional challenges and calving beginning in mid-April. Bears, wolves, and wolverines all occur on the coastal plain, although they are more abundant in the foothills and mountains. Brown bears emerge from their dens from late March through May; this period could well overlap seismic exploration periods.
Polar Bears	A majority of female polar bears of the Southern Beaufort Sea population now den on the Refuge coastal plain. As a result much of the area has been designated critical habitat.
Bowhead Whale	Now that there is limited sea ice during much of the year, exploration equipment could be transported to the area via barges through a known bowhead whale migration corridor.
Ringed and Bearded Seals	Now that there is limited sea ice during much of the year, exploration equipment could be transported to the area via barges through known bearded and ringed seal habitat.
Cultural Resources	The reverberation created by seismic exploration is known to damage buried artifacts.
Socioeconomic	Exploration activities have the potential to create employment opportunities within communities neighboring the Refuge and may also affect subsistence resource availability.
Environmental Justice	Under EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, federal agencies are required to develop strategies to address environmental justice concerns in their approach to operations.
Subsistence	Exploration activities have the potential to affect resource availability by creating disturbances that change caribou and polar bear movements.
Noise	Noise from vehicles, generators, aircraft, and human presence has the potential to

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	change the natural soundscape during seismic exploration.
Visual	Due to the relatively flat nature of the landscape, equipment associated with seismic exploration will be noticeable to recreationalists and residents in the vicinity.
Wilderness Values	The resulting exploration activities will require a significant level of industrial activity during the exploration work season in limited areas.

2 Proposed Action and Alternatives

2.1 Alternative 1 (No Action Alternative)

Under the no action alternative, the existing regulation would not be amended or updated. Management of the Coastal Plain, Arctic Refuge, would continue as stipulated in the ROD for the Arctic Refuge CCP (FWS 2015). There would continue to be no oil and gas exploration on Arctic Refuge.

2.2 Alternative 2 - Proposed Action

The Service proposes to allow opportunities for submission of applications to conduct seismic exploration by amending and updating the regulatory language of 50 CFR Part 37 - *Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska*, specifically § 37.21(b) and (c) as follows:

PART 37 – GEOLOGICAL AND GEOPHYSICAL EXPLORATION OF THE COASTAL PLAIN, ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

Subpart C – Exploration Plans

§ 37.21 Application Requirements.

(a) Prior to submitting an exploration plan, applicants may meet with the Regional Director to discuss their proposed plans and exploratory activities and the requirements of this part.

(b) Any person wanting to conduct exploratory activities may apply for a special use permit by submitting for approval one or more written exploration plans, in triplicate, to the Regional Director, Region 7, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503.

(c) In addition to containing the information required in paragraph (d) of this section, any exploration plan submitted shall describe the applicant's plan for carrying out an integrated

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program of exploratory activities in such a manner as will satisfy the objective and limitations stated in § 37.1. If an applicant submits an exploration plan in any given year with the intention of submitting another exploration plan the following year, the applicant shall describe in its initial plan how its future exploratory activities will be integrated with those proposed under its initial plan. Each exploration plan submitted must be published and be the subject of a public hearing in accordance with requirements of § 37.22(b).

(d) An exploration plan shall set forth in general terms such information as is required by this part and by the Regional Director in determining whether the plan is consistent with this part, including, but not limited to:

(1) The name and address of any person who will conduct the proposed exploratory activities, i.e., the applicant/permittee, and, if that person is an agency, firm, corporation, organization, or association, the names and addresses of the responsible officials, or, if a partnership, the names and addresses of all partners;

(2) The names and addresses of all persons planning at the time of plan submittal to participate in the proposed exploratory activities or share in the data and information resulting therefrom through a cost-sharing or any other arrangement;

(3) Evidence of the applicant's technical and financial ability to conduct integrated and well-designed exploratory activities in an arctic or subarctic environment and of the applicant's responsibility in complying with any exploration permits previously held by it;

(4) A map at a scale of 1:250,000 of the geographic areas in which exploratory activities are proposed and of the approximate locations of the applicant's proposed geophysical survey lines, travel routes to and within the refuge, fuel caches, and major support facilities;

(5) A general description of the type of exploratory activities planned, including alternate exploratory methods and techniques if proposed, and the manner and sequence in which such activities will be conducted;

(6) A description of how various exploratory methods and techniques will be utilized in an integrated fashion to avoid unnecessary duplication of the applicant's own work;

(7) A schedule for the exploratory activities proposed, including the approximate dates on which the various types of exploratory activities are proposed to be commenced and completed;

(8) A description of the applicant's proposed communication techniques;

(9) A description of the equipment, support facilities, methods of access and personnel that will be used in carrying out exploratory activities;

(10) A hazardous substances control and contingency plan describing actions to be taken to use, store, control, clean up, and dispose of these materials in the event of a spill or accident;

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(11) A general description of the anticipated impacts that the proposed exploratory activities may have on the refuge's wildlife, its habitat, the environment, subsistence uses and needs, and cultural resources, and a description of mitigating measures which will be implemented to minimize or avoid such impacts;
(12) A description of the proposed procedures for monitoring the environmental impacts of its operation and its compliance with all regulatory and permit requirements;
(13) A statement that, if authorized to conduct exploratory activities, the applicant shall comply with this part, its special use permit, its approved exploration plan, plan of operation, and all reasonable stipulations, demands and orders issued by the Regional Director;
(14) A description of the applicant's proposed data quality assurance and control program; and
(15) Such other pertinent information as the Regional Director may reasonably require.

If this alternative is selected, it is assumed that the Service will receive and possibly approve applications for seismic exploration activities on the 1002 area of the coastal plain. Proposed 3-D seismic exploration activities in the nearby National Petroleum Reserve - Alaska (NPRA) and analyzed in the BLM EA, DOI-BLM-AKF01000-2017-001-EA and the NPRA Integrated Activity Plan/EIS (2012), give us an understanding of what these activities would generally entail.

Seismic exploration maps the subsurface structure of rock formations by sending energy waves into the ground or water and then recording the reflected energy waves. One of the most common methods for creating these energy waves in the arctic is via vibroseis seismic operations which use truck-mounted vibrators that systematically put variable frequency energy into the earth. Several of these truck-mounted vibrators are located along a line and vibrate in synchrony in order to record energy along a transect. The reflected energy is recorded and the whole line moves ahead.

3-D seismic activities generally occur in the winter with crews beginning to mobilize and build ice roads and pads in December. Full crews arrive in January and commence seismic operations if the ice infrastructure has been completed. Seismic operations continue through most of April, with demobilization finishing by the first part of May. Crews may include 40–160 people depending on the planned activity with operations occurring 24 hours a day. The camp facility often includes sled-mounted units for preparing and eating meals, sleeping areas, washrooms, offices, shops, medical facilities, generator rooms, and any other support needed. The camp moves along with the exploration work. Any ice roads or pads built during this time are left to melt in place. Any ice bridges built across rivers are removed in order to decrease the chance of ice damming during the melt season. Frozen lakes are often used for landing strips.

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Without a specific exploration plan to evaluate, it is not possible to determine exact locations and timing of all the seismic work and staging. Although we can predict that seismic exploration activities will happen in the winter months, it is less clear what the timing of staging and pre-survey work would be. We can predict that ice roads may be used to stage and transport equipment and materials into the west end of the 1002 area of the coastal plain. Exploration activities further to the east would likely require barge transportation during the summer and fall before the sea ice freezes. Also, unlike the western side of the area, there is no nearby infrastructure on the eastside from which to build, possibly changing the kind and quantity of equipment used.

2.3 Alternatives Considered but Dismissed From Detailed Analysis

No other alternatives were analyzed in detail in this EA, because the proposed change of regulation will allow opportunities for submission of applications to conduct seismic exploration. The Service considered updating the environmental protection requirements of 50 CFR §§ 37.31 and 37.32, but determined that the regulations as currently written provide adequate and appropriate protection of refuge resources and allow the Regional Director to impose additional stipulations to ensure that permittees' activities are conducted in a manner which avoids significant adverse effects on the refuge's wildlife, its habitat, and environment.

3 Affected Environment

Per ANILCA § 1002(c), resource assessment baseline studies within the 1002 area of the coastal plain began shortly after its enactment and, as stipulated, are "continuing." Special emphasis was placed on caribou, wolves, wolverines, grizzly bears, migratory waterfowl, muskox, and polar bears of the coastal plain and their habitats. The purpose of the studies was to "assess the size, range, and distribution of populations of fish and wildlife; determine the extent, location, and carrying capacity of the habitats of the fish and wildlife; assess the impacts of human activities and natural processes on the fish and wildlife and their habitats; analyze the potential impacts of oil and gas exploration, development, and production on such wildlife and habitats; and analyze the potential effects of such activities on the culture and lifestyles (including subsistence) of affected Native and other people."

The environmental setting, flora and fauna, water resources, cultural resources, and rural lifestyles (including subsistence) of the 1002 area of the coastal plain, Arctic Refuge, are generally defined and described in the *Final EIS and Preliminary Final Regulations: Proposed Oil and Gas Exploration within the Coastal Plain of the Arctic NWR* (DOI 1983), and *Coastal Plain Report* (Clough and others 1987).

Additional natural, water and cultural resource data and assessments are provided in the numerous studies conducted under the Arctic Refuge Coastal Plain Resource Assessment over the past 30 years (FWS 1982; Garner and Reynolds 1983, 1984, 1985, 1986, 1987; McCabe and others 1992; Douglas and others 2002; among others). Cumulative effects of oil and gas

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activities on the Alaska North Slope were reviewed by the National Research Council, as these effects were not adequately integrated into ongoing studies up to that point (NRC 2003).

Since 1988, the natural and cultural resources, water resources, and lifestyles (including subsistence) in the Arctic Refuge, including the 1002 area of the coastal plain, have been minimally managed by human influence or intrusion, and administered for their wilderness values and natural processes (FWS 1988a, 1988b, 2015a, 2015b).

3.1 PHYSICAL ENVIRONMENT

3.1.1 Soils

Soils in the coastal plain are described in the 2015 Arctic Refuge CCP as including low terraces and floodplains of streams draining the North Slope of the Brooks Range. Materials underlying soils in this region consist of fluvial sands and silts, with increasing amounts of interstratified marine sediments near the coast. Generally, soils thaw less than 18 inches in summer and are poorly drained. Loamy textures are common on terraces and floodplains, and organic soils occur in depressions. Locally, peaty materials are buried beneath windblown sand deposits.

3.1.2 Hydrology

Water resources on the coastal plain of the Arctic National Wildlife Refuge consist of streams, lakes, and springs. Streams of the Arctic coastal plain flow north, several forming large alluvial fans as they flow into the Beaufort Sea where they contribute substantial volumes of water and sediment to coastal ecosystems (Arctic Refuge CCP). Like other areas of the Arctic, the coastal plain is underlain by continuous permafrost limiting infiltration of surface water and limiting groundwater resources (Lyons and Trawicki 1994). Groundwater that may exist below permafrost is thought to be saline or brackish (Williams 1970). While ninety-nine percent of the 1002 area is classified as wetlands, freshwater is limited and confined to the shallow zone above permafrost (Clough et al. 1987). Lakes are not evenly distributed across the coastal plain with concentrations occurring near the mouth of the Canning River and in the region of the Sadlerochit and Jago Rivers with very few lakes occupying the central Katakturuk River region (Trawicki et al. 1991). At Barter Island mean annual precipitation which includes the water equivalent of snow averages 6.3 inches per year, in Umiat east of the 1002 area on the North Slope it is 5.7 inches (Searby and Hunter 1971) emphasizing that climate and permafrost are dominant factors that limit water availability. The non-frozen water found on the coastal plain during the winter months is located in small isolated pools beneath ice hummocks associated with stream drainages , lakes with depths greater than 7 feet, and flowing surface waters associated with springs (Lyons and Trawicki 1994).

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Streams and Rivers

The 1002 area has a relatively high density of streams and rivers compared to other areas of the North Slope (Brackney 2008). These habitats support thirteen species of fish, including Dolly Varden, an important subsistence fish. The hydrography of these systems is strongly influenced by the climate which is characterized by extremely low winter temperatures and short, cool summers with low, desert-like levels of precipitation. Streamflow rapidly declines in most systems shortly after freeze up in September and ceases in most streams by December when they are generally frozen to the stream bed resulting in no flow or flow so low as to not be measureable (Lyons and Trawicki 1994). A few exceptions to this occur where springs result in open reaches and aufeis areas that develop providing important fish overwintering habitat (Arcone 1989). Break up on the Arctic coastal plain occurs during a brief period in late May or early June. Snowmelt begins in the mountains and foothills progressing towards the coastal plain. Rapidly melting water runs over the ground as sheetflow with infiltration limited by permafrost (Lyons and Trawicki 1994). Water in drainages rises rapidly, often flowing over ice covered stream channels. More than half of the annual discharge for these streams can occur during a period of several days to a few weeks (Clough et al. 1987, Sloan 1987). Based on origin, hydrologic regime, and chemical and biological characteristics, Craig and McCart (1975) classified North Slope streams into three categories: mountain, spring-fed, and tundra. Mountain streams are typically fast flowing and fed by varying proportions of snowmelt, glacier meltwater, and spring-fed tributaries. Waters are cold (usually less than 50 °F), occasionally turbid, moderately hard, and support low invertebrate densities. The most common species of fish in mountain streams is Dolly Varden. Mountain streams that receive glacial inputs are unique to the eastern North Slope, in the Jago, Hulahula, and Okpilak watersheds, discharge from glacial sources is the dominant source of flow when precipitation is low and air temperatures are high and transport large volumes of water, sediment and nutrients to downstream ecosystems (Arctic CCP). Spring-fed streams are often tributaries of mountain streams and have relatively stable flows and temperatures throughout the year. Spring-fed waters are characterized by low levels of dissolved solids and very high densities of macroinvertebrates. Many spring-fed streams provide critical spawning and overwintering habitat for Dolly Varden. Tundra streams originate in the Brooks Range Foothills and coastal plain ecoregions, are fed by surface runoff, tend to be meandering systems, and have low to moderate invertebrate densities. Waters are typically warmer and exhibit lower pH and conductivity relative to mountain and spring-fed streams (Arctic CCP). Huryn et al. (2004) found that gradients in freezing probability, nutrient concentrations, and substratum instability control invertebrate communities in these systems. Some projections indicate that glacial inputs could disappear within the next 50 years altering hydrology by reducing instream connectivity and negatively impacting fish migrating to critical overwintering habitat (Nolan et al. 2011). Surface water availability and instream connectivity

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will potentially be adversely impacted by deepening of the active layer on the coastal plain, increasing duration of the summer season, and increased evapotranspiration rates (Arctic CCP).

Springs and Aufeis Areas

Six springs are located on the Arctic coastal plain identified through reconnaissance investigation by Childers et al. (1977): Sadlerochit Spring, Red Hill Spring, Katakturuk River tributary Spring, Hulahula River Spring, Okerokovik River Spring, and Aichilik River Spring. During the winter months pressurized water discharges from a spring pushing up through the ice to the surface where it spreads out and freezes forming aufeis areas that can become extensive. These formations melt more slowly than snow, generally persist into the summer and may provide a temporary source of freshwater (Kane and Slaughter 1973). Open water associated with springs provides important winter habitat particularly once surface water runoff ceases due to freezing (Lyons and Trawicki 1994). Most springs in Arctic Refuge have survived since the last glacial maximum (Yoshikawa et al. 2007), suggesting that they will continue to flow and be refugia for aquatic biota in a changing climate.

Lakes

The density of lakes in the Arctic coastal plain is low compared to the rest of the North Slope and as noted earlier their distribution is not uniform, nor is their size and depth (Arctic CCP). Jorgenson and Shur (2007) classified the coastal plain into regions based on lake origin: thaw, depression, riverine, and delta. Depression lake basins are formed in undulating sandy, alluvial marine or eolian deposits, and are the majority found on the coastal plain concentrated in the depression lakes region between the Hulahula and Niguanak rivers. Riverine lakes include oxbow and floodplain lakes along sinuous channels and thaw lakes formed in ice-rich abandoned channels. Riverine lakes are most concentrated along the Jago and Niguanak rivers. Delta lakes include thaw, riverine, and tidal lakes and most are found in deltas of the Hulahula, Jago, Aichilik, and Canning rivers (Arctic CCP). The majority of lakes on the coastal plain are shallow lakes with surface areas ranging from 1,500 acres to less than 10 acres (Trawicki et al. 1991). Recharge of these systems is generally limited to snow melt and direct precipitation in the immediate vicinity of the lake (Lyons and Trawicki 1994). When not connected to larger drainage networks, evaporation has a strong influence on water chemistry and plays an important role in regulating lake water balance (Arctic CCP). Maximum winter ice thickness on lakes in the Arctic is between 6–7 feet (Bilello and Bates 1969, 1971, 1972, and 1975). Clough et al. (1987) reported that most lakes have basins less than 7 feet deep and thus freeze to the substrate. These shallow lakes generally melt from the surface downward in spring. Deeper lakes that do not freeze to substrate may have ice present on the surface well into July. Due to the level of winter freezing, the depth of lakes restricts the presence of fish, Hobbie (1984) found fish present

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only in lakes with depths greater than 5.6 feet. Shallow lakes generally lack fish because they usually freeze solid but they provide important habitat to emergent vegetation, invertebrates, and migratory birds due to the earlier availability of ice-free areas. Trawicki et al. (1991) identified fish presence in lakes on the coastal plain to be more frequent and widespread than previously suspected. Ninespine stickleback (*Pungitius pungitus*) was found in 34 of 52 lakes surveyed (65%) in 1989. In the past half a century, the duration of ice cover, thermal regimes, and rates of primary productivity have likely changed. In the future, changes in temperature, active layer depth, fire frequency and severity, and erosion rates could affect lake distribution, water quality, water levels, size, and connectivity to other habitats (Arctic CCP).

Winter Specific Hydrologic Data

Hydrologic data for the 1002 area are limited, the Service collected short-term (less than five years) of data over two decades ago at 11 stream gage sites on five drainage systems across the coastal plain and conducted an inventory of 119 lake basins to create lake contour maps, water volume calculations and estimates of winter water volume beneath ice cover. These lake basins constituted the majority of larger lake basins found in the 1002 area. These data were collected in large part to address questions regarding winter water availability in the 1002 area in the event of exploration activities. The USGS has collected some additional hydrography data on the Canning and Hulahula Rivers. In the Service stream studies winter water was found to occur over a wide area in most of the major river drainages but it was restricted to small isolated pools beneath ice hummocks scattered throughout the braided portions of these rivers. The volume of water available was estimated to be small, 9 million gallons over the 237 miles of inventoried area (Elliot and Lyons 1990). Total estimated volume of water in the study lakes ranged from 55,382 acre-feet (18 billion gallons) when free of ice to a low of 3,366 acre-feet (1.1 billion gallons) beneath a maximum ice thickness of seven feet. Ninety percent of the available water was contained in just nine of the 119 surveyed lakes, the majority of these were found in the Canning River delta area (up to eighty percent of the total volume), and only two of these lakes were located in the region between the Katakturuk and Sadlerochit rivers (Trawicki et al. 1991).

Climate Change Effects

Historically, in the nearby NPR-A the coastal regions have not thawed until after the second week of June (BLM 2012). By mid-century, these areas are projected to thaw the first week of June. By late century these areas are expected to thaw as early as June 1st. Changes in freeze-up date are predicted to be even greater. Historic data indicates NPR-A water bodies freeze by mid-September. Models indicate freeze-up will not occur until late September in southern regions and early October along the coast. By the end of the century, coastal waterbodies may not freeze until the end of October. These changes will result in a six-week increase in the length of the ice-free season.

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Landscape drying trends have been observed in northeastern Alaska (ACIA 2004). Increased temperatures and an extended growing season could increase the evapotranspiration rate, increasing the water deficit (defined as the amount by which evapotranspiration exceeds precipitation) and potentially affecting the annual water balance. The annual water balance represents the water available for plants and animals, streamflow, and groundwater recharge. Shallow water systems, including lakes and wetlands, could decrease in number and extent as the annual water balance experiences an ongoing deficit. Permafrost loss on the Refuge could also result in draining of many shallow water systems; the thawing of ice wedges and ice lenses could create more connections between surface water and groundwater systems. If wetlands and lakes continue to dry, an increase in vegetative cover can be expected eventually transitioning to dry meadows and shrublands. This would reduce the amount of habitat available for wetland-dependent species, such as waterfowl.

3.1.3 Climate

The North Slope is defined as the area north of the Brooks Range, including the Beaufort Sea Coastal Plain and the Brooks Range Foothills ecoregions. The climate of the North Slope is classified as arctic: summers are short and cool, and winters are long and cold. The growing season lasts from June to August. Subfreezing temperatures and snow may occur at any time during the year.

The Arctic coast experiences more frequent cloudiness and fog with higher winds; inland, clear skies are more common, winds are variable, and summers are warmer and less cloudy with increasing distance from the coast. At Barter Island on the coast, temperatures average 40 °F in July (warmest month) and -20 °F in February (coldest month) (Table 4–2). Temperatures on the coastal plain and in the northern foothills of the Brooks Range are more similar to those measured at weather stations at Kuparuk and Toolik Lake, ranging from means of 47 to 53 °F in July and -18 to -6 °F in February.

North of the Brooks Range, the Refuge receives little precipitation. The average annual water equivalent precipitation is less than 10 inches (in), most of which falls as summer rainfall, but it includes 32 to 46 in of snowfall. Evaporation rates are low due to low temperatures and a short growing season; the land is underlain by continuously frozen soil, which restricts soil drainage. Therefore, available soil moisture is considerably greater than the low annual precipitation would produce in a more temperate climate, and soils are usually saturated during summer.

Surface winds along the Arctic coast average 9 to 15 miles per hour (mph), with occasional intense storms generating winds exceeding 70 mph. Winds are predominantly from the northeast, although the strongest winds come from the west. September and October are the windiest months on the coast, probably due to maximum amounts of open water (Wendler et al. 2010). During winter, winds are a major force affecting the distribution and amount of snow cover on

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the coastal plain. Higher, rolling terrain is often blown clear, or nearly so, while dense snow drifts accumulate in sheltered areas along stream banks.

The Arctic is particularly sensitive to warming due to the historically extensive snow and ice cover, where the freezing point marks a critical threshold for stability of the landscape and thus both habitat and infrastructure sustainability. Accelerated melting of multiyear sea ice, reduction of terrestrial snow cover, and permafrost degradation are examples of the observed rapid Arctic-wide response to global warming.

Annual average near-surface air temperatures across Alaska and the Arctic have increased over the last 50 years at a rate more than twice as fast as the global average temperature (Taylor et al. 2017). There is limited meteorological monitoring on the North Slope, and no long term, continuous monitoring in the Arctic Refuge. Thus, long term trends are derived primarily from Utqiagvik (formerly Barrow). Especially strong warming has occurred over Alaska's North Slope during autumn. For example, Utqiagvik's warming since 1979 exceeds 7°F (3.8°C) in September, 12°F (6.6°C) in October, and 10°F (5.5°C) in November (Wendler et al. 2014).

Our understanding of precipitation trends are limited on the North Slope, in part because the difficulty of collecting rain and snow in windy sites makes historical precipitation data less reliable than temperature data. Overall, the 2016 May Alaska statewide snow coverage was the lowest on record dating back to 1967; the snow coverage of 2015 was the second lowest, and 2014 was the fourth lowest (Taylor et al. 2017). The length of the snow season impacts the timing available for winter exploration activities as well as the timing of wildlife activities, including occupancy of migration and birthing habitats. Snowpack in the Brooks Range, and glacier mass, affect water availability in rivers and lakes for fish and wildlife habitat.

Negative trends in precipitation were observed between 1950 and 1988 at Barter Island, on the Beaufort Sea coast in the center of the Arctic Refuge (Curtis et al. 1998; L'Heureux et al. 2004). Across six decades (1950–2010), researchers also observed a consistent decrease in winter precipitation at Utqiagvik (McAfee et al. 2013), which supported earlier analyses (L'Heureux et al. 2004). The Barter Island station, however, has not reported continuously since the late 1980s, so it cannot confirm recent trends at Utqiagvik. At Bettles, south of the Brooks Range, there appears to be an increase in winter precipitation, with the difference from the Arctic Coastal Plain resulting from the Brooks Range acting as a barrier to moisture transport.

3.2 Biological Environment

3.2.1 Vegetation

North of the Brooks Range, the coastal plain is treeless tundra, composed mainly of hardy dwarf shrubs, sedges, and mosses. Habitats on the North Slope can be grouped into four broad categories: coastal lagoons, lowland wet tundra and lakes, upland moist tundra, and river

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floodplains with willow shrub thickets. The geography of the 1002 Area differs from the coastal plain further west in that there is generally less low, flat, wet tundra and a greater proportion of rolling, drier terrain. A detailed description of all the habitats on the Refuge can be found in the 2015 Refuge CCP. The following is a summary of the information found there as it pertains to the Refuge coastal plain.

Shrub thicket habitat can be categorized into two types: dry and moist prostrate dwarf shrub. Dry prostrate dwarf shrub occupies dry areas of the coastal plain tundra and on dry, infrequently-flooded river terraces or alluvial fans throughout the refuge. Moist habitats on slightly elevated microsites of the coastal plain are often drier as a result of greater exposure to wind and lack of water from surrounding terrain. Lichen are more common than mosses in these drier habitats. Bare soil as a result of frost action is common in this habitat type. Moist prostrate dwarf shrub contains similar shrub species as dry, but greater winter snow cover and summer soil moisture allows grasses, sedges, and mosses to thrive in the understory.

The riparian shrub type develops on gravels along rivers and is dominated by the willows *Salix planifolia* and *S. alaxensis*. On the North Slope, this is the tallest vegetation type. Species composition and density is controlled by frequency of flooding, water velocity, and the size of particles deposited during flooding

The very wet graminoid vegetation type occurs on aquatic habitats surrounding large, open bodies of fresh water, very wet habitats that contain numerous small bodies of open water; and coastal marshes frequently inundated with salt water. Surface forms includ low-centered polygons with abundant standing water, thaw lake basins, edges of lakes, and lowbank coastline. There is usually little shrub, forb, or moss cover, except on drier microsites such as polygon rims.

3.2.2 Wetlands

Although the density is low compared to the rest of the North Slope, there are over four thousand lakes covering over 37,000 ac in the Refuge. Most (73 percent) of the lakes are in the coastal plain ecoregion. Most lakes in this region are shallow, freeze to the bottom during winter (Trawicki et al. 1991), and are recharged by snowmelt, overbank flooding, and precipitation. When not connected to larger drainage networks, evaporation has a strong influence on water chemistry and plays an important role in regulating lake water balance. Jorgenson and Shur (2007) classified the coastal plain into regions based on lake origin: thaw, depression, riverine, and delta. Thaw lakes are formed by the degradation of ice-rich sediments and, in the Refuge, are only in great abundance in a small thaw lake plain east of Demarcation Bay. Depression lake basins are formed in undulating sandy, alluvial marine or eolian deposits. Most of the lakes in the Refuge are in the depression lakes region between the Hulahula and Niguanak rivers. Riverine lakes include oxbow and floodplain lakes along sinuous channels and thaw lakes formed in ice-rich abandoned channels. Riverine lakes are most concentrated along the Jago and Niguanak rivers. Delta lakes include thaw, riverine, and tidal lakes and most are found in deltas of the

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Hulahula, Jago, Aichilik, and Canning rivers. Up to 80 percent of the winter water volume is in lakes in the Canning River delta (Trawicki et al. 1991).

Over 25 percent of the lakes on the North Slope of the Refuge are in the mountains and foothills. Most mountain lakes are of glacial origin and tend to be deeper, have larger surface areas, and store much greater volumes of water than coastal plain Lakes. The largest mountain lakes include Lake Peters (3,226), Lake Schrader (1,689 ac), Elusive Lake (772 ac), and Porcupine Lake (333 ac). With the exception of studies on two large deep glacial lakes, Lakes Peters and Schrader, the limnology of mountain lakes in the Refuge has not been well studied. In the late 1950s, Hobbie (1961) found that Lake Schrader was at the northern limit of thermally stratified lakes; Hobbie (1964) found that 50 percent of the annual primary productivity in Lake Peters occurred when the lake was still covered by ice. In the past half a century, the duration of ice cover, thermal regimes, inputs from glacial meltwater, and rates of primary productivity have likely changed. In the future, changes in temperature, active layer depth, fire frequency and severity, and erosion rates could affect lake distribution, water quality, water levels, size, and connectivity to other habitats.

Landscape drying trends have been observed in northeastern Alaska. Riordan et al. (2006) reported a reduction in wetland extent and the number and surface area of lakes on parts of the Yukon Flats between 1980 and 2002. Many wetlands on the Yukon Flats Refuge that were once aquatic habitats, such as lakes, now are shrub and wet meadow habitats. Historical aerial photographs from the boreal forest part of Arctic Refuge also show lakes shrinking or disappearing in the past 60 years.

Increased temperatures and an extended growing season could increase the evapotranspiration rate, increasing the water deficit (defined as the amount by which evapotranspiration exceeds precipitation) and potentially affecting the annual water balance. The annual water balance represents the water available for plants and animals, stream flow, and groundwater recharge. Shallow water systems, including lakes and wetlands, would decrease in number and extent as the annual water balance experiences an ongoing deficit. Permafrost loss on the Refuge could also result in draining of many shallow water systems on the Refuge; the thawing of ice wedges and ice lenses could create more connections between surface water and groundwater systems. If wetlands and lakes continue to dry, an increase in vegetative cover can be expected; and they could eventually transition to dry meadows and shrublands. This would reduce the amount of habitat available for wetland-dependent species, such as waterfowl.

3.2.3 Fisheries

Two types of fish habitat dominate the Arctic coastal plain: streams and lakes. Lake habitats may be isolated and without upstream or downstream connections, and may be further defined as deep or shallow. Environmental extremes also dominate fish habitats, between freezing, i.e., below 0°C/32°F during the long winter and flowing waters (above 0°C/32°F) during the short

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summer months. This combination, along with size, location, and morphology, including chemical and physical characteristics of the numerous lakes and tributaries of the Arctic coastal plain determine the distribution, densities and diversity of fish species (see Affected Environment - Hydrology 3.1.2).

Fish species may be categorized into freshwater residents, diadromous (both marine and freshwater) and marine. About 62 marine and diadromous fish occur in in the Beaufort Sea adjacent to the coastal plain and these species include Arctic char, Arctic cisco, Arctic flounder, boreal smelt, Pacific salmon (pink and chum), and fourhorn sculpin (Craig 1984; Clough and others 1987; Gallaway and Fechhelm 2000; BLM 2012). Nearshore marine environments provide important foraging and spawning habitats while the moving waters of river deltas provide overwintering habitat for some species. About 21 species of freshwater fish, including diadromous species that are predominantly freshwater, occur in the coastal plain and include Arctic lamprey, Arctic grayling, round whitefish, broad whitefish, ninespine stickleback, and burbot (Clough and others 1987; Moulton and George 2000; BLM 2012).

The 3- to 4-month Arctic summer is a critical period for fish to find quality foraging habitats and food resources and reproduce. It may be safely assumed that any fresh waters deeper than 2–2.5 meters (6-7 feet) deep, or alternatively below the maximum winter ice depth of the coastal plains environs may be suitable wintering habitat for fish (Bilello and Bates 1969, 1971, 1972, 1975 in Lyons and Trawicki 1994; Schmidt and others 1989; Moulton and George 2000). This type of habitat is considered restricted and a limiting factor to overwintering fish survival (Reynolds 1997). Large lakes are generally uncommon in the 1002 area of the coastal plain, and particularly those with overwintering capacity; do not freeze to the bottom during winter months, provide sufficient dissolved oxygen, and/or without salt water intrusion (Clough and others 1987).

Springs are important for spawning, rearing, and overwintering and these sites are generally more abundant and diverse than other waters for aquatic invertebrates as food resources (Glesne and Deschermeier 1984; Clough and others 1987).

The integrity of riparian areas is important for maintenance of water quality and fish populations on the coastal plain, more so at higher elevations where stream meandering during spring snowmelt or summer storm events is less prevalent than at lower elevations (Clough and others 1987).

Grayling are not as tolerant of brackish waters and occur more in riverine systems than char but are in large concentrations are only a few locations. Grayling make extensive migrations to and from spawning, rearing, foraging, and overwintering locations (West and Wiswar 1985; Mecklenburg and others 2002). Major Arctic grayling populations occur in the Canning, Tamayariak, Sadlerochit, Hulahula, Okpilak, and Aichilik Rivers. Arctic char (Dolley Varden) are primarily anadromous but rely on freshwater habitats for spawning, early rearing, and wintering. Therefore, char also migrate with primary movement corridors in the Canning,

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Aichilik and Hulahula Rivers. The Canning River has the largest char run and the Hulahula is the most important for subsistence purposes.

Smaller fish species which have little interest for sport or subsistence, are important food resources for birds, mammals and other fish.

Seventeen of the most commonly occurring fish species in the coastal plain are important subsistence resources (NRC 2003). Due to difficulty of access and seasonal restrictions, sport fishing may be considered minimal in the coastal plain (Clough and others 1987; BLM 2012). Arctic char is the most important subsistence freshwater fish species followed by Arctic grayling.

3.2.4 Bald and Golden Eagles

Bald eagles are considered a casual visitor on the coastal plain (Arctic Refuge CCP) but recent observations suggest that they may be more accurately considered a very rare possible breeder in the 1002 area of the coastal plain (T. Swem, pers. comm.). Golden eagles, on the other hand are fairly common visitors on the coastal plain, and rare breeders on the inland coastal plain (Arctic Refuge CCP). Across the entire Arctic Coastal Plain, overall golden eagle numbers in spring increased significantly between 1986 and 2012 at an annual rate of 7%; over the last decade of that period the increase was significant at an annual rate of 37% (Stehn et al. 2013). The mean annual index for golden eagles over the entire period was 118 birds, but in 2012, the index reached an all-time high of 522 (Stehn et al. 2013).

The 1002 area of the coastal plain is very important for non-breeding golden eagles, particularly subadults, which both scavenge and prey upon caribou during the calving and post-calving period of the Porcupine herd (Mauer 1985). Although none of the nest sites visited by Mauer (1985) and his colleagues were within the 1002 area of the coastal plain, subsequent observations have confirmed them as a breeding species there, including at nest sites within core calving areas (T. Swem, pers.comm.).

Within the refuge, golden eagles breeding north of the crest of the Brooks Range begin nesting very early in spring. Based on a three-year study (1988–1990), nest initiation dates in those golden eagles ranged from 23 March to 11 May, with annual mean nest initiation dates of 22 April, 14 April, and 5 April in 1988, 1989, and 1990, respectively (Young et al. 1995). Those dates would include the last third of the operations phase and the entirety of the demobilization phase of a recently-proposed winter seismic exploration project farther west on the North Slope (BLM CPAI-NPR- A Final Seismic Environmental Assessment, 2016). Elsewhere, disturbance and development correlated with reduction in golden eagle nest success (Kochert et al. 2002); winter seismic activity could have similar result.

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3.2.5 Resident Birds

Four species of birds are considered permanent residents of the coastal plain: Willow Ptarmigan, Rock Ptarmigan, Gyrfalcon, and Common Raven (Arctic Refuge CCP). Gyrfalcons are an uncommon resident of the inland coastal plain (Arctic Refuge CCP); eyries are known in the 1002 area of the coastal plain (T. Swem, pers. comm.). Even in the middle of winter, gyrfalcons may be present on their nesting territories; in the coastal Northwest Territories of Canada (at latitudes comparable to, or greater than, those of the 1002 area of the coastal plain), gyrfalcons have been found on territory as early as February (Booms et al. 2008). Both species of ptarmigan are important components of the gyrfalcon diet, particularly in winter and early spring when other prey types are either absent or scarce (Watson et al. 2012). Nest initiation dates range from early April to early June.

3.2.6 Migratory Birds

In the northern foothills of the Brooks Range, Arctic coastal plain and adjacent marine waters, 158 species have been recorded, including 79 breeding species and 79 species that are migrants, visitors, or vagrants. Birds that use the Refuge have ranges that include all 50 U.S. states and six continents. Thirty-five species of waterfowl have been observed on the Refuge. The geese, except Canada geese, and tundra swans primarily breed on the coastal plain (Arctic CCP 2015).

Red-throated loons have been identified as a species of Conservation Concern by the Service (2008a), Audubon Alaska (Stenhouse and Senner 2005) and the ADFG (2006). Its highest densities are found on the coastal plain and adjacent marine areas, but a few also breed in the Brooks Range and on the south side of the Refuge.

Twenty-six species of shorebirds breed on the Arctic Refuge, of which 22 breed on the coastal plain. Another species, the red knot, occurs as a migrant only. Of these 27 species, 21 are identified as species of Moderate or High Conservation Concern by the U.S. Shorebird Conservation Plan (Brown et al. 2001), Alaska Shorebird Conservation Plan (Alaska Shorebird Group 2008), the Service (2008a), and/or Audubon Alaska (Stenhouse and Senner 2005) because of small or declining populations.

3.2.7 Terrestrial Mammals other than Caribou

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As established by ANILCA, the first purpose of the Arctic Refuge is to "conserve fish and wildlife populations and habitats in their natural diversity." Among the wildlife species specifically listed in ANILCA under this purpose are several species of large terrestrial mammals including caribou, Dall sheep, muskox, moose, brown bear, wolf, and wolverine. Caribou will be considered in the next section; Dall sheep do not occur on the coastal plain. Among the five species which do occur in that region, both muskox and moose have experienced marked population declines over the last few decades. After muskox were reintroduced to the North Slope in the Arctic Refuge in 1969 and 1970, the population grew steadily and rapidly from 1978 to 1985 and then remained relatively stable until nearly the end of the century. Beginning in 1998, however, numbers within the refuge dropped dramatically for the next half decade and have remained very low ever since. The overall muskox population in northeast Alaska and northwest Canada peaked in 1993, declined through 2006, and has remained relatively stable since then. Most of that decline was due to losses from the Arctic Refuge. Today, most of the muskox in the area are either west or east of the Arctic Refuge (Arctic Refuge CCP).

Moose populations in northeast Alaska, including the Arctic Refuge, increased rapidly in the third quarter of the 20th century. From 1989–1994, however, moose in this region declined by at least 50%, leading to harvest closures on state lands. By the early 21st century, moose populations west of the refuge had started to increase, and by 2015 there was some indication that moose were beginning to increase within the refuge.. However moose continue to occur at low density east of the Canning River on the coastal plain and in the northern foothills of the refuge. Because of concerns about the small population size, harvest restrictions have been implemented (Arctic Refuge CCP).

Of the two species, muskox may be more vulnerable to potential disturbance on the coastal plain. Female muskox don't breed until they are four or five years old, most only breed every other year (or less frequently), and produce just a single calf. They subsist on generally poor quality forage in the winter time, and to compensate, they conserve energy by reducing their winter activity. In addition, calves are born between mid-April and mid-May, 4–6 weeks before snowmelt and subsequent green-up produce nutritious forage. As a result, late winter is a time of high vulnerability, and if any muskox were in the vicinity of seismic exploration camps and activity, disturbance could dangerously impact their energy balance (Arctic Refuge CCP).

Grizzly bears, wolves, and wolverines all occur on the coastal plain, but are more common inland in the foothills and mountains of the Brooks Range. Among the three, bears may be the most vulnerable to disturbance. Throughout the Arctic, brown bears have low rates of reproduction. They exhibit a delayed age at first reproduction (nine years of age in the Arctic Refuge), mean litter size of two, high first-year mortality, and an interval between successful litters of greater than three years. In addition, they emerge from their dens from late March through May; females with cubs usually emerge later than adult males (Arctic Refuge CCP). The den emergence period overlaps the late operation and entire demobilization phases of hypothetical winter seismic exploration. Human-bear conflicts would be possible at this time as recently-emerged and hungry bears are ranging widely in search of early spring food.

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3.2.8 Caribou

Caribou are the most abundant large mammal in Arctic Refuge and are an important subsistence species for Iñupiat and Athabascan (Gwich'in) hunters. Caribou are also hunted and viewed by other visitors to the Refuge and are prey for brown bears and wolves.

Caribou have been present in northeastern Alaska and the northern Yukon since the early Pleistocene. Human use of caribou in the region may date back thousands of years. Remnants of caribou fences and corral structures used by the Gwich'in people are found throughout the current southern range of the Porcupine caribou herd (Warbelow et al. 1975).

Large caribou herds tend to migrate over long distances using seasonally available forage resources that are often widely distributed. Caribou move in response to changing weather conditions, biting and parasitic insect harassment, and predators. In arctic areas, caribou reproduction is highly synchronous and the majority of calving occurs in a two- to three-week period. Most adult females give birth to a single calf. Caribou calves are precocious, being able to stand and nurse within one hour after birth and follow their mothers within a few hours. The first 24 hours of life are critical, when a behavioral bond is formed between the calf and its mother. Disturbance of maternal groups on the calving grounds may interfere with bond formation and can increase calf mortality. After calving, small bands of cows with newborn calves gradually merge into larger groups and are joined by yearlings, barren females, and bulls arriving from wintering areas.

Summer weather conditions promote the emergence of mosquitoes, nose bots, warble flies, and other biting insects. Insect harassment drives caribou into densely packed groups. These post-calving aggregations often move toward the Arctic coast or to higher elevations in the mountains to find relief from insects.

By August, large aggregations gradually dissolve into widely dispersed small groups that move slowly toward winter ranges. Breeding takes place en route, and by mid-November, caribou arrive in areas where they will spend the winter.

Four caribou herds live in northern Alaska. Two of these, the Porcupine and Central Arctic herds, consistently use Arctic Refuge seasonally or throughout the year. Caribou would be most susceptible to interaction and potential disturbance from winter exploration activities during their spring migration to calving grounds within the 1002 area of the coastal plain and for those that overwinter in that area, including members of the Teshekpuk Herd.

Porcupine Caribou Herd

An iconic symbol of Arctic Refuge, this herd migrates hundreds of miles from wintering grounds to give birth on the coastal plain and northern foothills of Arctic Refuge and nearby Yukon Territory in Canada. Residents of Arctic Village and, to a lesser extent, Kaktovik, hunt Porcupine

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caribou. Many visitors come to Arctic Refuge during early summer with hopes of seeing large numbers of caribou.

During the 1960s and 1970s, the Porcupine caribou herd was relatively stable at about 100,000 animals. Numbers steadily increased after 1978, peaked at 178,000 in 1989, and declined to 123,000 caribou in 2001 (Lenart 2007). Between 2002 and 2009, no estimates of abundance were available. During this period, caribou left the coastal plain and northern foothills of Arctic Refuge earlier and did not form large post-calving aggregations, or weather conditions precluded flights to photograph groups (E. Lenart, wildlife biologist, ADFG, pers. comm.). In 2010, 169,000 caribou were counted in a photocensus of the Porcupine caribou herd (Caikoski 2011). Between 2001 and 2013 the herd increased to levels not seen since monitoring began in 1977, with an estimated population of 197,000 (ADFG 2017b).

The Porcupine caribou herd ranges over 130,000 square mi (337,000 square km) of wild lands in northeastern Alaska and northwestern Canada (Lenart 2007). The entire Arctic Refuge coastal plain is key calving and post-calving habitat for Porcupine caribou (Griffith et al. 2002). Foothills and mountains of Arctic Refuge are also important summer, fall, and winter habitats, as well as spring and fall migration routes. As the summer progresses and willows (Salix sp.) emerge, caribou also use riparian habitats. The Porcupine caribou herd generally overwinters south of the Brooks Range in Arctic Refuge and in the Richardson and Ogilvie mountains of the Yukon Territory, Canada. Winter distribution varies by year but is primarily south of the Brooks Range (Caikoski 2011).

Spring migration to calving grounds begins in mid-April and continues through May. Pregnant caribou move northward from wintering areas toward calving grounds, where they give birth during the first week in June. Timing and routes of migration vary annually depending on where they overwintered, snow conditions, and timing of the onset of spring weather. Caribou wintering in Alaska often follow a northeasterly route to calving grounds, crossing the southern flanks and valleys of the Brooks Range, and eventually entering Canada near the Firth River. Caribou wintering in Canada also converge in this region. Some caribou wintering in Alaska move in a more northerly direction, crossing the eastern Brooks Range and traveling more directly toward calving grounds. As snowmelt progresses, caribou in the foothills spread northwestward along a broad front, primarily following the major river corridors and associated terraces where snow melt has advanced.

For the past few decades, the Porcupine caribou herd has calved in a region encompassed by the Arctic foothills and the coastal plain from the Canning River in Arctic Refuge to the Babbage River in Canada, an area of nearly 8.9 million ac (3.6 million ha) (Griffith et al. 2002). During the calving season in early June, Porcupine caribou selected areas of wet sedge, herbaceous tussock tundra and riparian vegetation types (Griffith et al. 2002). Emerging tussock cotton grass (*Eriophorum vaginatum*) flowers were an important source of high quality forage in areas used by calving caribou (Jorgenson et al. 2002). This plant species had greater biomass and forage quality in tussock tundra compared with other vegetation types. The distribution of tussock

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tundra and moist sedge-willow tundra was greater in calving areas in the Arctic Refuge 1002 area of the coastal plain than in areas further south and east (Jorgenson et al. 2002).

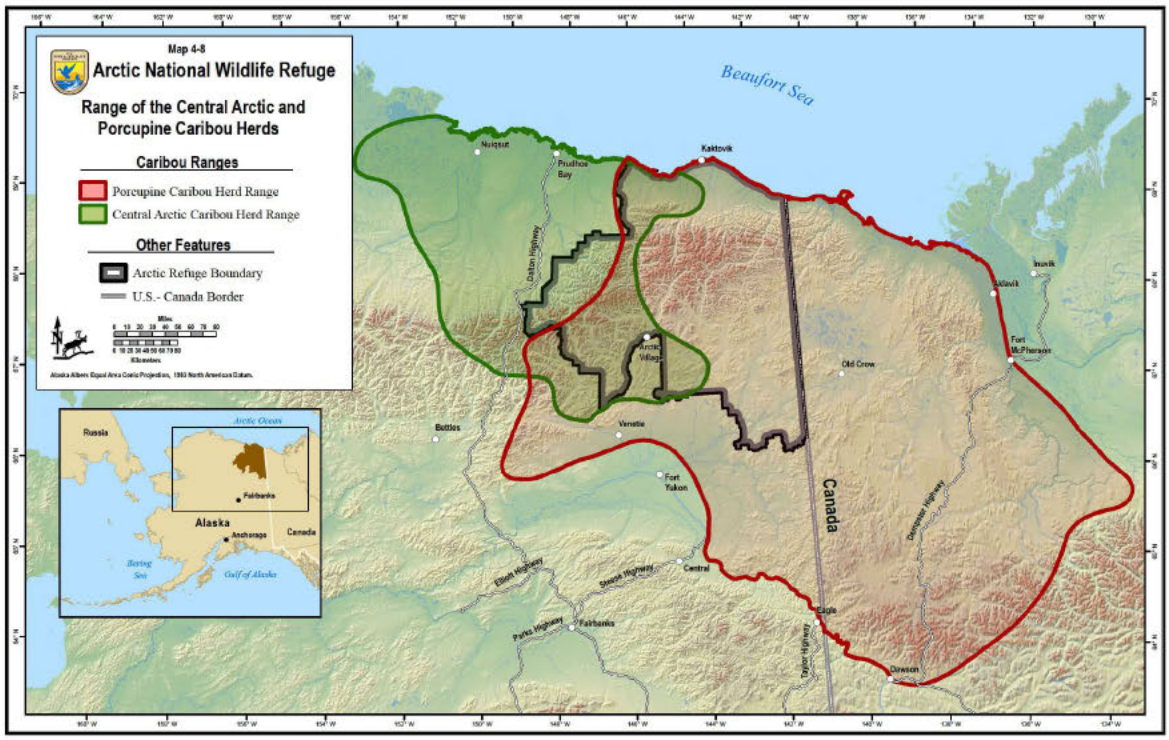
Central Arctic Caribou Herd

The annual range of the Central Arctic caribou herd overlaps that of the Porcupine caribou herd. Two main calving concentration areas have been identified for the Central Arctic caribou herd: a western area between the Kuparuk and Colville rivers, and an eastern area between the Sagavanirktok and Canning rivers. The eastern area includes the Canning River delta region in northwest Arctic Refuge.

During most winters, scattered groups of animals range throughout the coastal plain west of the Katakturuk River and adjacent uplands to the south. Between 2002 and 2009, the winter distribution of the Central Arctic caribou was north and south of the Brooks Range in Arctic Refuge. In some years, they mixed with Porcupine caribou wintering in the same region. In 2010, almost all Central Arctic caribou wintered on the south side of the Brooks Range in Alaska, as did Porcupine caribou.

This herd had about 5,000 caribou in the mid-1970s when it was first identified as a distinct herd (Cameron and Whitten 1979). By the early 1980s, it had grown to almost 13,000 and by the late 1990s, when net calf production was greater than 70 percent calves per female, it increased to over 25,000 (Cameron et al. 2002). A photo census in 2010 counted more than 70,000 caribou in the Central Arctic herd, but a late spring in 2013 resulted in high mortality and the population dropped to 50,000 animals (ADFG 2017a). A 2016 estimate showed further dramatic declines, and the population estimate decreased an additional 50% and is at less than 23,000 caribou. The declines are attributed to both high adult female mortality and mixing of the Central, Teshekpuk and Porcupine herds.

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3.2.9 Polar Bear

Of the two polar bear subpopulations (or stocks) found in the United States, polar bears in the Southern Beaufort Sea (SBS) subpopulation are the most likely to occur in the 1002 area of the coastal plain. The subpopulation is shared by the U.S. and Canada and is listed as Threatened under the Endangered Species Act. Critical habitat was established in 2010. The boundary of the SBS subpopulation, as recognized by the Polar Bear Specialists Group, is Icy Cape, Alaska to the west and south of Banks Island and east of the Baillie Islands, Canada to the east (Obbard et al. 2010). The SBS subpopulation had an estimated population size of approximately 900 bears in 2010 (Bromaghin et al. 2015). This estimate represents a significant reduction from previous estimates of approximately 1,800 in 1986 (Amstrup et al. 1986), and 1,526 in 2006 (Regehr et al. 2006). Although there was some evidence in the 2010 estimate that the population might be showing signs of the subpopulation beginning to increase (Bromaghin et al. 2015). Analyses of over 20 years of data on the size and body condition of bears in this subpopulation demonstrated declines for most sex and age classes (Rode et al. 2010, 2014).

Population declines and the size and body condition of bears in the SBS subpopulation have been linked to declining sea ice conditions in the Beaufort Sea (Regehr et al. 2006; Rode et al. 2010,

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2014, in press; Bromaghin et al. 2015). Declining sea ice conditions in the Beaufort Sea have also led to an increase in the proportion of the subpopulation coming on shore in summer and autumn (from 5.8% during 1986–1999 to 20% during 2000–2014) and a 30 day increase in time spent on land (Atwood et al. 2016). While on land, polar bears typically do not feed (Rode et al. 2015), although bears in the SBS subpopulation are drawn to bowhead whale remains from subsistence harvest, particularly adjacent to the community of Kaktovik, Alaska (Wilson et al. 2017). These whale remains may be helping offset lost hunting opportunities for bears in the SBS subpopulation due to sea ice loss (Herreman and Peacock 2013, Atwood et al. 2016).

In addition to a higher proportion of the SBS subpopulation occurring on shore during summer and autumn, there is also an increasing trend towards more bears denning on land (Olson et al. 2017). Denning substrate (i.e., sea ice or mainland) is significantly related to where bears occur in autumn. Pregnant polar bears in the SBS subpopulation that spent >25 days on land in autumn all subsequently denned on land (Olson et al. 2017). Between 1985–2013 the percent of bears denning on land in the SBS subpopulation increased from 34 to 55% and is linked to sea ice declines. Designated Critical Denning Habitat overlaps with 77% of the 1002 area of the coastal plain (U.S. Fish and Wildlife Service 2010). There is also 38% more denning habitat available in the coastal plain of the Arctic Refuge than in the region immediately west of the refuge (Durner et al. 2006). Polar bears have been shown to den in the 1002 area of the coastal plain with greater frequency than expected based on available habitat (Amstrup 1993). Based on known den locations from 2000–2010, 22% of dens for bears in the SBS subpopulation occurred within the 1002 area of the coastal plain (Durner et al. 2010). Thus, the 1002 area of the coastal plain has been documented to be an important area for denning by polar bears and will likely increase in importance as the percent of bears denning on land increases with sea ice loss (Olson et al. 2017).

The mean dates of den entrance and emergence for polar bears that den on land in the SBS subpopulation is 11 November and 3 March, respectively (Rode et al. in review). Females observed with cubs in spring emerged 15 days later than females observed without cubs (Rode et al. in review). Land-based denning also appears to be important for polar bears, as bears that den on land have significantly higher reproductive success (Rode et al. in review).

3.2.10 Bowhead Whale

The bowhead whale is classified as endangered under the ESA and as depleted under the Marine Mammal Protection Act. It was listed in 1970, but no critical habitat has been designated. A detailed discussion of the bowhead whale migration and population history is included in the BLM Integrated Action Plan/EIS (2012). The Bering-Chukchi-Beaufort Seas stock of whale is important to the Inupiat peoples of the northern arctic for subsistence. If barging of materials to Kaktovik, Alaska, is required to support exploration of the eastern 1002 area, this population may be affected.

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The size of the Bering-Chukchi-Beaufort Seas stock was estimated at 10,400 to 23,000 animals in 1848, before commercial whaling decreased the stock to between 1,000 and 3,000 animals by 1914 (Woodby and Botkin 1993). This stock has slowly increased since 1921 when commercial whaling ended, and in 2001 estimates indicated a population size of about 10,500 whales (George et al. 2004, Zeh and Punt 2005). Separate analyses suggest the mean annual rate of increase from 1978 to 2001 to be between 3.4 and 3.5 percent (George et al. 2004, Brandon and Wade 2004).

Bowhead whales migrate through the Beaufort Sea while traveling between wintering areas in the Bering Sea and summer feeding grounds in the Canadian Beaufort Sea, although some animals may remain in areas offshore in the Beaufort and Chukchi seas throughout the summer. The spring migration typically begins in the Bering Sea in mid-March to early April, depending on ice conditions. During the spring migration, bowhead whales follow somewhat predictable leads that form along the coast of western Alaska to Point Barrow. From Point Barrow eastward to Amundsen Gulf, the leads and the migration occur farther from shore based largely on satellite telemetry tracks (Alaska Department of Fish and Game, unpublished data19). From April to June, most bowhead whales are distributed along a migration corridor that extends from their Bering Sea wintering grounds to their feeding grounds in the eastern Beaufort Sea (Moore and Reeves 1993). Some bowhead whales migrate westward to feeding grounds in the western Chukchi Sea (Bogoslovskaya et al. 1982, Mel'nikov et al. 1997, Alaska Department of Fish and Game satellite telemetry data). Bowhead whales arrive on their primary summer feeding grounds in the eastern Beaufort Sea from mid-May through June and remain in the Canadian Beaufort Sea and Amundsen Gulf until late August or early September. Some whales may occur regularly in the western Beaufort Sea, particularly near Barrow Canyon, and in the Chukchi Sea along the northwestern Alaskan coast in late summer. These animals may be summer residents but may also be "early autumn" migrants. However, it should be noted that recent telemetry data has suggested that bowhead movements are far more labile within their range than formerly thought (Quakenbush et al. 2010) and 'reverse' migratory behavior has been documented.

Bowhead whales that have summered in the eastern (Canadian) Beaufort Sea begin the fall migration in late August to September and are usually out of the Beaufort Sea by late October (Treacy 1988−1997, 2000, 2002a, 2000b; Moore and Reeves 1993). The fall migration route extends from the eastern Beaufort Sea, along the continental shelf across the Chukchi Sea, and down the coast of the Chukotka Peninsula (Moore and Reeves 1993, Quakenbush et al. 2010b) The extent of ice cover may influence the route, timing, or duration of the fall migration. Moore et al. (2000) noted that bowheads in the U.S. Beaufort Sea tended to be distributed closer to shore during their westward migration in light ice years. Miller et al. (1996) also observed that whales moving from 147° to 150° West longitude in the central Beaufort Sea, migrated closer to shore in light and moderate ice years (median distance offshore 18 to 25 miles), and farther offshore in heavy ice years (median distance offshore 35 to 45 miles).

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3.2.11 Ringed and Bearded Seals

Ringed seals (*Phoca hispida*) are the smallest and most abundant of the Arctic ice seals (seals that use ice to carry out important life history traits) (Smith and Hammill 1981, Kingsley 1986). Ringed seals have a circumpolar distribution, occurring in all areas of the Arctic Ocean north of approximately 35° north latitude (Kelly et al. 2010, King 1983). A detailed discussion of the ringed seal population and life history is included in the BLM Integrated Action Plan/EIS (2012).

Bearded seals (*Erignathus barbatus nauticaus*) are a pagophilic (ice-associated) seal present in the Chukchi and Beaufort seas year round. They are generally considered to inhabit areas of shallow water (less than 200 meters) that are at least seasonally ice covered (Burns 1970, Kelly 1988b, Cameron et al. 2010). A detailed discussion of the bearded seal population and life history is included in the BLM Integrated Action Plan/EIS (2012).

3.3 Social Environment

3.3.1 Cultural Resources & Historic Background

The Arctic Refuge CCP (2015) describes in detail the known cultural and historic context of the Refuge. When considering development within the Refuge's coastal plain, it is important to note that cultural resources on the North Slope and coastal plain are on or near the surface of the tundra and tend to be oriented along river corridors and coastal beaches. This means that many cultural resource sites on the Refuge are vulnerable to erosion and other natural forces, and to a lesser extent, from public use of Refuge lands and waters. Human use has occurred in the area for more than 10,000 years (Reanier 2003).

Communities surrounding the Arctic coastal plain or that rely on resources, such as caribou, from the coastal plain include Arctic Village, Chalkyitsik, Coldfoot, Deadhorse, Fort Yukon, Kaktovik, Prudhoe Bay,Venetie, and Wiseman. Details of the histories of all communities, except Deadhorse and Prudhoe Bay, are included in the Arctic Refuge CCP (2015). Deadhorse and Prudhoe Bay were not included in the CCP because their residents do not generally use Refuge wildlife resources. These communities fundamentally support infrastructure for the operational oil fields.

Prudhoe Bay and Deadhorse

Prudhoe Bay was named in 1828 for Baron Prudhoe by British explorer Sir John Franklin. In the 1970s the site was extensively developed to support oil drilling operations. The 800-mile Trans Alaska Pipeline, constructed to transport crude oil from Prudhoe Bay to Valdez, has its northern terminus here. At Valdez oil is loaded into marine tankers for shipment throughout the U.S. Prudhoe Bay is also the unofficial northern terminus of the Pan-American Highway. Deadhorse

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is a small community which is absorbed into Prudhoe Bay for statistical purposes. Prudhoe Bay is a large work camp for the oil industry. All residents are employees of oil-drilling or oil-production and support companies and work long consecutive shifts. Living quarters and food are provided to the workforce, and there are a number of recreational facilities. There are no permanent residents of Prudhoe Bay.

3.3.2 Socioeconomic

Although the communities of Arctic Village, Chalkyitsik, Coldfoot, Fort Yukon, Kaktovik, Venetie, Wiseman, and Prudhoe Bay surround the Refuge, generally only economies of Kaktovik, Coldfoot, Wiseman, and Prudhoe Bay would be directly affected by oil and gas exploration as they are located either in locations where infrastructure could be staged or along the Haul Road, the only developed land route into the area. All of the communities would be indirectly affected if caribou, a valuable subsistence resource, was affected due to their proximity to and use of the Porcupine caribou herd.

Table 3 – 2: Demographic Characteristics of the Communities Near Arctic Refuge

Demographic Characteristics	Arctic Village	Chalkyitsik	Cold-foot	Fort Yukon	Kaktovik	Venetie	Wiseman	Prudhoe Bay
Overall 2010 Census Population	152	69	10	583	239	166	14	2174
American Indian and Alaska Native	135	59	1	45	212	152	0	163
White	7	10	9	520	24	3	13	1804
Two or more races	10	0	0	10	3	10	1	41
Other races	0	0	0	8	0	1	0	166

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Median age	29	27.5	43	33.7	30.5	30.5	28.5	50
Median household income	$27,250 +/- $9,667	$38,750 +/- $16,617	Not Available	$33,194 +/- $7,432	$58,125 +/- $33,478	$28,333 +/- $21,379	Not Available	94,906 +/- 11,207
Employment in 2016								
Employed (#)	87	48	11	266	125	103	5	1978
Employed in the Private Sector (#)	14	6	9	113	41	23	5	1978
Employed in local and/or state government (#)	73	42	2	153	84	80	0	0
Employed in all 4 Quarters (#)	31	27	9	138	93	40	0	1891

3.3.3 Environmental Justice

Some of the communities potentially affected by the Proposed Action are predominantly Alaska Native, with lower incomes than Alaska and U.S. averages. As a result of these socioeconomic characteristics, the analysis of environmental consequences of the Proposed Action and Alternatives in Chapter 4 will determine whether there are disproportionate adverse impacts on these communities as a result of the proposed project.

3.3.4 Subsistence

Section 803 of ANILCA defines subsistence uses as: The customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as

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food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of inedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter or sharing for personal or family consumption; and for customary trade (16 U.S.C. § 3113).

One of the purposes of the Arctic Refuge is to provide the opportunity for continued subsistence uses by local residents in a manner consistent with the purposes of conserving fish and wildlife populations and habitats and fulfilling international treaty obligations with respect to fish and wildlife (USFWS 2015). With the exception of Prudhoe Bay, each of the affected communities within the proposed project area is characterized by active participation in subsistence fishing, hunting, and trapping on federal, state, and Native corporation lands.

Subsistence Harvest Practices In or Near the Refuge

According to the Arctic Refuge CCP (2015) Arctic Village, Chalkyitsik, Fort Yukon, Kaktovik, Venetie, and Wiseman use the Refuge for subsistence purposes. Due to their close proximity Arctic Village, a Gwich'in community, and Kaktovik, a Inupiat community, use the Refuge most frequently. The subsistence way of life encompasses much more than just a way of obtaining food or natural materials. It involves traditions that are important mechanisms for maintaining cultural values, family traditions, kinships, and passing on those values to younger generations. It is considered a way of life, rather than just an activity. (Alaska Federation of Natives 2010).

Not only are subsistence opportunities critical to the cultural identities of these communities, the resources gained provide needed sustenance for residents. There are very few year-round employment opportunities and food costs are high due to the cost of air transportation.

Although both Arctic Village and Kaktovik rely heavily on the Refuge for subsistence resources, the resources used are significantly different. Subsistence harvest in Arctic Village was 10,000 to 21,000 pounds with moose and caribou constituting 90 percent of the harvest in each year, according to the State of Alaska's Community Subsistence Information System (1993–1997) and data collected by the Council of Athabascan Tribal Governments in 2001 and 2002. The harvested caribou from these surveys come primarily from the migrating Porcupine caribou herd. Because of this, the Gwich'in people consider the Porcupine caribou herd's calving grounds on the coastal plain as sacred ground, a birthing place for thousands of caribou each year (Gwich'in National 1988).

Kaktovik is an Inupiat community located on Barter Island on the shore of the Beaufort Sea. The Kaktovikmiut's way of life continues to be heavily dependent on subsistence harvest of marine and terrestrial animals and fish. Caribou hunting occurs throughout most of the year, while bowhead whaling occurs from late August to early October. When the community harvests a whale, marine resources composed 59 to 68 percent of their total subsistence harvest (Minerals Management Service 2003). In addition to whales, Kaktovik residents also harvest a considerable number of Dall's sheep and caribou, contributing 17 to 30 percent of the annual harvest by weight.

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3.3.5 Recreation

The coastal plain is located on lands within ADF&G Game Management Unit (GMU) 26C. ADF&G regulates the seasons, licenses, and bag limits (ADF&G 2015h). Access to prime hunting areas is typically by chartered aircraft, boat, or foot. Two guide use areas could be affected by exploration activities. Nonresident brown bear and Dall sheep hunters must be accompanied in the field by a big game guide authorized to operate in the area (USFWS 2014a).

There are two registration brown bear hunting seasons in GMU 26C. They are held from January 1 to May 31 and August 25 to May 31. In 2016, of the 27 permits issued 12 people reported going hunting (ADF&G website 2017). Caribou hunting is also popular and the hunt is open year round. No permit statistics were available to quantify caribou hunting pressure.

3.3.6 Noise

Sound is defined as a particular auditory effect produced by a given source, for example the sound of rain on the roof, and is measured in decibels (dB). A-weighted sound level measurements (dBA) are a measure of how the human ear hears sound and is used to characterize sound levels. Table 3–4 shows dBA levels for sounds associated with the area and equipment being proposed for use in the action alternatives.

Table 3 - 4: dBA Levels

Source of Noise	dBA Level
Ambient sound without human influence	20 – 30 dBA
Ground wind 5–10 miles per hour	35 – 45 dBA
Ground wind 20 – 30 miles per hour	55 – 65 dBA
Single engine plane fly over at 1,000 ft	88 dBA
Cessna 206	79 dBA
Bell Huey 204	88 dBA
R-66	82 dBA
Propane generator at 500 ft away	30–35 dBA
(Bolin 2006, Illingworth and Rodkin 2006, Schulten 1997, ICAO Annex 2006, US Coast Guard 2010)	

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Currently there is no source of non-ambient noise on the coastal plain, aside from ground wind and the occasional aircraft, high overhead. Generally, noise levels on the Refuge are expected to be between 20 and 30 dBA in calm winds and up to 40 to 50 dBA in moderate to strong winds.

3.3.7 Visual

Visual resources are often described in relation to landscape character or the overall impression created by an area's unique combination of features, such as land, vegetation, water, and existing structures (cultural modification). Viewsheds are the geographical areas that are visible from given locations. They include all surrounding points that are in line-of-sight with a given location and exclude points that are beyond the horizon or obstructed by terrain and other features.

The landscape character of the coastal plain is of a landscape that is relatively flat, yet interspersed with low ridges and depressions. Tall, linear lined objects would be an unusual characteristic. Viewsheds on the coastal plain are virtually free from indications of human activities except where subsistence structures are located.

3.3.8 Wilderness Values

The Arctic Refuge, including the coastal plain, was initially proposed as "The Last Great Wilderness" and wilderness values were highly prominent in its initial establishment as the Arctic National Wildlife Range. The Refuge's 2015 CCP recommended the 1002 area for Wilderness designation because it exemplifies the wilderness qualities of natural condition, natural quiet, scenery, wild character, and ecological wholeness. The area's diverse wildlife species are particularly valued because they exist in a wilderness context, with their natural behaviors, interactions, movements, and cycles continuing.

The area offers exceptional opportunities for wilderness oriented recreation—adventure, exploration, solitude, and emersion in the natural world. As well, the area holds high symbolic and existence value for millions of people who don't visit, but find satisfaction, inspiration, even hope in just knowing it exists.

4 Environmental Consequences

NEPA requires the disclosure of environmental impacts associated with the alternatives including the No Action Alternative. This chapter presents the anticipated environmental impacts of Alternative 1 (No Action) and Alternative 2. These analyses provide the basis for comparing the effects of the alternatives on the Affected Environment. The exploration activities described in Alternative 2 are general in nature. If Alternative 2 is selected, the regulations are updated, and applications are received, the Service would complete additional NEPA analysis based on the specifics of each proposal at that time.

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4.1 DEFINITIONS OF TERMS

Direct Effects – Direct effects are impacts that are caused by the alternatives at the same time and in the same place as the action.

Indirect Effects – Indirect effects are impacts caused by the alternatives that occur later in time or farther in distance than the action.

Long-term Effects – Long-term effects are impacts that would occur throughout the life of the project.

Short-term Effects- Short-term effects are impacts that would occur during only the construction phase of this project.

Cumulative Effects ——The Council on Environmental Quality (CEQ) defines cumulative effects as impacts on the environment which result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant actions taking place over a period of time (40 CFR 1508.7). Informed decision making is served by consideration of cumulative effects resulting from projects that are proposed, under construction, recently completed, or anticipated to be implemented in the reasonably foreseeable future.

CEQ guidance in considering cumulative effects states that the first steps in assessing cumulative effects involve defining the scope of the other actions and their interrelationship with a proposed action. The scope must consider other projects whose effects coincide with the location and timetable of a proposed action and other actions. Cumulative effects analyses must also evaluate the nature of interactions among these actions (CEQ 1997). The cumulative effects assessment is based on available information at the time of development of this EA.

To identify cumulative effects, the analysis needs to address two fundamental questions.

1. Does a relationship exist such that affected resource areas of the Proposed Action or alternatives might interact with the affected resource areas of past, present, or reasonably foreseeable future actions?
2. If such a relationship exists, then does an EA reveal any potentially significant effects not identified when the Proposed Action is considered alone?

Mitigation — Mitigation includes special procedures and minimization measures that are implemented to avoid, reduce, or compensate for effects caused by an action. Some mitigation measures are already incorporated into the Proposed Action to avoid and reduce the potential for adverse effects. Other mitigation measures could be characterized as Best Management Practices that further reduce or compensate for adverse effects.

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4.2 SIGNIFICANCE CRITERIA

Summaries of the effects on the resources synthesize information about context, intensity, and duration, which are weighed against each other to produce a final assessment. While each summary reflects a determination using best professional judgment regarding the relative importance of the various factors involved, Table 4–1 provides a general guide for how summaries are reached.

Table 4 - 1: Descriptions of Final Assessment Categories

Assessment	Description
Beneficial	Resource improvements would occur and would have a perceptible change to the resource.
Adverse: Negligible	Impacts are generally extremely low in intensity (often they cannot be measured or observed), are temporary, and do not affect unique resources.
Adverse: Minor	Impacts tend to be low intensity or of short duration, although common resources may have more intense, longer-term impacts.
Adverse: Moderate	Impacts can be of any intensity or duration, although common resources are affected by higher intensity, longer impacts while unique resources are affected by medium or low intensity, shorter-duration impacts.
Adverse: Significant	Impacts that in their context and due to their intensity (severity) have the potential to meet the thresholds for significance set forth in CEQ regulations and therefore, warrant heightened attention and examination for potential mitigation in order to fulfill the policies set forth in NEPA.

4.4 ALTERNATIVE 1 – NO ACTION

Direct and Indirect Effects: Implementation of the No Action Alternative would result in no direct or indirect impacts to any of the considered resources. There would be no new exploration activities allowed on the coastal plain; and therefore no effects due to this project would occur.

Cumulative Effects: No direct or indirect effects to the existing condition of the resources considered would occur under the No Action Alternative; therefore, no cumulative effects would occur on the resources.

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4.5 ALTERNATIVE 2 – PHYSICAL ENVIRONMENT

4.5.1 Soils

It is difficult to fully describe potential environmental consequences when the scope and nature of activities has not been fully outlined. The BLM Integrated Action Plan/EIS (2012) for the NPRA describes general consequences to soils as a result of seismic exploration activities.

Seismic surveys to collect geological data would occur during the winter months. Frozen ground and sufficient snow cover, along with the requirement for low-pressure ground vehicles, would prevent most disturbances to vegetation or compaction of the soils. A majority of seismic surveys create minor, short-term disturbance to soils and vegetation (Jorgenson et al. 2003). However, even with protective measures in place, some small areas of disturbance to soils and vegetation would be expected to occur from seismic surveys and overland moves. In some instances, past overland moves and seismic surveys have disturbed vegetation (the insulating layer), altered the thermal balance, and increased the risk of thermokarsting (Jorgenson et al. 1996). Areas of soil disturbance could be caused at streambank crossings from damage to the vegetative mat, which could be scraped away, leaving exposed soil. Disturbance could also be caused, damaging the tops of tussocks in dryer areas, reducing the insulating abilities, and hastening loss of permafrost. Water-saturated areas show less damage to vegetation and soils from large-tired vehicles (USDOI 2005). The potential for soil erosion would increase with an increase in disturbance to soil and vegetation. Best management practices and other measures are designed to keep areas and severity of disturbance as small as possible.

4.5.2 Hydrology

It is difficult to fully describe potential environmental consequences when the scope and nature of activities has not been fully outlined. This section is developed to address very general potential activities limited to seismic exploration of unknown scope and attendant infrastructure to accomplish this including development of ice roads. It is clear that because unfrozen water is limited in winter on the Arctic coastal plain, negative effects of water withdrawals on overwintering fish populations, benthic invertebrates, and birds and mammals that feed on those organisms seem likely (West et al. 1992). Water withdrawal and its direct influence on reducing available habitat (wetted space) probably impacts fish populations more than any other winter alteration (Cunjak 1996). Since the distribution of adult and juvenile fish is extremely restricted during the long arctic winter when most of a drainage is frozen solid (Craig and Poulin 1975), water removal , leading to reduced groundwater flow or altering baseflow, ice and temperature regimes has the potential to affect all life stages of some populations. Seismic activity could potentially reduce fish populations, divert fish from their normal locations, or adversely affect fish populations and habitat. Exploration activities bring the potential for fuel spills or other releases of contaminants that could affect water quality.

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Seismic Exploration and Thermokarst Activity

Seismic exploration can cause thermokarst, especially when snow is insufficient to protect soil and vegetation (WesternGeco 2003). Removal or damage of the organic mat exposes soils to erosion by wind and water, which could deposit sediment into water bodies resulting in higher turbidity and concentrations of suspended sediment. To cause high turbidity, the peat mat must be sufficiently eroded to expose underlying mineral soils, and the mineral soils must be fine grained (BLM 2012).

Effects of seismic exploration on water resources and aquatic habitats

Seismic surveys can be conducted using dynamite (or other explosives), air guns, or Vibroseis to generate acoustical energy pulses necessary to locate subsurface geological formations that might contain oil or gas (BLM 2012). Research has demonstrated that high-intensity acoustic energy can lead to damaged auditory sensory hair cells in fish, effectively reducing the ability to hear (McCauley et al. 2003; Popper 2003; Smith et al. 2004; Popper et al. 2005). The extent of damage and the ability to regenerate these cells is dependent on the intensity and duration of noise and the species of fish. Underwater shock waves can also cause injury to the swim bladder and other organs and tissue (Wright 1982), which could result in a sub-lethal or lethal effects. Fleeing behavior is also a well-documented response by fish to anthropogenic sounds (Popper 2003; Popper et al. 2004). Because of a lack of information regarding the impacts on fish from Vibroseis specifically, winter field tests on the North Slope were conducted in 2000, to measure the sound pressure levels in water that were generated by Vibroseis rigs operating on the ice overhead (Greene 2000; Nyland 2002). The results indicated that these sound pressures were great enough 10 meters from the source to cause avoidance behavior, but no measurements were made directly below the Vibroseis equipment. Fish fleeing behavior was the most obvious effect of Vibroseis during the 2003 Alaska Department of Natural Resources/BLM study (Morris and Winters 2005). Because exploration using Vibroseis occurs in the winter when physiological stress is the greatest for most fish species, a flight response could potentially be detrimental. (BLM 2012)

Use of Explosives

Use of explosives is a major disturbance to fish and wildlife. These are particularly stressful to fish that are captive in overwintering habitats and would likely have a negative impact on terrestrial and aquatic animals that congregate near spring-fed oases during winter as well as presenting potential contamination issues.

Effects of Water Withdrawal from Lakes

In other areas of the North Slope the primary source of water during the winter months for exploration activities is unfrozen water that lies beneath the ice cover of both shallow and deep lakes. This water is somewhat saline because of the exclusion of ions during the freezing of the upper part of the lake. Water from lakes may be used for ice roads, pads and airstrips, and potable water for field crews. Typically the volume of water taken from an individual lake

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depends on the depth of the lake, volume of unfrozen water in the lake, and the presence and type of fish documented (BLM 2012).

Water withdrawal affects the available habitat for fish species if they are present, macroinvertebrates and can otherwise impact aquatic habitat by further altering water quality and reducing the water available when breakup occurs potentially affecting spring recharge and lake levels.

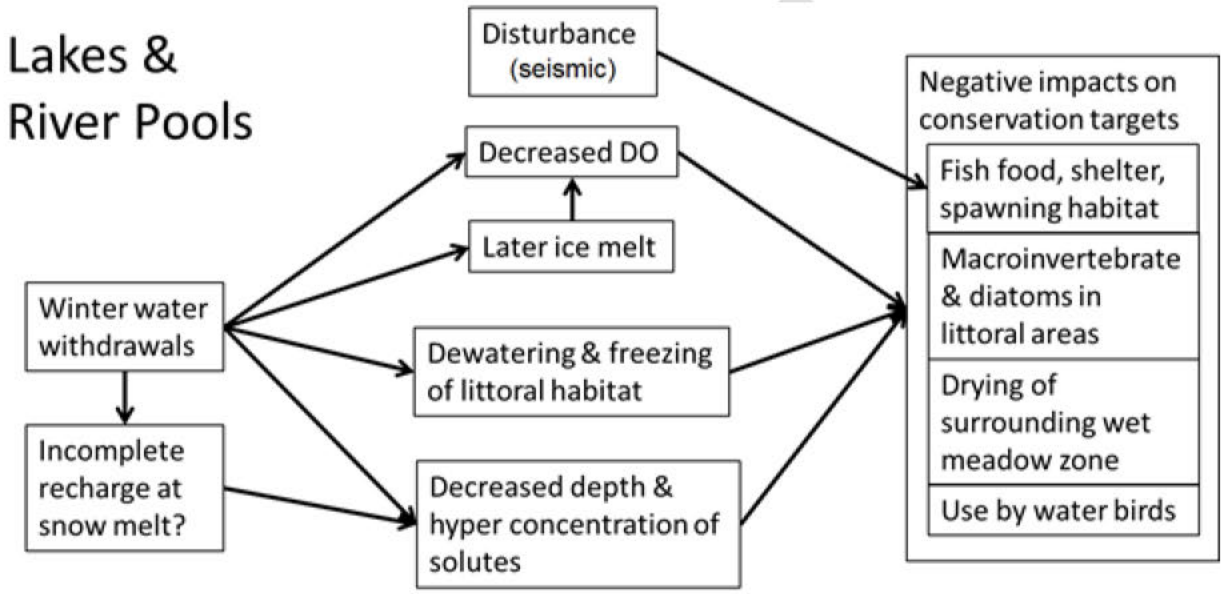


Figure 1. Potential impacts of seismic exploration on lakes and rivers

Removal or compaction of snow can increase the depth of freezing on lakes, sometimes by one foot or more. As a result, the water quantity available in a lake during the winter months can be greatly reduced, and the salinity of the water beneath the ice can be increased further. Maintaining the natural hydrologic regime may not be possible under various pumping scenarios. To reduce impacts to the natural hydrologic regime, regulations typically prohibit snow compaction on fish-bearing lakes, but snow compaction is unavoidable when ice aggregates are removed from lakes (BLM 2012).

There are no studies assessing the effects of permitted withdrawals on lake water chemistry on the North Slope of Alaska. Hinzman et al. (2006) conducted a study to assess the effects of what turned out to be relatively small water withdrawals on water chemistry and lake-recharge. This work was funded by the Department of Energy and oil field companies, and did not undergo a standard peer-review process, yet it is widely cited by the BLM and DOE. Unfortunately, only a small fraction of the permitted withdrawal volume was actually pumped from the study lakes, the study design had almost no ability to detect change, and the researchers were unable to get their dissolved oxygen sensors functioning to conduct any relevant measurements in pumped lakes.

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Thus, we have no information on potential impacts of heavy pumping that is currently allowed by water withdrawal permits on the North Slope of Alaska. Despite the low ability to detect change, Hinzman et al. (2006) did find that one of four pumped lakes did not fully recharge at snow melt. This suggests that water withdrawals far less than permitted volumes can have significant impacts on lake hydrology and the availability of wetted habitat. Canadian studies on ice-covered lakes have found that water withdrawals have a substantial and wide range of negative impacts on aquatic ecosystems (Cott et al. 2008). These include reduction of habitat for fish, waterfowl, and furbearers; reduction in oxygen available to overwintering fish; and dewatering and freezing of littoral habitats which kills plants, invertebrates, and fish eggs. Isolated lakes may be particularly vulnerable as they may not recharge at snowmelt. Organisms in small isolated lakes are particularly sensitive to water withdrawals. The effects of water withdrawals on wet meadow zones surrounding lakes are unknown, but would likely be great if lakes are not fully recharged at snowmelt. This would result in a reduction in habitat for waterfowl and shorebirds that use these lakes during the summer.

Effects during exploration on water chemistry from water withdrawals could be short term if lakes are fully recharged during spring. Impacts to overwintering fish and littoral zone communities will likely be more substantial and longer-term, especially in isolated lakes.

Effects of Ice Roads, Ice Pads and Ice Bridges

Ice roads and ice pads are used extensively during the winter season for access and for seismic exploration. Ice roads require about 1 million to 1.5 million gallons of water per linear mile and generally can be built at a rate of about 1.5 inches of thickness per day (BLM 1998). Ice pads can require up to 5 million gallons of water to build and range in size from 3 to 10 acres. Floating ice bridges may be necessary to cross large rivers and must be of sufficient thickness to handle heavy truck traffic. Smaller rivers require ice bridges, which are often constructed of aggregate chips and water and placed on grounded ice. Ice roads and bridges can cause additional freeze-down, reducing the already limited overwinter water volume available for fish habitat and affecting water quality. During snow melt ice bridges can create ice dam flooding if not removed properly.

4.6 ALTERNATIVE 2 - BIOLOGICAL ENVIRONMENT

4.6.1 Vegetation

Similar to the effect to soils, we expect seismic surveys to create minor, short-term disturbance. Vegetation near stream banks may be particularly at risk as the soil they grow in may be more be disturbed by the movement of equipment uncross uneven ground. In the NPRA EIS (2012) they found that in general, construction of ice roads, pads, and airstrips would have only localized impacts on vegetation, usually limited in wetter areas to compression of the tundra vegetation under the roads and pads and a shortened growing season for the plants in the following summer due to delayed melting of the ice in the spring. However, ice roads and pads could also cause breakage of shrubs and scuffing and crushing of tussocks in moist or drier habitats, and localized

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areas of plant death (Jorgenson 1999; Pullman et al. 2005; Yokel et al. 2007). Recovery from most impacts to vegetation would be expected within a few years.

4.6.2 Wetlands

The BLM Integrated Action Plan/EIS (2012) for the NPRA describes general consequences to wetlands as a result of seismic exploration activities and similar to the NPR-A, the vast majority of the 1002 area of the coastal plain is considered wetlands, according to the Service National Wetlands Inventory database. As such, we can assume that any ground-disturbing actions to vegetation will also be impacting wetlands. Once a specific exploration plan has been developed a full analysis can be completed in order to develop site specific mitigations.

4.6.3 Fisheries

Direct impacts would include mortality to fish or alterations to habitat by geophysical exploration that make these unacceptable or suboptimal for life history requirements and/or long-term survival, including contaminant spills, failure of sewage or waste-water disposal, blasting, channelization, culverts or barriers to movement, increased turbidity from construction, toxic effects of drilling muds or depletion of dissolved oxygen levels. Over-harvesting of selected fish species may occur if not stipulated as a prohibition to the increased human workforce during exploration or development.

Indirect impacts would fish swept into storage reservoirs during high flows (storm events, spring snowmelt or construction activities) where fish are trapped when water levels return to normal or are pumped out. Such events occur naturally. Additionally, such artificial impoundments may provide alternative overwintering habitat for some species in a region where such habitats are scarce. Access to and from the larger population would be necessary for this to be an effective benefit to fish species. Abandoned deep-water reservoirs have been beneficial for several fish species (Moulton and George 2000).

Early pipeline and development in the Prudhoe Bay area reduced some fish populations due to locations of road crossings, undersized or undercut culverts prior to understanding species-specific swimming needs (Moulton and George 2000).

Those species that do not migrate are not as likely to be affected by impacts related to barriers and some habitat changes. However, wintering areas are essential. Therefore, any factor linked with exploration or development that reduces adequate open water depths during winter months may have the potential to reduce populations at specific locations.

Each Arctic grayling river-population is distinct from others. Therefore, geophysical impacts could have a larger footprint on a landscape scale than a single site. However, the distribution of

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the Arctic grayling has increased in Prudhoe Bay environs since the development of the the oil-field (NRC 2003).

Direct, indirect, and cumulative effects of geophysical exploration and oil-field development pose little risks to freshwater fisheries and their habitats based on recent evaluations and using best management practices that have evolved since the late 1970s to late 1980s (Moulton and George 2000; NRC 2003; BLM 2012). The use of vibration equipment in lieu of blasting has reduced overpressure mortalities in fish and less intrusive to habitats. Low ground-bearing pressure vehicles reduce soil disturbances and potential for sediment mobilization and associated accumulation to lakes and streams. Capping the amount of water withdrawal from any natural waters may minimize overwinter mortalities or reduction of overwintering habitat for fish.

4.6.4 Bald and Golden Eagles

Although we do not anticipate significant effects to bald eagles, as they are not common within the 1002 of the coastal plain; further analysis of project specific plans will be required to analyze possible effects and needed mitigation measures for golden eagles. We know the golden eagles feed on caribou calves being born in the 1002 area and that they are within their nesting season during the time of winter exploration. Elsewhere, disturbance and development correlated with reduction in golden eagle nest success (Kochert et al. 2002) and we expect winter seismic activity could have similar result.

4.6.5 Resident Birds

Ptarmigan and gyrfalcon are known to be present within the 1002 area of the coastal plain during the winter. Gyrfalcon, like golden eagles, are early-nesting birds that could be disturbed by winter seismic exploration during both the late operation and demobilization phases. Gyrfalcons are known to be disturbed by both fixed-wing aircraft and helicopter overflights; disturbed birds are less likely to use the same site in subsequent year (Booms et al. 2008). Further analysis of project specific plans will be required to analyze possible effects and needed mitigation measures for bird species present during any proposed seismic activities.

4.6.6 Migratory Birds

Many species of migratory birds use the coastal plain for nesting or for feeding in preparation for fall migration. These include a variety of waterfowl and shorebirds that are dependent on aquatic and lakeshore habitats for nesting or feeding. If winter water withdrawals impact shoreline vegetation and/or aquatic plants, fish, and invertebrates, these effects could negatively impact waterfowl and shorebirds.

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4.6.7 Terrestrial Mammals (Caribou, Muskox, Wolverine, Grizzly Bears)

Impacts to habitat used by terrestrial mammals would be minor, as most seismic activities would occur during the winter on frozen tundra or ice. Potential causes of disturbance to terrestrial mammals from seismic activities would include surface vehicular traffic on frozen tundra or ice and fixed-wing aircraft traffic. In most cases, these activities would cause short-term displacements of and/or disturbance to terrestrial mammals. Where 3-D seismic exploration survey lines are located only 660 to 1,200 feet apart, localized displacement of terrestrial mammals could last for several days or lead to complete abandonment of localized habitat.

Effects on caribou and moose could include temporary habitat displacement and increased energy expenditure associated with increased disturbance movement. Caribou overwintering on the coastal plain would likely be encountered during seismic surveys. It is possible that displacement of caribou by seismic exploration activities during winter could have a negative effect on their energy balance (intake versus expenditure). Because these animals are mobile and the operation would be short in duration (e.g., 2 to 3 days in one area), it is not anticipated that any lasting adverse impacts to caribou would result under most circumstances. However, this assumption has not been scientifically tested and conditions for winter survival vary from year to year. It is possible that this disturbance could have an additive effect on natural winter mortality and could disproportionately impact young of the year and pregnant cows. Caribou have been shown to exhibit panic or violent, running reactions to aircraft flying at elevations of approximately 160 feet and to exhibit strong escape responses (animals trotting or running) to aircraft flying at 150 to 1,000 feet (Calef et al. 1976). Additional effects on caribou nutrition during the calving and post calving periods could occur as a result of delayed green up of vegetation underlying ice roads and pads or areas of compacted snow. The severity of these impacts would be dependent on the extent of the affected areas and by timing of snowmelt during a particular year.

Previous studies of the effects of oil and gas exploration on muskoxen in Alaska and Canada focused on disturbances associated with winter seismic operations. Some muskoxen reacted to seismic activities at distances up to 2.5 miles from the operations; however, reactions were highly variable among individuals (Reynolds and LaPlant 1985). Responses varied from no change in behavior to becoming alert, forming defense formations, or running away (Winters and Shideler 1990). The movements of muskoxen away from the seismic operations did not exceed 3 miles and had no apparent effect on muskox distribution (Reynolds and LaPlant 1986). Unlike caribou, muskoxen are not able to travel and dig through snow easily. In the winter, they search out sites with shallow snow, and greatly reduce movements and activity to conserve energy (USDOI U.S. Fish and Wildlife Service 1999). Muskoxen survive the winter by using stored body fat and reducing movement to compensate for low forage intake (Dau 2001). Because of this strategy, muskoxen may be even more susceptible to disturbances during the winter. It is possible that repeated disturbances of the same animals during winter could result in increased

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energetic costs that could increase mortality rates. Depending upon the location of the seismic exploration, impacts on muskox populations would be non-existent to minor.

Seismic camps could result in localized disturbance and/or displacement of terrestrial mammals for up to a few days. Bears and foxes could also be attracted to camps and conflict could result. Since seismic camps generally move at least once a week and proper handling of wastes would be regulated through permitting, the potential for bears or foxes to be attracted to human food sources would be minor. In addition, most seismic activity would occur when bears were hibernating and not attracted to scents. However, grizzly bears denning on the coastal plain, including females with dependent cubs, would be exposed to disturbance from seismic activities. Disturbance during winter can cause bears to abandon their dens, which increases winter mortality. Mitigations measures, such as those employed in existing oil fields west of the refuge will be required to minimize this disturbance.

The potential effects of seismic activities on wolverines would include disturbance from air and surface vehicle traffic, and increased human presence. Wolverines are considered a shy and secretive species that is present at very low densities and may be sensitive to disturbance.

4.6.8 Caribou

Addressed in previous section

4.6.9 Polar Bears

Terrestrial oil and gas industry seismic survey activities on the North Slope of Alaska typically require between 80 and 160 personnel. Substantial logistical support is required for a seismic survey operation, and also to support the personnel camps, vehicles, security, aircraft operations, restocking of the explosive magazine (if explosives are used), medical support, scientists, marine mammal observers, ice road construction, barge traffic, and many other logistical and support functions.

Polar bears present in the Arctic Refuge 1002 area may be affected by seismic survey activities in various ways. Noise, vibrations, sights, and smells produced by seismic survey activities may elicit a wide range of responses from polar bears. Polar bears respond to the sights and sound of snowmachines, vehicles, vessels, and aircraft; especially helicopters (Watts and Ratson 1989; Dyck 2001; Dyck and Baydack 2004; Andersen and Aars 2005). Polar bear responses to disturbance are highly variable and are influenced by an individual bear's previous experiences and tolerance level. Polar bears are most likely to respond to the majority of seismic survey activities with short-term behavioral and physiological responses such as avoidance, increased vigilance, increased heart rate, and other stress responses. Disturbance during resting may result in increased energy expenditure or adverse physiological responses (Watts et al. 1991), but short-term reactions like these will rarely affect the health or survival of individual animals or the population. The effects of fleeing from aircraft may be minimal if the

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event is short and the animal is otherwise healthy and unstressed. However, on a warmer day, a short run may be enough to overheat a well-insulated polar bear. The effect of fleeing an aircraft or ground vehicle on polar bear cubs, particularly cubs of the year, would likely be the use of energy that otherwise would be needed for survival during a critical time in a polar bear's life, and potentially separation from the female. If the exposure and separation, or both, were brief and singular then the effect would most likely be minimal. Chronic disturbances, extreme reactions, disruption of key behaviors such as feeding or denning, or separation of dependent cubs from the female are more likely to affect health or survival. Polar bears directly interacting with seismic survey activities increase the risk of human-bear encounters, conflicts, and injury or death of polar bears.

Seismic survey activities disturbing female polar bears at maternal den sites are of great concern. Minimizing disturbance while bears are in dens is important because timing of den emergence is significantly related to cub survival (Rode et al. in review). Female polar bears entering dens and females in dens with cubs are more sensitive to noises than other age and sex groups. Disturbance during the early stages of denning may cause a female polar bear to abandon the den site in search of another one. A female polar bear may locate another suitable den site and continue her reproductive process Denning female bears may abandon their dens early in response to stress (Amstrup 1993). Amstrup (1993) reported most polar bears in dens continue to occupy the dens after close approaches by aircraft. Although the snow attenuates some aircraft noise (Blix and Lentfer 1992), repeated overflights may cause polar bears to abandon or depart their dens. Premature den site abandonment after the birth of cubs, or if the female abandons the cubs after they emerge from the den, will result in cub mortality. The potential for disturbance increases once the female emerges from the den. She is more vigilant against perceived threats and easier to disturb.

Though human activities (e.g. industrial, subsistence) are expected to exert a smaller influence on polar bear populations than the loss of sea ice habitat (Atwood et al. 2015; Regehr et al. 2015), the cumulative effects of seismic survey activity and climate change are not well understood. Habitat loss due to changes in Arctic sea ice is the primary cause of decline in polar bear populations, and the decline of sea ice is expected to continue throughout the polar bear's range for the foreseeable future (73 FR 28212, May 15 2008). Under both stabilized and unabated greenhouse gas emissions models, polar bears are expected to have greatly decreased persistence throughout the region (Atwood et al. 2015). The effects of seismic survey activity in the Arctic Refuge 1002 area combined with the effects of climate change could have unknown effects on the Southern Beaufort Sea population of polar bears.

The requirements of incidental take authorizations under the Marine Mammal Protection Act, such as polar bear interaction plans, training, monitoring, and mitigation measures have proven effective at reducing the effects of oil and gas industry activities, including seismic surveys, on polar bears in other areas of northern Alaska. Mitigation measures, including a pre-activity den survey and a 1.6-km (1-mi) operational exclusion zone around known dens help to limit disturbance of denning female polar bears. The current incidental take regulations for oil and gas

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industry activity in the Beaufort Sea and adjacent areas of northern Alaska, published in the Federal Register on August 5, 2016 (81 FR 52276), include a comprehensive analysis of the effects of oil and gas industry activity to polar bears, as well as mitigation, monitoring, and reporting requirements. A detailed description of mitigation measures that limit the effects of seismic surveys on polar bears is available at title 50 of the Code of Federal Regulations, part 18, subpart J, section 18.128.

4.6.10 Bowhead Whale

Bowhead whales would generally only be affected if offshore ice roads are developed or if project infrastructure will be shipped to the project site via barge through the Beaufort and Chukchi Sea. Further analysis, in conjunction with the National Marine Fisheries Service, of project specific plans will be required to analyze possible effects and needed mitigation measures for bowhead whales.

4.6.11 Bearded and Ringed Seals

Similar to bowhead whales, bearded and ringed seals would generally only be affected if offshore ice roads are developed or if project infrastructure will be shipped to the project site via barge through the Beaufort and Chukchi Sea. Further analysis, in conjunction with the National Marine Fisheries Service, of project specific plans will be required to analyze possible effects and needed mitigation measures for these ice seals.

4.7 ALTERNATIVE 2 - SOCIAL ENVIRONMENT

4.7.1 Cultural Resources

Very little cultural resource investigations or inventories have occurred within the 1002 area. Therefore, pursuant to Section 106 of the National Historic Preservation Act, applications for exploration within the 1002 would be required to include sufficient identification and evaluation of cultural resources to ensure that potential adverse effects could be avoided, minimized or mitigated.

4.7.2 Socioeconomic

Impacts to socioeconomic resources would be considered to be significant if an action resulted in a substantial change in the local or regional population; and housing, community general services, or social conditions from the demands of additional population/population shifts. Impacts would also be considered major if there were a substantial change in the local or regional economy, employment, or spending or earning patterns.

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We would expect minor direct and indirect effects in Coldfoot and Wiseman during transport of equipment and personnel. Communities used for staging, likely Prudhoe Bay and/or Kaktovik could expect to see increases in activity during the project. They would see increases in air traffic as equipment and personnel are transshipped to the field. Staging communities would also experience increased activity in hoteling and restaurants to support personnel. Project personnel would be experienced operators from outside the area.

4.7.3 Environmental Justice

A Federal agency is required to identify and address, as appropriate, any disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations (Executive Order 12898, February 11, 1994, amended January 30, 1995, by Executive Order 12948). This includes health risks and other impacts for people who rely principally on fish or wildlife for subsistence. Subsistence activities are a way of obtaining food or natural materials and an important mechanism for maintaining cultural values, family traditions, kinships, sharing practices, and relationships to the land. We do not expect direct or indirect effects to the

4.7.4 Subsistence

The Alaska National Interest Lands Conservation Act (ANILCA) Section 810 requires an evaluation of the effects on subsistence uses for any action to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands. This analysis will be done as part of the final environmental assessment.

4.7.5 Recreation and sport hunting

On-shore seismic surveys in the winter would likely be conducted using mobile seismic camps comprised of ski-mounted trailers that are moved every few days to once a week (BLM 2012). Such activities could displace species being sought by hunters in the area, having an impact on their success if they were unable to locate animals due to the disturbance. Any ice roads, ice pads or snow trails would be temporary. Disturbance lasts only while the survey or camp train is passing through. Lighting at the facilities would be visible to any hunters or recreationalists passing nearby. Persistence of compacted snow or ice structures may be encountered by recreationalists in the spring and are unlikely to be a barrier to recreation by foot or boat travel.

4.7.6 Noise/Soundscape

Noise from vehicles, generators, aircraft and human presence has the potential to affect both humans and wildlife within the vicinity of seismic survey activities. The disturbance distance

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depends on the source and strength of noise, but should be negligible outside the immediate vicinity and is only temporary in nature.

4.7.7 Visual

On-shore seismic surveys on the North Slope are only collected in the winter; therefore, the colors of structures and equipment would be in contrast with the white color of the snow-covered landscape. Lights on equipment would be visible when the equipment is passing through an area. Few travelers would be expected on the Arctic Coastal Plain during the winter, minimizing the numbers of the public that would be affected by localized visual disturbance. Local subsistence users could be traveling on the tundra and observe the seismic activity. The BLM's NPRA EIS (2012) determined that "visual resources could be minimally impacted from the moving camps, aircraft, and human presence. The seismic operations would have a moderate contrast on the landscape character element of line."

4.7.8 Wilderness Values

Wilderness characteristics consist of size, naturalness, wildness, and outstanding opportunities for solitude or primitive and unconfined recreation. They may also include supplemental and symbolic values.

Seismic surveys would be conducted in winter, when there are fewer visitors seeking a wilderness experience come to the Arctic Coastal Plain. Ice roads, ice pads, airstrips, and snow trails would be used for staging winter seismic activities and are temporary in nature. The BLM's NPRA EIS (2012) describes seismic activity as consisting of low-ground-pressure vehicles to minimize potential impacts to the tundra. The typical survey lasts about 100 days. Seismic camps, which generally consist of six camp strings of five ski-mounted trailers, are typically moved every few days to once a week. The presence of this equipment on the Arctic Coastal Plain would have a significant but temporary impact on the wilderness value of the area where seismic surveys are being conducted during the time period of the activity. Impacted wilderness values would include naturalness, outstanding opportunities for solitude or primitive and unconfined recreation, and scenic values resulting from moving camps and associated noise from generators, aircraft, vehicles/trailers and human presence (BLM 2012). Impacts to wilderness values should be negligible once the activity is completed.

Longer lasting impacts to vegetation could result from seismic surveys, which could impact wilderness values of naturalness and scenic values. The color contrast would be minimal from ground view and almost nonexistent from more than a few hundred feet away (BLM 2012). After 8 to 9 years, the evidence of use would be minimal (BLM 2012). Seismic operations by their nature do not follow the same routes every year and the number of miles of survey line run can vary greatly from year to year.

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5 Cumulative Effects

Past, Present or Reasonably Foreseeable Actions

Across the larger landscape of the North Slope (North Slope Borough), the coastal plain from Point Barrow to Point Demarcation (approximately the U.S. and Canadian border) is increasingly developed. This is especially true of the western end with the National Petroleum Reserve-Alaska (NPRA), Prudhoe Bay and adjoining oilfield from Tarn and Kuparuk on the western end to Point Thompson on the eastern end at the western-most boundary of the Arctic Refuge and 1002 area. With the discovery of oil in the late 1960s came the first explorations, developments and finally production. Following the international oil crisis of 1973, the Trans-Alaska Pipeline Systems (TAPS) was build and spanned Alaska from north to south, Prudhoe Bay to Valdez. The TAPS has been moving oil from the oilfield to transports for 40 years and likely to continue for the long term. Lateral pipelines are under construction or proposed to connect with the TAPS in the near future. The TAPS is approved to operate via DOE permit through 2032.

To accommodate development and infrastructure construction, a road was constructed from Fairbanks to Deadhorse to convey personnel and material necessary to build and maintain the oilfields, pipeline and support services and allowed overland access to the North Slope year-round. Initially constructed with private funds and for industrial purposes only, the road was eventually turned over to the State of Alaska to maintain. In addition to still be maintained largely for industrial purposes, it is now a popular for vacationers and sport hunter access (FWS 2010).

The oil and gas industry continue to expand with one of the most recent developments, the Liberty Project on the Alaska outer continental shelf (BOEM 2017) and the NPRA being opened for oil and gas lease sales, as announced in September 2017. The development of the North Slope, including the coastal plain environs is likely to continue into the foreseeable future (Clement and others 2013; NRC 2014, 2015; Alaska Arctic Policy Commission 2015).

Increasing mean annual summer temperatures concurrent with projections for less snow cover during winter months will greatly facilitate development of industry, infrastructure, and public access to the North Slope.

The proposed full build-out oil and gas development scenario footprint projected to be 2,000 acres or 0.13 percent of the total 1.5 million acre 1002 area as described in the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987). This includes 8 large pads for housing storage, drilling with a heavy-duty large airstrip (estimated 82 acres each); 19 medium-size pads for drilling with light-duty airstrip (estimated 37 acres each); and, 26 small pads for drilling (estimated 11 acres each). Also, 8 gravel pits would established, each about 150 acres. Additionally about 275 miles of pipeline corridor (average 100-foot wide) would be developed with associated construction widths reduced to maintenance and operation, estimated at 3,330 acres. Note that the total footprint based on the estimated acreage annotated here is about 6,175

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acres which vastly exceeds the 2,000 acre full build scenario described in the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987) and still does not include road infrastructure, water pumping sites, dock facilities or seawater treatment plants.

It is possible that the differences in the 1987 scenario build-out acreages may be accounted for in the area *directly affected* by oil and gas development, which is estimated at 12,650 acres, or 0.84 percent of the total 1.5 million acre 1002 area (Clough and Christiansen 1987). This would include the actual footprints of scattered pads and all associated construction and maintenance and operation phases of development through production. Improvements in industry technology since development of the 1987 may greatly reduce pad size or consolidation of separate pads into pads facilitating multiple drilling operations. However, pipelines, gravel pits, and other supporting infrastructure footprint will remain constant.

Advances in the oil and gas state-of-the-industry since the late 1970s through late 1980s include: increasing directional drilling capacities; reduced pad sizes; multiple drillings from a single pad; low ground-bearing pressure vehicles; winter site development; buffer zones around critical resources; among other features or best management practices (BMPs), the scope and scape of the exploration, development and production may be expected to be reduced from the initial estimate. All these considerations serve to mitigate direct, indirect and cumulative effects through avoiding, minimizing, rectifying, reducing, and/or compensating the significance of context and intensity for the proposed oil and gas exploration, development, and production activities.

Concurrently, there have been advances in understanding of mitigation technologies and cumulative effects for many Arctic species and habitats. The 29 listed mitigation recommendations of the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987), although now largely dated, provide a basis for updating and augmenting state-of-the-industry advances since (Clough and Christiansen 1987). Specifically, this includes the changes for threatened, endangered and sensitive (TES) species: arctic pennycress (*Noccaea arctica*, formerly *Thlaspi arcticum*), more common than initially determined; the delisting of the American Peregrine Falcon (*Falco peregrimus anatum*) and Arctic Peregrine Falcon (*F.p. tundrius*); and, listing of the polar bear (*Ursus maritimus*), among other considerations.

Cumulative effects including some aspects of climate change, not adequately considered in the 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987) are addressed at least up to the time of publication in *Cumulative Environmental Effects of Oil and Gas Activities on the Alaska's North Slope* (NRC 2003). Additionally, biological resources in relation to oilfield developments including: vegetation and biotic communities; caribou, grizzly bear; polar bear; Arctic fox; Pacific Loon; Tundra Swan; Lesser Snow Goose; Common Eider (Pacific Eider); shorebirds; freshwater invertebrates; freshwater fish; anadromous fish; and benthic marine communities are discussed in *The Natural History of an Arctic Oil Field: Development and the Biota* (Truett and Johnson 2000). Finally, parallels from exploration, development and production of oil and gas on the North Slope may be National Petroleum Reserve – Alaska EIS

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(BLM 2012), which are directly comparable to the coastal plain 1002 area. Additional information relative to wildlife and water resources and the oil and gas industry may be found in a variety of environmental evaluations, principally through NEPA, and other permitting conditions, for example, the recent Liberty Development Project (BOEM 2017).

As examples of advances in state-of-the-industry, oil and gas environmental impacts can be significantly reduced if these activities occur during winter months, when the tundra is frozen and protected by snow cover, and most wildlife are absent (Gliders and Cronin 2000). In summer, the thawing snow and lengthening days bring millions of shorebirds and waterfowl in search of nesting sites along with caribou migrating from wintering locations in the interior. The oil exploration and production process involves multiple stages that may require several years or even decades to complete for each oil field. New technologies involving reduced well spacing, elimination of reserve pits, directional drilling, winter maintenance and construction from ice pads and roads, aerial support, and the use of baseline and ongoing biological monitoring programs to facilitate decision making have reduced the areal impacts of development. The incorporation of baseline biological studies and monitoring of exploration and field development assists in minimizing impacts to high-value habitats and species. In this manner the oil and gas industry reduces encroachment on wildlife habitat and avoids disturbance to wildlife during critical periods (Gliders and Cronin 2000).

As a specific example, denning bears and particularly denning females with young were susceptible to seismic blasting during exploration surveys. Rousing bears, emerging and resettling, required energy reserves that might place individual bears at risk for long-term survival and especially cubs-of-the-year. In part this was because field crews were unaware of denning sites. Bear dens are now more closely monitored due to the threatened status of the polar bear, typically via radio-telemetry. Additionally, traditional blasting has been replaced by vibrators and sensor lines which are far less intrusive to denning bears. As a consequence, the disturbance threat has been greatly reduced through advances in technology (Reynolds and others 1986; McLellan and Shackleton 1988, 1989; Mattson 1990; Blix and Lentfer 1992; Linnell and others 2000).

However, cumulative effects of oil and gas exploration, development and production become problematic for long-term recovery and restoration. Some sites abandoned and rehabilitated to various degrees still show evidence of impacts 40 to 60 years following the activity (Walker and others 1987; Felix and Raynolds 1989; Gliders and Cronin 2000; Kemper and MacDonald 2009; Jorgenson and others 2010; McCarter and others 2017).

As an example of unknowns and uncertainty of climate change in relation to oil and gas exploration, development and production are water resources and their use for industry. While the creation of impoundments for water storage and subsequent use for drilling operations has created habitat and expanded the distribution of such species as the Arctic char (Moulton and George 2000; NRC 2003), it is only with the provision that pumping capacity is capped so that sufficient overwintering habitat is available below the maximum ice depth and large enough to

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contain dissolved oxygen for the longest period of ice coverage. This is important in a landscape where overwintering habitat for fish is limited (Reynolds 1997).

Climate projections for the North Slope indicate not only warming but drying through the summer months and less precipitation through the winter (ACIA 2004). This situation may lead to lower minimum depths in natural lakes or artificial impoundments where entrapments may increase that may ultimately affect fish species populations, invertebrate food resources and possibly trophic cascade effects (Ims and Fuglei 2005). As aquatic invertebrates are a primary food resource for migratory shorebirds, and reduction in this energy-rich, seasonal resource could greatly affect the survival of adults and nesting efforts (Bart and others 2012; Hof and others 2017).

Even using the largest footprint estimated for development from 1987 *Coastal Plain Report/EIS* (Clough and Christiansen 1987), this may be scattered across the landscape of 1.5 million acres of the coastal plain 1002 area. As mean annual summer temperature increase, as they have to the present, migrating caribou will seek out the coolest remaining sites, including patches of snow which are used to avoid or reduce biting insects. Oil and gas developments have been demonstrated to affect movement and foraging behavior previously (Ballard and others 2000; Cameron and others 1979, 1989, 2005; Cronin and others 2000; among others). While behavioral responses may be individually or herd specific, and have not affected the overall health of North Slope caribou to this time, the point is that with future environmental change, a threshold may be crossed at some point in the future where wildlife resource requirements may come in direct conflict with industry.

Fragmentation

A reconsideration of the full build-out of the proposed 1987 action, with allowances for reductions due to advances in technology, is best considered at a landscape scale. The placement of about 60 drill pads and other facilities across the length and depth of the 1.5 million acres 1002 area, amounting to a total consolidated footprint of less than 1 percent, is minimal. However, additive to this is the pipeline connections for each well, which if not a barrier to movement, at a minimum an encumbrance to species movement for specie that depend on landscape mobility such as caribou and bears.

Further, there is operation and maintenance activities along roadways by vehicles, facility activity and human presence, fixed and rotor-wing aircraft traffic conveying personnel and materiel or conducting surveys among widely distributed sites, and other noise or visual distractions (Gliders and Cronin 2000; Pepper and others 2003). These disturbances may affect the quality of habitat immediately adjacent for foraging or reproduction or other life history events thereby reducing value to wildlife. Some species, while tolerant of period disturbances may eventually abandon areas if the disturbance is continuous. Alternatively, some species are less tolerant or intolerant during specific life history events such as nesting or calving. For example, increased human activity and industrial development are also implicated in the declines of many caribou herds throughout the circumpolar region (CAFF 2010). Compounding these

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considerations are changes to resources, some naturally-occurring with or without climate change, and others aggravated through human activities. For example, the siting of pads along the coastal plain places caribou seeking cooler, wind-blown areas for insect relief, and/or polar bear movements along shorelines and river deltas may increase the potential for wildlife-human conflict, not limited to life-threatening situations. All of the above may be collectively embraced in the concept of habitat fragmentation, with the result that despite the widely spaced placement of oil and gas activities, the combination of a suite of human-made feature and activities reduces the value of the overall landscape (Franklin and others 2002; Lindenmayer and Fischer 2006).

When wildlife have no other options available, individuals may remain in poor-quality habitat that may lead to higher predation or mortality or low reproduction rates and these types of habitats situations are primarily modified by human activities (Batten 2004). Further, such situations may occur in relatively pristine areas (Batten 2004). By definition, a source population is that which has sufficient numbers in excess over mortality to maintain itself or increase indefinitely, and a sink population is that which has insufficient excess or net loss (mortality) which over time, may decline to eventual extinction at that location. Sources and sinks are increasingly important considerations in human-altered environments. An ecological trap is a situation in which wildlife settle in seemingly optimal habitat, but conditions were either deceptive or change rapidly to suboptimal, threatening survival if the individual remains at that site, or, upon departure if it was unable to gain sufficient body energy reserves for movement or survival. A factor contributing to population sink conditions are subsidized predators – those predators that are tolerant of human presence and tend to increase in association with humans, specifically gulls (*Larus* spp.), Common Raven, and red fox (Truett et al. 1997; Mitchell and Pihl 2005).

For the 1002 area, even slight alterations to water availability and hydrology, species nutrient uptake, survival rates, increased predation, habitat fragmentation, flock/herd social structure, or behavioral stress could contribute to conditions creating a population sink or ecological trap situation (Van Horne 1983; Pulliam 1988; Pulliam and Danielson 1991; Franklin et al. 2002; Battin 2004; Lindenmayer and Fischer 2006; Beale 2007).

As a cautionary note, monitoring of wildlife and their habitats will certainly occur throughout the lifespan of the project. One of the simplest and cost-effective measures is the counting of individuals for density or abundance. This is typically interpreted as an indicator of habitat quality but caution is recommended as other factors need to be validated to confirm the effects and their significance for the proposed oil and gas exploration, development and production (Van Horne 1983).

Climate Change

As noted in the discussion here, climate changes are difficult address or isolate as a single subject due to its effect on nearly every aspect of Arctic biology, ecology, and physics. Climate change are affecting the Arctic and boreal ecosystems twice as fast as any other region on earth (ACIA 2004; IPCC 2007; NRC 2008; Clement et al. 2013). Using climate projections

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(ALFRESCO – Alaska Frame-based Ecosystem Code sponsored by Scenarios Network for Alaska Planning – SNAP; http://www.snap.uaf.edu), for 33-, 66-, and 99-year futures based upon temperature and precipitation, ecosystems are likely to change through 3 general avenues: (1) no change, i.e., refugia; (2) jump from existing climax to new (and potentially novel) climax community; or (3) progress through a series of successional seral stages to a new (and potentially novel) climax community (SNAP/EWHALE 2012).

More to the point, future climate projections for the North Slope include increasing mean high summer temperature, increasing mean low winter temperatures, less precipitation, and landscape drying (ACIA 2004; Martin and others 2009; SNAP/EWHALE 2012). This may be translated to less water for drilling operations including the risk of over-pumping water resources in a landscape with relatively limited open water despite the appearance of abundance. Such drying will affect wetland functions and values for wildlife resources and water quality. Less water and higher temperatures will place some species at risk for continued occupation of preferred habitats, such as overwintering habitat for freshwater fish, freshwater invertebrates, waterfowl and shorebird production (ACIA 2004; Tulp and Schekkerman 2008).

Additionally, the projected drying may create conditions conducive for invasive species (vascular and nonvascular plants, invertebrates and vertebrates, and pathogens) to pioneer and establish populations (NRC 2002, 2008; Carlson and Shephard 2007; Crowl and others 2008; Bella 2009; Conn and others 2010; Lassuy, D.R., and P.N. Lewis. 2013). As an example the red fox is just now entering the Arctic Refuge which will ultimately compete with native Arctic fox and is a far more plastic and effective predator than native fox or equivalent mesocarnivores. Declines in waterfowl production have been demonstrated in multiple locations where red fox were not previous present. Increasing soil disturbances for development and infrastructure may create pathways for invasive plants and the increased movement of personnel and materiel may create human-subsidized transport of seeds or propagules.

Loss of sea ice will create the potential for increased shore zone erosion during storm or tide surge events. Sea level rise is already causing dislocation and relocation of traditional village sites to higher grounds if available elsewhere in Alaska.

Uncertainty

As expressed by local residents and subsistence resource users during scoping for numerous development projects is the fear of displacement of those resources due to increasing fragmentation of the landscape for traditional lifestyles (North Slope Borough 2009). Equal with this concern is the fear of catastrophic spills that will affect subsistence resources, particularly long-term incidents that may require years (or generations) to restore and rehabilitate to achieve pre-incident conditions (North Slope Borough 2009).

While the oil and gas industry may take every precaution and opportunity to prevent accidental spills or toxic exposure to humans and the environment, the potential risks will remain throughout the lifespan of exploration, development and production, and until the coastal plain is

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restored and rehabilitated. Due to the concentration of some species in the coastal plain, which for a few species may include significant proportions of global populations, an inland or marine spill could have significant consequences (Brown and others 2007; CAFF 2010; Dickson and Smith 2013; among others).

Remoteness and weather are compounding factors for incident assessment, control and cleanup, in addition to the general lack of water as noted previously. The oil and gas industry mitigation and BMPs have evolved based on experience, knowledge and technology. Similarly, understanding and knowledge of biological and water resources has increased over time and with technology. However, foreseeable changes may be acknowledged but uncertainty and lack of knowledge make management of oil and gas exploration, development, and production or natural resources management tenuous in many respects for the long-term (Wilson and others 2013).

Some cumulative effects of exploration, development and production may be avoided through careful monitoring and permit stipulations. Therefore, strict adherence to those stipulations will be critically important. Other effects may be mitigated via collaborative and cooperative effort, particularly through adaptive management that is modified as new information or technology becomes available. Industry and agency monitoring must therefore work together so that evolving approaches may be fully explored to meet the needs of natural and physical resources and industry needs.

6 List of Preparers, Contributors, and Advisors

This EA was developed by U.S. Fish and Wildlife Service (Service) staff. The Service holds final responsibility for all content. Personnel for each contributing party are listed in Table 6-1.

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DRAFT

From: Lor, Socheata
To: Damberg, Doug
Cc: Brady, Stephanie; Ryan Mollnow
Subject: Re: Arctic SOL opinion
Date: Friday, November 17, 2017 2:03:10 PM

Thank you, Stephanie, for getting this from Joe.

Soch

~~~~~~~~~~~~~~~~~~
Socheata Lor, Ph.D.
Deputy Assistant Regional Director - Region 7
National Wildlife Refuge System
U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99503
Office: 907.786.3420
Cell: 907.891.6194
~~~~~~~~~~~~~~~~~~

On Fri, Nov 17, 2017 at 11:59 AM, Damberg, Doug <doug_damberg@fws.gov> wrote:

> yes - RD wanted a copy.
> Thx
>
> Doug Damberg
> Refuge Supervisor, AK North Zone
> U.S. Fish and Wildlife Service
> 1011 E. Tudor Rd.; Anchorage, AK 99503
> Office: (907) 786-3329
> Cell: (907) 947-6302
>
> On Fri, Nov 17, 2017 at 11:58 AM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:
>
> > I never received this but Joe may have it. do you want me to ask him?
> >
> > stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |
> > U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska |
> > 907.306.7448
> >
> > On Fri, Nov 17, 2017 at 11:54 AM, Damberg, Doug <doug_damberg@fws.gov> wrote:
> >
> > > Did we ever get the re-write of the original solicitor's opinion that Joe was doing regarding the 1002 exploration window? If so, can someone please forward to Soch and I? If you don't have it, do you know who might?
> > >
> > > Thanks,
> > >
> > > Doug Damberg
> > > Refuge Supervisor, AK North Zone

U.S. Fish and Wildlife Service
1011 E. Tudor Rd.; Anchorage, AK 99503
Office: (907) 786-3329
Cell: (907) 947-6302

From: Steve Berendzen
To: Arthur, Stephen
Subject: Re: [Update] 1002 EA Review
Date: Friday, November 17, 2017 3:38:42 PM

Thanks - glad u got to comment

Sent from my iPhone

On Nov 17, 2017, at 1:58 PM, Arthur, Stephen <stephen_arthur@fws.gov> wrote:

> I guess I missed that, but I did add my comments to the draft document yesterday.
>
> Steve
>
> Stephen M. Arthur, Ph.D.
> *Supervisory Wildlife Biologist*
> *Arctic National Wildlife Refuge*
> *101 12th Ave., Room 236*
> *Fairbanks, AK 99701*
> *(907)455-1830*
>
> On Fri, Nov 17, 2017 at 9:01 AM, Steve Berendzen <steve_berendzen@fws.gov> wrote:
> > Steve, the call went well yesterday, & I can give you a quick update if you want, or we could wait until Monday when I'll download with Joanna if that works for you
> >
> > Sent from my iPhone
> >
> > On Nov 17, 2017, at 12:12 PM, Arthur, Stephen <stephen_arthur@fws.gov> wrote:
> >
> > > Thanks, I'll plan to call for this.
> > >
> > > Steve
> > >
> > > Stephen M. Arthur, Ph.D.
> > > *Supervisory Wildlife Biologist*
> > > *Arctic National Wildlife Refuge*
> > > *101 12th Ave., Room 236*
> > > *Fairbanks, AK 99701*
> > > *(907)455-1830*
> > >
> > > On Thu, Nov 16, 2017 at 10:19 AM, Steve Berendzen <steve_berendzen@fws.gov> wrote:
> > > > FYI - if you want to join
> > > >
> > > > Sent from my iPhone
> > > >
> > > > Begin forwarded message:

From: tracy_fischbach@fws.gov
Date: November 16, 2017 at 1:55:10 PM EST
To: joanna_fox@fws.gov, christopher_putnam@fws.gov, edward_decleva@fws.gov, tracy_fischbach@fws.gov, socheata_lor@fws.gov, ryan_r_wilson@fws.gov, stephanie_brady@fws.gov, steve_berendzen@fws.gov, peter_wikoff@fws.gov, doug_damberg@fws.gov, nicole_gustine@fws.gov, sheila_dufford@fws.gov, brian_mccaffery@fws.gov, jenifer_kohout@fws.gov, john_w_martin@fws.gov, john_trawicki@fws.gov, margaret_perdue@fws.gov, wendy_loya@fws.gov
Subject: [Update] 1002 EA Review
Reply-To: tracy_fischbach@fws.gov

Hi all,

If you want to join us via conference call line, the number is b5 - CIP [redacted] See you all there! -Tracy

1002 EA Review

Hi all,

For those outside Refuges, you're attendance is not required, but if you are still able and willing to help, you are very welcome. We will go through the document relatively quickly in order to determine where significant gaps remain and what to do about them. We do know we are allowed to say, "Additional literature review is needed to fully consider the consequences and cumulative effects of exploration activities on XXXXX resource." I will have the Vidyo on. If you need a conference call line, please let me know.

Thanks!

When	Thu Nov 16, 2017 11am – 12pm Alaska Time
Where	FWS-FW7 NWRS Conference Room/Regional Office (map)

Video call	b5 - CIP [redacted]
Who	• tracy_fischbach@fws.gov - organizer • stephanie_brady@fws.gov • john_trawicki@fws.gov • christopher_putnam@fws.gov • doug_damberg@fws.gov • socheata_lor@fws.gov • nicole_gustine@fws.gov • edward_decleva@fws.gov • brian_mccaffery@fws.gov • ryan_r_wilson@fws.gov • jenifer_kohout@fws.gov • wendy_loya@fws.gov • peter_wikoff@fws.gov • margaret_perdue@fws.gov • john_w_martin@fws.gov • steve_berendzen@fws.gov • joanna_fox@fws.gov

From:	Brady, Stephanie
To:	Joseph Darnell
Subject:	Fwd: Arctic Exploration proposed rule
Date:	Friday, November 17, 2017 4:37:38 PM
Attachments:	Arctic NWR permit application NPRM 10.12.17_AK edits redline (1).pdf ANWR - 2 Drft Reg.pdf

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the first document is a pdf of our track changes of the proposed rule that we came up with - I meant to cc: you on this -

stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |
U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska |
907.306.7448

---------- Forwarded message ----------
From: **Brady, Stephanie** <stephanie_brady@fws.gov>
Date: Fri, Nov 17, 2017 at 9:34 AM
Subject: Arctic Exploration proposed rule
To: Michael Gieryic <mike.gieryic@sol.doi.gov>
Cc: Tracy Fischbach <tracy_fischbach@fws.gov>

Hi there Mike - attached to this email is the Arctic exploration proposed rule - for context as you think about the Arctic EA.

I have attached the copy going through surname in headquarters as well as our edits in track changes dated 10.12. From what I understand, our edits were not accepted - but I wanted you to see them anyway.

Thanks. Stephanie

stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy |
U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska |
907.306.7448

Billing Code: 4333-15

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 37

[Docket No. FWS–R7–NWRS–2017–0072; FF07R00000 1XX FXRS12610700000]

RIN 1018–BC92

Coastal Plain of the Arctic National Wildlife Refuge, Alaska; Geological and Geophysical Exploration Plans; Application Requirements

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule; availability of draft environmental assessment.

SUMMARY: We, the U.S. Fish and Wildlife Service, propose to amend the regulations regarding the dates when an application may be submitted for a permit for a geological and geophysical exploration plan on the Arctic National Wildlife Refuge lands described in the Alaska National Interest Lands Conservation Act. This action is an update to our regulations to

Comment [BS1]: Or just delete this sentence

allow opportunities for applications to conduct seismic exploration. Further, the ability to collect new information on oil and gas resources will better inform public policy decisions. We are taking this action in support of Executive Order 13783, Promoting Energy Independence and Economic Growth.

DATES: Electronic comments on this proposed rule via http://www.regulations.gov must be submitted by 11:59 p m. Eastern time on [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]. Comments submitted by mail must be postmarked no later than [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

ADDRESSES: *Document availability:* The draft environmental assessment prepared in support of this proposed rule may be found at http://www regulations.gov in Docket No. FWS–R7–NWRS–2017–0072. Information and supporting documentation that we receive in response to this proposed rule will be available to you for review at *http://www.regulations.gov*, or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, Alaska Regional Office, 1011 E. Tudor Rd., Mail Stop 211, Anchorage, AK 99503; telephone (907) 306–7448.

Comment submission: You may submit comments on this proposed rule or the draft environmental assessment by one of the following methods:

(1) Electronically: Go to the Federal eRulemaking Portal: *http://www.regulations.gov*. Search for FWS–R7–NWRS–2017–0072, which is the docket number for this

Comment [LS2]: Too many words Get to the point

Comment [BS3]: This makes is seem as tho this was just a regulatory oversight – not changed by the Departments view of the law

Comment [BS4]: Further in the background it is stated that the regs are being re-visited for the ability to collect new scientific information about the Coastal Plain, including its oil and gas resources, will better inform public policy decisions on use and management of the natural resources of the Plain

Plus the current regs confine the dates by which an applicant can apply to conduct seismic exploration

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rulemaking. You may submit a comment by clicking on "Comment Now!" Please ensure that you have found the correct rulemaking before submitting your comment.

(2) By hard copy: Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R7–NWRS–2017–0072, U.S. Fish and Wildlife Service, MS: BPHC, 5275 Leesburg Pike, Falls Church, VA 22041–3803.

We will not accept email or faxes. We will post all comments on *http://www.regulations.gov*. This generally means that we will post any personal information you provide us. For additional information, see **Request for Comments**, below.

FOR FURTHER INFORMATION CONTACT: Stephanie Brady, National Wildlife Refuge System, Alaska Regional Office, 1011 E. Tudor Rd., Mail Stop 211, Anchorage, AK 99503; telephone (907) 306–7448; fax (907) 786–3976; stephanie_brady@fws.gov.

SUPPLEMENTARY INFORMATION:

Background

The Arctic National Wildlife Refuge (hereafter, Arctic Refuge), located in northeastern Alaska, is administered by the U.S. Fish and Wildlife Service (Service). The Arctic Refuge was first established in 1960 as the Arctic National Wildlife Range through Public Land Order 2214, for the purpose of preserving unique wildlife, wilderness, and recreational values. The original 8.9-million-acre Range was withdrawn from all forms of appropriation under public land laws, including mining, but not from mineral leasing.

The Arctic Refuge was expanded to 19 million acres with the enactment of the Alaska National Interest Lands Conservation Act (ANILCA) (Public Law 96–487; 16 U.S.C. 410hh–

3233, 43 U.S.C. 1602–1784). Section 303(2) of Public Law 96–487 set forth that the purposes for which the Arctic Refuge was established and should be managed include:

(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including participation in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge.

Under ANILCA, the Service was to provide for a comprehensive and continuing inventory and assessment of the fish and wildlife resources of the coastal plain of the Arctic Refuge. This effort was to include an analysis of the impacts of oil and gas exploration, development, and production, and the Service was directed to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources (16 U.S.C. 1342). The "coastal plain" was defined in section 1002 of Public Law 96–487 by a map entitled "Arctic National Wildlife Refuge," dated August 1980 (Figure 1). Biological studies and geological exploration coordinated by the Service, U.S. Geological Survey (USGS), and Bureau of Land Management (BLM) were initiated shortly after enactment of the Act. In April 1982, the Service completed the initial report summarizing

Comment [LS5]: "to provide for" sounds awkward "to conduct" may be better?

known information about fish and wildlife and their habitats occurring on the Arctic Refuge coastal plain (hereafter referred to as “the section 1002 area”).

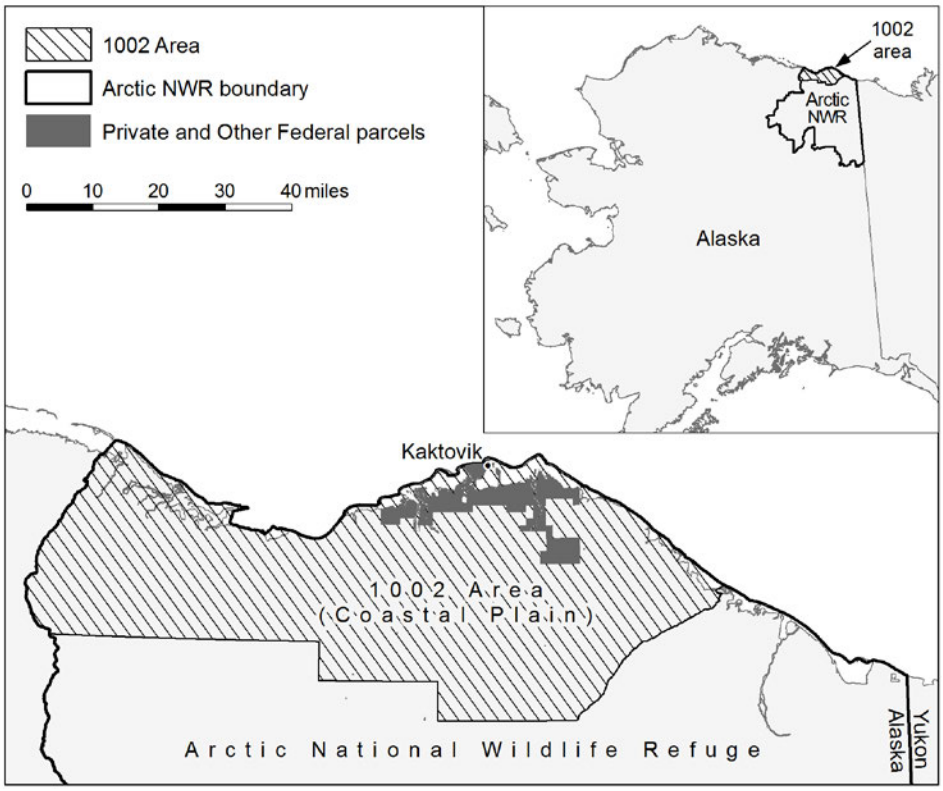


Figure 1. Arctic National Wildlife Refuge showing the coastal plain and section 1002 area.

Section 1002(d) of Public law 96-487 directed the Secretary of the Interior to establish guidelines for exploration through regulations within 2 years after enactment of the Act. In 1982, the Service published a proposed rule to establish guidelines for carrying out exploratory activities on the coastal plain of the Arctic Refuge (47 FR 41060, September 16, 1982). Publication of the proposed regulations had been delayed as a result of the litigation over the decision in March 1981 to transfer responsibility for developing the guidelines from the Service

to the USGS. *See Trustees for Alaska* v. *Watt*, 524 F. Supp. 1303 (D. Alaska 1981), *aff'd per curium*, 690 F.2d 1279 (9th Cir. 1982). The final rule with the regulations along with the "Record of Decision for Oil and Gas Exploration Within the Coastal Plain of the Arctic National Wildlife Refuge, Alaska" (ROD) was published April 19, 1983 (48 FR 16858) with the regulations being codified as 50 CFR part 37. The ROD was based upon the Final Environmental Impact Statement, which had been filed with the Environmental Protection Agency on February 23, 1983, and made available to the public on March 4, 1983. The guidelines were subsequently revised to change the deadlines for submission of exploration plans to the Department for consideration. *See* 49 FR 7569 (March 1, 1984).

Plans were submitted to the Service in accordance with the regulations with plans for summer access by helicopter during 1983–85 being then approved. *See* U.S. Dept. of the Interior, Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment: Report and Recommendation to the Congress of the United States and Final Legislative Environmental Impact Statement, Vol. 1 at 3 (April 1987) ("Section 1002 Report"). The summer exploratory activities were limited to field observations, surface measurements, mapping, and collection of rock samples. One helicopter-supported gravity survey permit was issued for the summer of 1983. Winter exploration plans involving mechanized surface transportation to conduct seismic surveys were approved for the winters of 1983–84 and 1984–85(Section 1002 Report). One permittee, representing an industry group of over 20 companies, was issued a permit to collect the seismic data. More than 1,300 line miles of seismic data were acquired as a result of the winter exploratory activities during the two winters(Section 1002 Report). No exploratory activities of this type have occurred in the Arctic Refuge Coastal Plain since 1985.

The Section 1002 Report was submitted to Congress in April 1987. The report recommended that the entire Arctic Refuge coastal plain be made available for oil and gas leasing(Section 1002(h) Report). The submittal was delayed 7 months past the statutory deadline by a court ruling requiring the Secretary to seek public participation in preparation of the legislative environmental impact statement accompanying the report. *See Trustees for Alaska* v. *Hodel*, 806 F.2d 1378 (9th Cir. 1986).

The Service has historically interpreted the authorization to conduct exploratory activities under section 1002 to have expired with the submittal of the section 1002(h) report to Congress. The legal underpinnings for this position were set out in a January 18, 2001, memorandum to Secretary Bruce Babbitt from Solicitor John Leshy (2001 Memorandum) responding to a letter from Congressman Edward Markey asking what oil and gas related activities are currently allowed or prohibited on the coastal plain of the Arctic Refuge. While opining that the authority expired with submittal of the April 1987 report to Congress, the 2001 Memorandum noted that there were two possible answers to the question because of the wording of section 1002.

The legal interpretation, that the authority to authorize further exploration activities under section 1002 expired in 1987, was tested when the State of Alaska sued the Department of the Interior in 2015. *State of Alaska* v. *Sally Jewell, et al.*, No. 3:14-cv-00048-SLG (D. Alaska). In that suit, the State of Alaska appealed the Service denial of the State's permit request to conduct exploratory work on the Coastal Plain arguing that there was no cutoff of authority in section 1002. In affirming the Service's rejection of the application based upon the interpretation of section 1002 articulated in the 2001 Memorandum, the Court applied the two-step process established by the U.S. Supreme Court in *Chevron U.S.A.* v. *Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984). Applying the first step, the Court concluded that section 1002 was

Comment [BS6]: We do not interpret – SOL interpret Can this be re-worded?

Comment [LS7]: Should these words be capped?

ambiguous as to whether additional exploration work was authorized under section 1002, a position advanced by the United States in its briefing. The Court then considered the Service's interpretation of section 1002 and concluded it was a permissible construction. In so finding, the court noted that the Service's construction is not the only permissible interpretation or necessarily the Court's.

It is well established that a department is not bound by prior interpretations of statutes and that it may make changes. Prior interpretations of ANILCA section 1002 focused on the deadline for a report to Congress

Comment [LS8]: Again, this is capped but not previously

This continuing authority recognizes that new and better technology is likely to be developed that can be put to use to expand human knowledge and understanding of the many natural resources of the Coastal Plain. The ability to collect new scientific information about the Coastal Plain, including its oil and gas resources, will better inform public policy decisions on use and management of the natural resources of the Coastal Plain. Without the authority to do further exploration work, the scientific knowledge about the subsurface resources of the Coastal Plain will be limited to what was learned over 30 years ago. Decisions on management and best use of all of the resources on the Coastal Plain will therefore not be informed by the latest and best scientific information.

Comment [LS9]: Capped? Should it be Coastal Plain?

Comment [BS10]: This applies to the above section regarding why we are doing this

The long-term national defense and security of the nation is dependent upon reliable and secure sources of domestic energy resources. President Trump in his March 28, 2017, Executive Order, Promoting Energy Independence and Economic Growth, placed specific emphasis on the need to develop energy resources when he stated:

Section 1 Policy. (a) It is in the national interest to promote clean and safe development of the Nation's vast energy resources, while at the same time avoiding regulatory burdens that

unnecessarily encumber energy production, constrain economic growth, and prevent job creation. Moreover, the prudent development of these natural resources is essential to ensuring the Nation's geopolitical security.

Central to meeting the goal of developing the country's natural resources in a responsible manner to ensure the Nation's geopolitical security is having and considering the best and latest information about the oil and gas resources of the Coastal Plain that science and technology can provide. There have been many advances in geophysical sciences since the 1980's that can today be utilized to further advance the level of knowledge about the oil and gas resources of the Coastal Plain beyond what was learned from exploration work done over 30 years ago. It would be imprudent to make important decisions for development and implementation of plans for securing oil and gas resources and maintaining energy infrastructure such as the Trans Alaska Pipeline System over the long term without securing and utilizing the knowledge that can be gleaned from new modern exploration work on the Coastal Plain. In addition to informing long-term energy security planning, the availability of this new data will further the Service's resource management of the Coastal Plain.

Proposed Changes

In this document, we propose to change the regulations found at 50 CFR part 37 by removing language that restricts the timeframe in which a special use permit to conduct exploratory activities may be issued.

Request for Comments

You may submit information concerning this proposed rule or the draft environmental assessment by one of the methods listed in **ADDRESSES**. We will not accept comments sent by e-mail or fax or to an address not listed in **ADDRESSES**.

If you submit a comment via *http://www.regulations.gov*, your entire submission — including any personal identifying information, such as your address, phone number, or e-mail address—will be posted on the Web site. If your submission is made via a hardcopy comment that includes personal identifying information, you may request at the top of your document that we withhold this personal identifying information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on *http://www.regulations.gov*.

Endangered Species Act Consideration

Section 7 of the Endangered Species Act (16 U.S.C. 1536) requires the Secretary of the Interior to "review other programs administered by him (or her) and utilize such programs in furtherance of the purposes of the Act" and to "insure that any action authorized, funded, or carried out * * * is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat . . . ." Prior to issuance of these regulations, we would consult under section 7 of the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 et seq.), to ensure that any applications for exploration in the section 1002 area of the Arctic Refuge are not likely to jeopardize the continued existence of any species designated as endangered or threatened, or modify or destroy its critical habitat, and that the regulations are consistent with conservation programs for those species. Consultation under section 7 of the Act for the regulations may cause us to change these proposed regulations. Our biological opinion resulting from the section 7 consultation will be a

public document available from the person listed under **FOR FURTHER INFORMATION CONTACT** or via *http://www.regulations.gov* in Docket No. FWS–R7–NWRS–2017–0072.

Required Determinations

Executive Order 13771—Reducing Regulation and Controlling Regulatory Costs

This proposed rule is considered to be an Executive Order (E.O.) 13771 deregulatory action (82 FR 9339, February 3, 2017) because it would amend regulations that currently restrict the dates when a permit application for an exploration plan for the Arctic Refuge would be allowed.

Regulatory Planning and Review (Executive Order 12866 and 13563)

The Office of Management and Budget (OMB) has determined that this rule is not significant. OMB bases its determination upon the following four criteria:

(a) Whether the rule will have an annual effect of $100 million or more on the economy or adversely affect an economic sector, productivity, jobs, the environment, or other units of the government.

(b) Whether the rule will create inconsistencies with other agencies' actions.

(c) Whether the rule will materially affect entitlements, grants, user fees, loan programs, or the rights and obligations of their recipients.

(d) Whether the rule raises novel legal or policy issues.

The proposed rule would remove the regulations that restrict the dates when a permit application may be submitted for a geophysical exploration plan on the section 1002 area in the Arctic Refuge. Thus, this rule would open the process to accept oil exploration applications for

the section 1002 area. Under the proposed rule as an administrative action, potential costs would be limited to application costs incurred by companies choosing to submit applications and by the Service to process the applications.

This analysis is limited in scope and addresses only the administrative action by the Service to accept and review new exploration plans in the Arctic Refuge. Therefore, this analysis does not evaluate costs and benefits related to the issuance of special use permits for specific exploration plans as the details of those plans are currently unknown, and the analysis would be speculative in regards to methods, location, and timing of the exploration activities. Furthermore, the review and approval process for a special use permit in the Arctic Refuge must undergo a separate process under the National Environmental Policy Act (NEPA). ~~Geological exploration and assessment undertakings under the NEPA process could include a number of activities such as seismic testing, aerial surveying, road construction, and more.~~ These exploratory activities have potential impacts including, but not limited to: polar bear viewing tourism, subsistence hunting (especially caribou) by residents, and cultural use by Alaska Natives. Furthermore, "available information indicates that any ANWR oil would be scattered among multiple smaller fields rather than concentrated in a single large field, which would make development more expensive and potentially expand the area in which any environmental effects might occur" (Congressional Research Service 2015).

Measures such as Secretarial Order No. 3352 have occurred to move forward toward energy development in the Arctic Refuge (Department of the Interior May 2017). However, Section 1003 of ANILCA states "production of oil and gas from the Arctic National Wildlife Refuge is prohibited and no leasing or other development leading to production of oil and gas

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Comment [BS11]: We are speculating what activities would be proposed – we think this should be removed

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Comment [LS12]: Should we put (Arctic Refuge) behind this? First time ANWR is used in this doc

from the [Refuge] shall be undertaken until authorized by an act of Congress." Therefore, this analysis does not estimate the potential costs and benefits of oil drilling and extraction.

With this proposed rule, we solicit public input on potential economic impacts and the number of businesses affected to help quantify costs and benefits. Please see the **Request for Comments** section at the end of **SUPPLEMENTARY INFORMATION** for further information about submitting comments.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions) (5 U.S.C. 601 et seq.). However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule would not have a significant economic impact on a substantial number of small entities. Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for "significant impact" and a threshold for a "substantial number of small entities." See 5 U.S.C. 605(b). SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule would not have a significant economic impact on a substantial number of small entities.

The U.S. Small Business Administration (SBA) defines a small business as one with annual revenue or employment that meets or is below an established size standard. To assess the effects of the proposed rule on small entities, we focus on businesses that operate and/or develop

oil gas field properties (North American Industry Classification System (NAICS) 211) that have fewer than 500 employees. According to the U.S. Census Bureau, there are 8,064 businesses under NAICS 211, of which over 99 percent qualify as small businesses (2012). Thus, we expect that most entities that may apply for a special use permit would be considered small as defined by the SBA.

Under the proposed rule, individual businesses would have the opportunity to submit applications for a geological and geophysical exploration plan on the section 1002 area in the Arctic Refuge. Although estimating the number of potential future applicants would be speculative, the last seismic survey (completed in 1985) was conducted by 27 companies under 1 permit. If 27 individual companies applied for separate special use permits under the proposed rule, this would represent less than 1 percent of small businesses.

We therefore certify that this proposed rule would not have a significant economic effect on a substantial number of small entities as defined under the Regulatory Flexibility Act (5 U.S.C. 601 et seq.). A Regulatory Flexibility Analysis is not required. Accordingly, a Small Entity Compliance Guide is not required.

Small Business Regulatory Enforcement Fairness Act

This proposed rule is not a major rule under 5 U.S.C. 804(2), the Small Business Regulatory Enforcement Fairness Act. This rule:

a. Would not have an annual effect on the economy of $100 million or more.

b. Would not cause a major increase in costs or prices for consumers; individual industries; Federal, State, tribal, or local government agencies; or geographic regions.

c. Would not have significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of U.S.-based enterprises to compete with foreign-based enterprises.

Unfunded Mandates Reform Act

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.), we have determined the following:

a. This rule would not ‘‘significantly or uniquely’’ affect small governments. A small government agency plan is not required. Actions under the proposed rule would not affect small government activities in any significant way.

b. This rule would not produce a Federal mandate of $100 million or greater in any year. It would not be a ‘‘significant regulatory action’’ under the Unfunded Mandates Reform Act.

Takings (Executive Order 12630)

In accordance with E.O. 12630, this proposed rule would not have significant takings implications. A takings implication assessment is not required. This proposed rule does not contain a provision for taking of private property.

Federalism (Executive Order 13132)

This proposed rule does not have sufficient Federalism effects to warrant preparation of a federalism summary impact assessment under E.O. 13132. It would not interfere with the ability of States to manage themselves or their funds. This proposed rule, if adopted, would affect the

geological exploration of the coastal plain of the Arctic Refuge, which is managed by the Service in Alaska, and would not have a substantial direct effect on State or local governments in Alaska.

Civil Justice Reform (Executive Order 12988)

In accordance with E.O. 12988, the Office of the Solicitor has determined that this proposed rule does not unduly burden the judicial system and meets the requirements of sections 3(a) and 3(b)(2) of E.O. 12988.

Paperwork Reduction Act

This rule does not contain any new collection of information that require approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq*.). OMB has previously approved the information collection requirements associated with Service Special Use Permit Applications (FWS Form 3–2469) and assigned OMB Control Number 1018–0162 (expires December 31, 2019). An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act

Our draft environmental assessment is part of the administrative record for this proposed rule. In accordance with the National Environmental Policy Act (NEPA, 42 U.S.C. 4321 et seq.) and part 516 of the U.S. Department of the Interior Manual (516 DM), the Service proposes amending the existing language in 50 CFR Part 37—Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska, related to exploration plans [50 CFR

37.21(b) and (c)], to remove the date restrictions now in place for those plans. Our draft environmental assessment sets forth that the proposed action to change the regulatory language as described in the rule portion of this document will have no significant impacts on the environment.

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we will evaluate the potential effects on federally recognized Alaska Native tribal governments and Alaska Native corporations through a 810 analysis. . This rule would not interfere with the ability of Tribes to manage themselves or their funds or to regulate exploration activities on Tribal lands. However, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis, and we are seeking their input to evaluate this proposed rule. In addition, we have evaluated this proposed rule under Alaska Native Claims Settlement Act corporation policies. We will consult with Alaska Native tribes and Alaska Native corporations regarding the proposed changes in this rule for the Arctic Refuge.

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Comment [BS13]: We do not like the wording of this – we have not evaluated the potential effects – we have not completed a 810 analysis -

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Comment [BS14]: We have not consulted on this rulemaking -

Energy Supply, Distribution, or Use (Executive Order 13211)

Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking actions that could have significant adverse effects on energy supply, distribution, or use. We believe that the rule could have positive effects on energy supplies, distribution, or use.

Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.

Clarity of This Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

(a) Be logically organized;

(b) Use the active voice to address readers directly;

(c) Use common, everyday words and clear language rather than jargon;

(d) Be divided into short sections and sentences; and

(e) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in **ADDRESSES**, above. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that you find unclear, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

List of Subjects in 50 CFR Part 37

Administrative practice and procedure, Alaska, Environmental protection, Historic preservation, Oil and gas exploration, Penalties, Reporting and recordkeeping requirements, Surety bonds, and Wildlife refuges.

Proposed Regulation Promulgation

Accordingly, we propose to amend part 37 of title 50 of the Code of Federal Regulations as set forth below:

PART 37—GEOLOGICAL AND GEOPHYSICAL EXPLORATION OF THE COASTAL PLAIN, ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

1. The authority citation for part 37 is revised to read as follows:

AUTHORITY: 5 U.S.C. 301; 16 U.S.C. 715s and 3142; and 31 U.S.C. 9701.

2. Amend § 37.21 by revising paragraphs (b) and (c) to read as follows:

§ 37.21 Application requirements.

*** * * * ***

(b) Any person wanting to conduct exploratory activities may apply for a special use permit by submitting for review and processing one or more written exploration plans, in triplicate, to the Regional Director, Region 7, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503.

(c) In addition to containing the information required in paragraph (d) of this section, any exploration plan submitted shall describe the applicant's plan for carrying out an integrated program of exploratory activities in such a manner as will satisfy the objective and limitations stated in § 37.1. If an applicant submits an exploration plan in any given year, with the intention of submitting another exploration plan the following year, the applicant shall describe in its initial plan how its future exploratory activities will be integrated with those proposed under its initial plan. Each exploration plan submitted must be published and be the subject of a public hearing in accordance with requirements of § 37.22(b).

* * * * *

§ 37.52 [Amended]

3. Amend § 37.52 by:

a. In the first sentence, removing the period and adding in its place a comma and the words “for 3 years from the date the permittee submits the data and information to the Regional Director pursuant to § 37.53.”; and

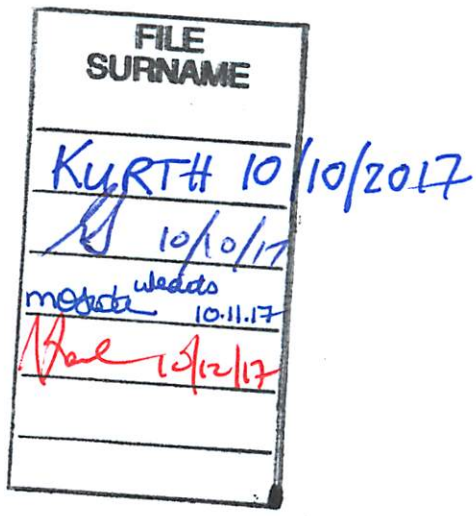
b. In the second sentence, removing the words “Until September 2, 1989, the” and adding in their place the word “The”.

Dated: _____.

_____

Principal Deputy Assistant Secretary for Fish and Wildlife and Parks.

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Billing Code: 4333-15

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 37

[Docket No. FWS–R7–NWRS–2017–0072; FF07R00000 1XX FXRS12610700000]

RIN 1018–BC92

Coastal Plain of the Arctic National Wildlife Refuge, Alaska; Geological and Geophysical Exploration Plans; Application Requirements

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule; availability of draft environmental assessment.

SUMMARY: We, the U.S. Fish and Wildlife Service, propose to amend the regulations regarding the dates when an application may be submitted for a permit for a geological and geophysical exploration plan on the Arctic National Wildlife Refuge lands described in the Alaska National Interest Lands Conservation Act. This action is a necessary update to our

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regulations as the dates in the regulations are long past. We are taking this action in support of Executive Order 13783, Promoting Energy Independence and Economic Growth.

DATES: Electronic comments on this proposed rule via http://www.regulations.gov must be submitted by 11:59 p.m. Eastern time on [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]. Comments submitted by mail must be postmarked no later than [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

ADDRESSES: *Document availability:* The draft environmental assessment prepared in support of this proposed rule may be found at http://www.regulations.gov in Docket No. FWS–R7–NWRS–2017–0072. Information and supporting documentation that we receive in response to this proposed rule will be available to you for review at *http://www.regulations.gov*, or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, Alaska Regional Office, 1011 E. Tudor Rd., Mail Stop 211, Anchorage, AK 99503; telephone (907) 306–7448.

Comment submission: You may submit comments on this proposed rule or the draft environmental assessment by one of the following methods:

(1) Electronically: Go to the Federal eRulemaking Portal: *http://www.regulations.gov*. Search for FWS–R7–NWRS–2017–0072, which is the docket number for this rulemaking. You may submit a comment by clicking on "Comment Now!" Please ensure that you have found the correct rulemaking before submitting your comment.

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(2) By hard copy: Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R7–NWRS–2017–0072, U.S. Fish and Wildlife Service, MS: BPHC, 5275 Leesburg Pike, Falls Church, VA 22041–3803.

We will not accept email or faxes. We will post all comments on *http://www.regulations.gov*. This generally means that we will post any personal information you provide us. For additional information, see **Request for Comments**, below.

FOR FURTHER INFORMATION CONTACT: Stephanie Brady, National Wildlife Refuge System, Alaska Regional Office, 1011 E. Tudor Rd., Mail Stop 211, Anchorage, AK 99503; telephone (907) 306–7448; fax (907) 786–3976; stephanie_brady@fws.gov.

SUPPLEMENTARY INFORMATION:

Background

The Arctic National Wildlife Refuge (hereafter, Arctic Refuge), located in northeastern Alaska, is administered by the U.S. Fish and Wildlife Service (Service). The Arctic Refuge was first established in 1960 as the Arctic National Wildlife Range through Public Land Order 2214, for the purpose of preserving unique wildlife, wilderness, and recreational values. The original 8.9-million-acre Range was withdrawn from all forms of appropriation under public land laws, including mining, but not from mineral leasing.

The Arctic Refuge was expanded to 19 million acres with the enactment of the Alaska National Interest Lands Conservation Act (ANILCA) (Public Law 96–487; 16 U.S.C. 410hh–3233, 43 U.S.C. 1602–1784). Section 303(2) of Public Law 96–487 set forth that the purposes for which the Arctic Refuge was established and should be managed include:

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(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including participation in coordinated ecological studies and management of this herd and the Western Arctic caribou herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge.

Under ANILCA, the Service was to provide for a comprehensive and continuing inventory and assessment of the fish and wildlife resources of the coastal plain of the Arctic National Wildlife Refuge. This effort was to include an analysis of the impacts of oil and gas exploration, development, and production, and the Service was directed to authorize exploratory activity within the coastal plain in a manner that avoids significant adverse effects on the fish and wildlife and other resources (16 U.S.C. 1342). The "coastal plain" was defined in section 1002 of Public Law 96–487 by a map entitled "Arctic National Wildlife Refuge," dated August 1980 (Figure 1). Biological studies and geological exploration coordinated by the Service, U.S. Geological Survey (USGS), and Bureau of Land Management (BLM) were initiated shortly after enactment of the Act. In April 1982, the Service completed the initial report summarizing known information about fish and wildlife and their habitats occurring on the Arctic Refuge coastal plain (hereafter referred to as "the section 1002 area").

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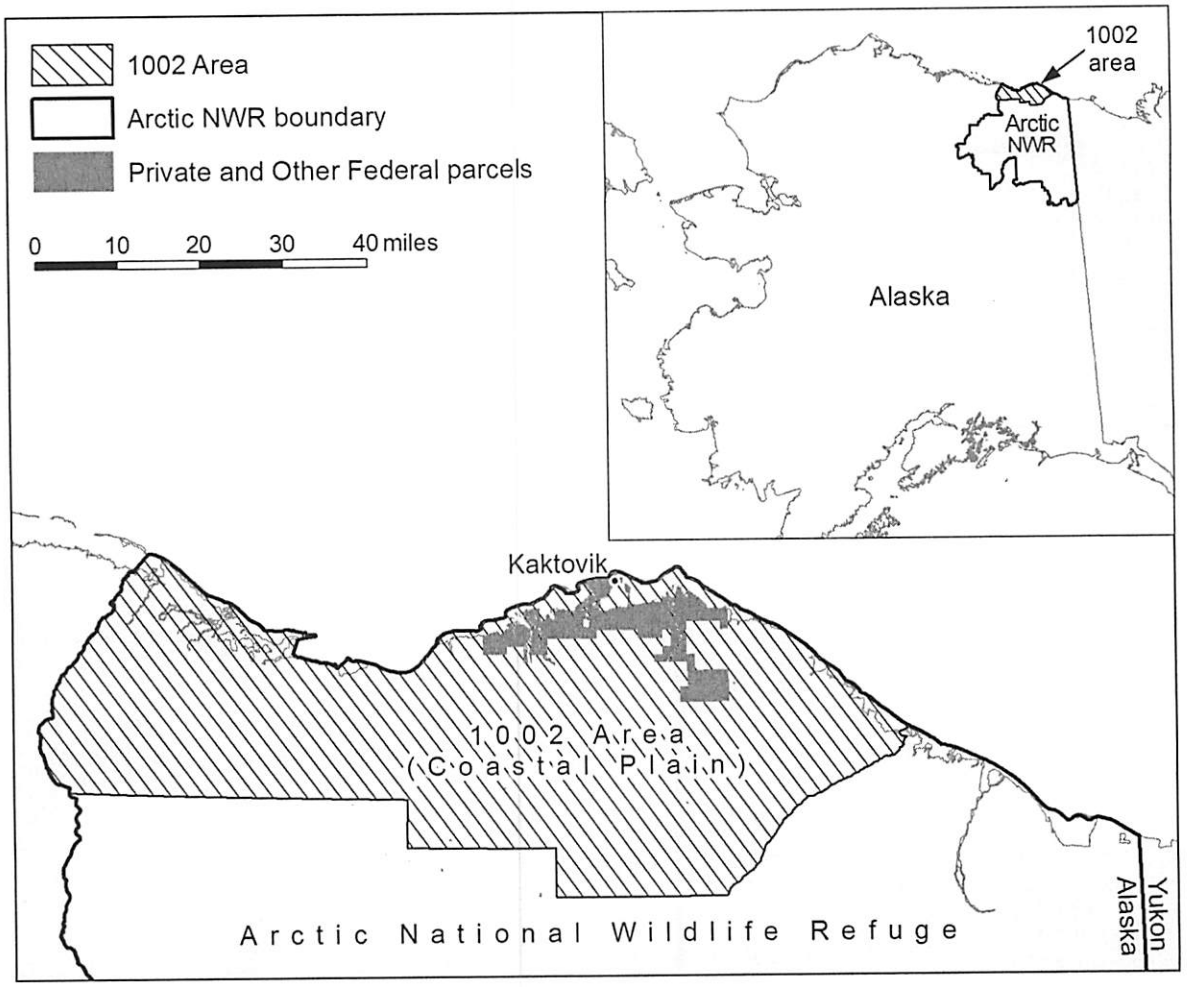


Figure 1. Arctic National Wildlife Refuge showing the coastal plain and section 1002 area.

Section 1002(d) of Public law 96–487 directed the Secretary of the Interior to establish guidelines for exploration through regulations within 2 years after enactment of the Act. In 1982, the Service published a proposed rule to establish guidelines for carrying out exploratory activities on the coastal plain of the Arctic Refuge (47 FR 41060, September 16, 1982). Publication of the proposed regulations had been delayed as a result of the litigation over the decision in March 1981 to transfer responsibility for developing the guidelines from the Service to USGS. *See Trustees for Alaska* v. *Watt*, 524 F. Supp. 1303 (D. Alaska 1981), *aff'd per curium*, 690 F.2d 1279 (9th Cir. 1982). The final rule with the regulations along with the

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"Record of Decision for Oil and Gas Exploration Within the Coastal Plain of the Arctic National Wildlife Refuge, Alaska" (ROD) was published April 19, 1983 (48 FR 16858) with the regulations being codified as 50 CFR part 37. The ROD was based upon the Final Environmental Impact Statement, which had been filed with the Environmental Protection Agency on February 23, 1983, and made available to the public on March 4, 1983. The guidelines were subsequently revised to change the deadlines for submission of exploration plans to the Department for consideration. *See* 49 FR 7569 (March 1, 1984).

Plans were submitted to the Service in accordance with the regulations with plans for summer access by helicopter during 1983–85 being then approved. *See* U.S. Dept. of the Interior, Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment: Report and Recommendation to the Congress of the United States and Final Legislative Environmental Impact Statement, Vol. 1 at 3 (April 1987) ("Section 1002 Report"). The summer exploratory activities were limited to field observations, surface measurements, mapping, and collection of rock samples. One helicopter-supported gravity survey permit was issued for the summer of 1983. Winter exploration plans involving mechanized surface transportation to conduct seismic surveys were approved for the winters of 1983–84 and 1984–85. Section 1002 Report. One permittee, representing an industry group of over 20 companies, was issued a permit to collect the seismic data. More than 1,300 line miles of seismic data were acquired as a result of the winter exploratory activities during the two winters. No exploratory activities of this type have occurred in the Arctic Refuge Coastal Plain since 1985.

The Section 1002 Report was submitted to Congress in April 1987. The report recommended that the entire Arctic Refuge coastal plain be made available for oil and gas leasing. Section 1002(h) Report. The submittal was delayed 7 months past the statutory

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deadline by a court ruling requiring the Secretary to seek public participation in preparation of the legislative environmental impact statement accompanying the report. *See Trustees for Alaska* v. *Hodel*, 806 F.2d 1378 (9th Cir. 1986).

The Service has historically interpreted the authorization to conduct exploratory activities under section 1002 to have expired with the submittal of the section 1002(h) report to Congress. The legal underpinnings for this position were set out in a January 18, 2001, memorandum to Secretary Bruce Babbitt from Solicitor John Leshy (2001 Memorandum) responding to a letter from Congressman Edward Markey asking what oil and gas related activities are currently allowed or prohibited on the coastal plain of the Arctic Refuge. While opining that the authority expired with submittal of the April 1987 report to Congress, the 2001 Memorandum noted that there were two possible answers to the question because of the wording of section 1002.

The legal interpretation, that the authority to authorize further exploration activities under section 1002 expired in 1987, was tested when the State of Alaska sued the Department of the Interior in 2015. *State of Alaska* v. *Sally Jewell, et al.*, No. 3:14-cv-00048-SLG (D. Alaska). In that suit, the State of Alaska appealed the Service denial of the State's permit request to conduct exploratory work on the Coastal Plain arguing that there was no cutoff of authority in section 1002. In affirming the Service's rejection of the application based upon the interpretation of section 1002 articulated in the 2001 Memorandum, the Court applied the two-step process established by the U.S. Supreme Court in *Chevron U.S.A.* v. *Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984). Applying the first step, the Court concluded that section 1002 was ambiguous as to whether additional exploration work was authorized under section 1002, a position advanced by the United States in its briefing. The Court then considered the Service's interpretation of section 1002 and concluded it was a permissible construction. In so finding, the

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court noted that the Service's construction is not the only permissible interpretation or necessarily the Court's.

It is well established that a department is not bound by prior interpretations of statutes and that it may make changes. While the prior interpretations of ANILCA section 1002 focused on the deadline for a report to Congress, with the passage of time we find it increasingly significant that section 1002 did not include a deadline for when exploration plans must be submitted. We interpret the absence of a deadline to mean that the authority of the Service to collect new and more detailed scientific information about all of the resources on the Coastal Plain has not expired.

This continuing authority recognizes that new and better technology is likely to be developed that can and should be put to use to expand human knowledge and understanding of the many natural resources of the Coastal Plain. The ability to collect new scientific information about the Coastal Plain, including its oil and gas resources, will better inform public policy decisions on use and management of the natural resources of the Plain. Without the authority to do further exploration work, the scientific knowledge about the subsurface resources of the Coastal Plain will be limited to what was learned over 30 years ago. Decisions on management and best use of all of the resources on the Coastal Plain will therefore not be informed by the latest and best scientific information.

The long-term national defense and security of the Nation is dependent upon reliable and secure sources of domestic energy resources. President Trump in his March 28, 2017, Executive Order, Promoting Energy Independence and Economic Growth, placed specific emphasis on the need to develop energy resources when he stated:

include SOL.

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Section 1. *Policy.* (a) It is in the national interest to promote clean and safe development of our Nation's vast energy resources, while at the same time avoiding regulatory burdens that unnecessarily encumber energy production, constrain economic growth, and prevent job creation. Moreover, the prudent development of these natural resources is essential to ensuring the Nation's geopolitical security.

Central to meeting the goal of developing the country's natural resources in a responsible manner to ensure the Nation's geopolitical security is having and considering the best and latest information about the oil and gas resources of the Coastal Plain that science and technology can provide. There have been many advances in geophysical sciences since the 1980's that can today be utilized to further advance the level of knowledge about the oil and gas resources of the Coastal Plain beyond what was learned from exploration work done over 30 years ago. It would be imprudent to make important decisions for development and implementation of plans for securing oil and gas resources and maintaining energy infrastructure such as the Trans Alaska Pipeline System over the long term without securing and utilizing the knowledge that can be gleaned from new modern exploration work on the Coastal Plain. In addition to informing long-term energy security planning, the availability of this new data will further the Service's resource management of the Coastal Plain.

Proposed Changes

In this document, we propose to change the regulations found at 50 CFR part 37 by removing language that restricts the timeframe in which a special use permit to conduct exploratory activities may be issued.

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Request for Comments

You may submit information concerning this proposed rule or the draft environmental assessment by one of the methods listed in **ADDRESSES**. We will not accept comments sent by e-mail or fax or to an address not listed in **ADDRESSES**. If you submit a comment via *http://www.regulations.gov*, your entire submission—including any personal identifying information, such as your address, phone number, or e-mail address—will be posted on the Web site. If your submission is made via a hardcopy comment that includes personal identifying information, you may request at the top of your document that we withhold this personal identifying information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on *http://www.regulations.gov*.

Endangered Species Act Consideration

Section 7 of the Endangered Species Act (16 U.S.C. 1536) requires the Secretary of the Interior to "review other programs administered by him (or her) and utilize such programs in furtherance of the purposes of the Act" and to "insure that any action authorized, funded, or carried out * * * is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat . . . ." Prior to issuance of these regulations, we would consult under section 7 of the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 et seq.), to ensure that any applications for exploration in the section 1002 area of the Arctic Refuge are not likely to jeopardize the continued existence of any species designated as endangered or threatened, or modify or destroy its critical habitat, and that the regulations are consistent with conservation programs for those species. Consultation under section 7 of the Act for the regulations may cause us to change these

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proposed regulations. Our biological opinion resulting from the section 7 consultation will be a public document available from the person listed under **FOR FURTHER INFORMATION CONTACT** or via *http://www.regulations.gov* in Docket No. FWS–R7–NWRS–2017–0072.

Required Determinations

Executive Order 13771—Reducing Regulation and Controlling Regulatory Costs

This proposed rule is considered to be an Executive Order (E.O.) 13771 deregulatory action (82 FR 9339, February 3, 2017) because it would amend regulations that currently restrict the dates when a permit application for an exploration plan for the Arctic Refuge would be allowed.

Regulatory Planning and Review (Executive Orders 12866 and 13563)

The Office of Management and Budget (OMB) has determined that this rule is not significant. OMB bases its determination upon the following four criteria:

(a) Whether the rule will have an annual effect of $100 million or more on the economy or adversely affect an economic sector, productivity, jobs, the environment, or other units of the government.

(b) Whether the rule will create inconsistencies with other agencies' actions.

(c) Whether the rule will materially affect entitlements, grants, user fees, loan programs, or the rights and obligations of their recipients.

(d) Whether the rule raises novel legal or policy issues.

The proposed rule would remove the regulations that restrict the dates when a permit application may be submitted for a geophysical exploration plan on the section 1002 area in the

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Arctic Refuge. Thus, this rule would open the process to accept oil exploration applications for the section 1002 area. Under the proposed rule as an administrative action, potential costs would be limited to application costs incurred by companies choosing to submit applications and by the Service to process the applications.

This analysis is limited in scope and addresses only the administrative action by the Service to accept and review new exploration plans in the Arctic Refuge. Therefore, this analysis does not evaluate costs and benefits related to the issuance of special use permits for specific exploration plans as the details of those plans are currently unknown, and the analysis would be speculative in regards to methods, location, and timing of the exploration activities. Furthermore, the review and approval process for a special use permit in the Arctic Refuge must undergo a separate process under the National Environmental Policy Act (NEPA). Geological exploration and assessment undertakings under the NEPA process could include a number of activities such as seismic testing, aerial surveying, road construction, and more. These exploratory activities have potential impacts including, but not limited to: polar bear viewing tourism, subsistence hunting (especially caribou) by nonnative and native Alaskans, and cultural use by native Alaskans. Furthermore, "available information indicates that any ANWR oil would be scattered among multiple smaller fields rather than concentrated in a single large field, which would make development more expensive and potentially expand the area in which any environmental effects might occur" (Congressional Research Service 2015).

Measures such as Secretarial Order No. 3352 have occurred to move forward toward energy development in the Arctic Refuge (Department of the Interior May 2017). However, Section 1003 of ANILCA states "production of oil and gas from the Arctic National Wildlife Refuge is prohibited and no leasing or other development leading to production of oil and gas

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from the [Refuge] shall be undertaken until authorized by an act of Congress." Therefore, this analysis does not estimate the potential costs and benefits of oil drilling and extraction.

With this proposed rule, we solicit public input on potential economic impacts and the number of businesses affected to help quantify costs and benefits. Please see the **Request for Comments** section at the end of **SUPPLEMENTARY INFORMATION** for further information about submitting comments.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions) (5 U.S.C. 601 et seq.). However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule would not have a significant economic impact on a substantial number of small entities. Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for "significant impact" and a threshold for a "substantial number of small entities." See 5 U.S.C. 605(b). SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule would not have a significant economic impact on a substantial number of small entities.

The U.S. Small Business Administration (SBA) defines a small business as one with annual revenue or employment that meets or is below an established size standard. To assess the effects of the proposed rule on small entities, we focus on businesses that operate and/or develop

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oil gas field properties (North American Industry Classification System (NAICS) 211) that have fewer than 500 employees. According to the U.S. Census Bureau, there are 8,064 businesses under NAICS 211, of which over 99 percent qualify as small businesses (2012). Thus, we expect that most entities that may apply for a special use permit would be considered small as defined by the SBA.

Under the proposed rule, individual businesses would have the opportunity to submit applications for a geological and geophysical exploration plan on the section 1002 area in the Arctic Refuge. Although estimating the number of potential future applicants would be speculative, the last seismic survey (completed in 1985) was conducted by 27 companies under 1 permit. If 27 individual companies applied for separate special use permits under the proposed rule, this would represent less than 1 percent of small businesses.

We therefore certify that this proposed rule would not have a significant economic effect on a substantial number of small entities as defined under the Regulatory Flexibility Act (5 U.S.C. 601 et seq.). A Regulatory Flexibility Analysis is not required. Accordingly, a Small Entity Compliance Guide is not required.

Small Business Regulatory Enforcement Fairness Act

This proposed rule is not a major rule under 5 U.S.C. 804(2), the Small Business Regulatory Enforcement Fairness Act. This rule:

a. Would not have an annual effect on the economy of $100 million or more.

b. Would not cause a major increase in costs or prices for consumers; individual industries; Federal, State, tribal, or local government agencies; or geographic regions.

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c. Would not have significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of U.S.-based enterprises to compete with foreign-based enterprises.

Unfunded Mandates Reform Act

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.), we have determined the following:

a. This rule would not ''significantly or uniquely'' affect small governments. A small government agency plan is not required. Actions under the proposed rule would not affect small government activities in any significant way.

b. This rule would not produce a Federal mandate of $100 million or greater in any year. It would not be a ''significant regulatory action'' under the Unfunded Mandates Reform Act.

Takings (Executive Order 12630)

In accordance with E.O. 12630, this proposed rule would not have significant takings implications. A takings implication assessment is not required. This proposed rule does not contain a provision for taking of private property.

Federalism (Executive Order 13132)

This proposed rule does not have sufficient Federalism effects to warrant preparation of a federalism summary impact assessment under E.O. 13132. It would not interfere with the ability of States to manage themselves or their funds. This proposed rule, if adopted, would affect the

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geological exploration of the coastal plain of the Arctic Refuge, which is managed by the Service in Alaska, and would not have a substantial direct effect on State or local governments in Alaska.

Civil Justice Reform (Executive Order 12988)

In accordance with E.O. 12988, the Office of the Solicitor has determined that this proposed rule does not unduly burden the judicial system and meets the requirements of sections 3(a) and 3(b)(2) of E.O. 12988.

Paperwork Reduction Act

This rule does not contain any new collection of information that requires approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). OMB has previously approved the information collection requirements associated with Service Special Use Permit Applications (FWS Form 3–2469) and assigned OMB Control Number 1018–0162 (expires December 31, 2019). An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act

Our draft environmental assessment is part of the administrative record for this proposed rule. In accordance with the National Environmental Policy Act (NEPA, 42 U.S.C. 4321 et seq.) and part 516 of the U.S. Department of the Interior Manual (516 DM), the Service proposes amending the existing language in 50 CFR Part 37—Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska, related to exploration plans [50 CFR

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37.21(b) and (c)], to remove the date restrictions now in place for those plans. Our draft environmental assessment sets forth that the proposed action to change the regulatory language as described in the rule portion of this document will have no significant impacts on the environment.

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we have evaluated potential effects on federally recognized Indian Tribes and have determined that there are no potential effects. This rule would not interfere with the ability of Tribes to manage themselves or their funds or to regulate exploration activities on Tribal lands. However, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis, and we are seeking their input to evaluate this proposed rule. In addition, we have evaluated this proposed rule under Alaska Native Claims Settlement Act corporation policies. We are consulting with Alaska Native tribes and Alaska Native corporations regarding the proposed changes in this rule for the Arctic Refuge.

Energy Supply, Distribution, or Use (Executive Order 13211)

Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking actions that could have significant adverse effects on energy supply, distribution, or use. We believe that the rule could have positive effects on energy supplies, distribution, or use.

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Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.

Clarity of This Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

(a) Be logically organized;

(b) Use the active voice to address readers directly;

(c) Use common, everyday words and clear language rather than jargon;

(d) Be divided into short sections and sentences; and

(e) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in **ADDRESSES**, above. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that you find unclear, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

List of Subjects in 50 CFR Part 37

Administrative practice and procedure, Alaska, Environmental protection, Historic preservation, Oil and gas exploration, Penalties, Reporting and recordkeeping requirements, Surety bonds, and Wildlife refuges.

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Proposed Regulation Promulgation

Accordingly, we propose to amend part 37 of title 50 of the Code of Federal Regulations as set forth below:

PART 37—GEOLOGICAL AND GEOPHYSICAL EXPLORATION OF THE COASTAL PLAIN, ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

1. The authority citation for part 37 is revised to read as follows:

AUTHORITY: 5 U.S.C. 301; 16 U.S.C. 715s and 3142; and 31 U.S.C. 9701.

2. Amend § 37.21 by revising paragraphs (b) and (c) to read as follows:

§ 37.21 Application requirements.

* * * * *

(b) Any person wanting to conduct exploratory activities may apply for a special use permit by submitting for review and processing one or more written exploration plans, in triplicate, to the Regional Director, Region 7, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503.

(c) In addition to containing the information required in paragraph (d) of this section, any exploration plan submitted shall describe the applicant's plan for carrying out an integrated program of exploratory activities in such a manner as will satisfy the objective and limitations stated in § 37.1. If an applicant submits an exploration plan in any given year, with the intention of submitting another exploration plan the following year, the applicant shall describe in its initial plan how its future exploratory activities will be integrated with those proposed under its initial plan. Each exploration plan submitted must be published and be the subject of a public hearing in accordance with requirements of § 37.22(b).

* * * * *

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§ 37.52 [Amended]

3. Amend § 37.52 by:

a. In the first sentence, removing the period and adding in its place a comma and the words "for 3 years from the date the permittee submits the data and information to the Regional Director pursuant to § 37.53."; and

b. In the second sentence, removing the words "Until September 2, 1989, the" and adding in their place the word "The".

Dated: _____.

_____

Acting Assistant Secretary for Fish and Wildlife and Parks.

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§ 37.52 [Amended]

3. Amend § 37.52 by:

a. In the first sentence, removing the period and adding in its place a comma and the words "for 3 years from the date the permittee submits the data and information to the Regional Director pursuant to § 37.53."; and

b. In the second sentence, removing the words "Until September 2, 1989, the" and adding in their place the word "The".

Dated: _____.

_____

Acting Assistant Secretary for Fish and Wildlife and Parks.

0000003947

§ 37.52 [Amended]

3. Amend § 37.52 by:

a. In the first sentence, removing the period and adding in its place a comma and the words "for 3 years from the date the permittee submits the data and information to the Regional Director pursuant to § 37.53."; and

b. In the second sentence, removing the words "Until September 2, 1989, the" and adding in their place the word "The".

Dated: _____.

_____

Acting Assistant Secretary for Fish and Wildlife and Parks.

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From: Earthjustice Newsletter
To: Roger Kaye
Subject: How grizzly bears saved this Vietnam vet"s life
Date: Sunday, November 19, 2017 6:52:55 AM

"If people are allowed to shoot grizzlies, all these bears that have tolerated people are going to be betrayed by humanity in such a deadly way. It's ugly."

EARTHJUSTICE | FORTHERECORD



After two tours, this Vietnam vet went into the American wilderness to confront his demons

The story of how grizzly bears "saved his life" and why he's fighting like hell to protect them.

READ MORE

Your gift will be matched $1-for-$1!

We've been fighting in court for years to protect grizzly bears and other endangered wildlife and we're not stopping now. Help us take on these critical courtroom battles today and your gift will be matched $1-for-$1!

DONATE NOW



Here's the dirt that industry won't tell you about 'clean' natural gas

It's not clean, it's not good for the planet, and it's not necessary.

READ MORE

For two decades, this tribe fought for the right to breathe clean air —then won

Now EPA Administrator Scott Pruitt wants to take these protections away as a gift to the coal industry.

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Her list of clients includes Big Tobacco

An attorney who has spent her career defending defective or dangerous products could soon be part of the very agency responsible for developing safety standards for our consumer products.

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Why are we still fighting about Styrofoam trash?

In Florida, cities have banned it, but powerful lobbyists are using it as a proxy battle to stop local governments from passing strong environmental laws.

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QUOTABLE

"It's a procedural victory, but a victory for people breathing nonetheless."

— Earthjustice attorney Adrian Martinez on a recent ruling that will make it harder for industry lobbyists to push through last-minute changes to weaken air regulations.

READ MORE

HOW YOU CAN HELP

Help protect this iconic bird's habitat

The health of sage-grouse habitat determines the survival of an entire ecosystem, including the golden eagle, elk, pronghorn and mule deer. But if the oil and gas industry has its say, tens of millions of acres of wildlife habitat across the western U.S. could soon make way for fossil fuel development.

A massive development threatens Southwest's last free-flowing river

The San Pedro River provides an oasis of life for hundreds of species of migratory birds, and jaguars have been seen prowling the nearby Whetstone mountains —but a massive development could decimate this desert gem.

TAKE ACTION

TAKE ACTION

Roger, thank you for being an **Earthjustice Donor**. You make our work possible.

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From:	Craghead, Anissa
To:	Shaun Sanchez; Jeffery Donahoe; Miller, Kayla; Eric Kershner; Ronald Kokel; Gloria Bell; Craig Hoover; Rosemarie Gnam; Tim Vannorman; Robert Curry; Tom Busiahn; Edward Grace; Karen Clark; Madonna Baucum; Theresa Rabot; Joy Nicholopoulos; Charles Wooley; Michael Oetker; Eustis, Christine; Matt Hogan; Alexandra Pitts; Aaron Mize; John Schmerfeld; Van Alstyne, Lisa; Julie Jackson; Cogliano, Mary; Gary Frazer; Gina Shultz; Jeff Newman; Bridget Fahey; Craig Aubrey
Cc:	Sara Prigan; Susan Wilkinson; Katherine Garrity; Unbehaun, Nancy
Subject:	Due by CoB Tuesday, November 21, 2017: Weekly 30-day Projection Report for Federal Register Documents
Date:	Monday, November 20, 2017 5:40:32 AM
Attachments:	FWS entries, 30 day spreadsheet for November 28 2017_MASTER.xlsx

Hi, all---

Please submit your input for the weekly report of **all** Federal Register (FR) documents (both notices and rules) estimated to clear the Department in the next 30 days.

IMPORTANT INFORMATION:

Timelines for This Report
Because of the holiday this week, I ask that you please use the attached to submit any updates and additions by close of business **on Tuesday, November 21**. When updating the attached spreadsheet, please pay special attention to "Summary," "Estimated Date for DOI Clearance," "Current Status," and "Has Been at Current Status Since (Date)" responses for your actions. When updating entries, please be aware that this report generally covers early, mid , and late December time frames. Please highlight the cells that you change so that it will be easier for us to identify your changes. Your input should be emailed to Anissa Craghead, Sara Prigan, and Susan Wilkinson.

This week's report should list only those FR documents estimated to clear the Department between November 28 and December 28, 2017.

Other Information
In order to ensure that we don't provide conflicting information during the clearance process, please:
--provide us complete and accurate information for this 30-day projection;
--update briefing papers to include any new dates (and, if applicable, information) UNLESS you've identified a "not later than" (NTL) date that carries notable consequences---such NTL dates should be retained and explained in your briefing paper; and
--upload revised briefing papers into DTS.
DTS entries for your actions **must** include the most up-to-date information.

Exec Sec continues to urge us to be realistic in terms of the documents we put on this list. If the document has not been provided to our Director's corridor for surnaming, it probably should not be on the list considering how long surnaming/clearance is taking at each step of the process.

Please note that Kayla Miller, Special Assistant, Ecological Services in Headquarters is providing the input for both Headquarters and Regional ES documents.

Additionally, PPM will provide updates for all Information Collection notices.

If you have any questions, please contact me at anissa_craghead@fws.gov.

Thanks once again for your help with this, and Happy Thanksgiving to all,

Anissa

Anissa Craghead
Senior Management Analyst, Division of Policy, Performance, and Management Programs
U.S. Fish and Wildlife Service
5275 Leesburg Pike, MS: BPHC
Falls Church, VA 22041-3803

Telephone: 703-358-2445

Bureau	RIN or OMB Control Number	Title	Summary	Type	Estimated Date for DOI Clearance	Critical Date (Judicial, Statutory, or Other)	Current Status	Has Been at Current Status Since (Date)	DCN (Optional)	Program (Optional)	Explain Critical Date if "Other"
FWS	b5 - DP (and not responsive)										

FWS		05 - DP (and not responsive) [redacted]

FWS		b5 - DP (and not responsive)									

FWS		[redacted]										

FWS		p5 - DP (and not responsive)	
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FWS		65 - DP (and not responsive) [redacted]									
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FWS	b5 - DP (and not responsive) [redacted]										
FWS	[redacted]										

FWS											
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FWS	[redacted]										
FWS	[redacted]										
FWS	[redacted]										
FWS	1018-BC92	Geological and Geophysical Exploration of the Coastal Plain, Arctic National Wildlife Refuge, Alaska; Exploration Plans; Application Requirements	The proposed rule would amend the regulations that restrict the dates when an application may be submitted for a permit for a geological and geophysical exploration plan on the Arctic National Wildlife Refuge lands described in the Alaska National Interest Lands Conservation Act.	Proposed Rule	late November				SEN 6553	NWRS	

FWS		b5 - DP (and not responsive)										
FWS		b5 - DP (and not responsive)										
FWS												

FWS		05 - DP (and not responsive)									
FWS											

From: Patrick Lemons
To: Kohout, Jenifer
Subject: Re: GMA Story Airing Friday & Nightline TBD
Date: Monday, November 20, 2017 7:21:47 PM

Nicely done. Thanks for the support.

Sent from my iPhone

On Nov 20, 2017, at 5:17 PM, Kohout, Jenifer <jenifer_kohout@fws.gov> wrote:

> Hi Greg,
>
> > I did connect with Christopher and Patrick to discuss the GMA tape and your subsequent conversation with Steve. I'm sharing the following for your information.
> >
> > Based on what we could see from the footage, the close proximity of the skiff to polar bears resting on the barrier island did not appear to cause a disruption of behavioral patterns that would suggest "take" had occurred. Our approach to level B take emphasizes changes in behavior that are biologically significant while also considering the totality of the factors and circumstances. Restrictions on how close commercial guides can get to polar bears on the barrier islands within the Refuge is governed by Refuge Special Use permits. Those permits and the Refuge polar bear viewing guidance (attached) attempt to carefully balance a desire to accommodate safe polar bear viewing with minimizing disturbance.
> >
> > As Steve raised in his comments to you, our Incidental Take Regulations for Oil & Gas activities require that marine vessels stay at least 1/2 mile away from polar bears. The 1/2 mile separation is intended to minimize the potential effects of the activity that Industry vessels are conducting; this may range from just transiting an area to seismic surveys. Observational data suggests that 1/2 mile provides an appropriate buffer to minimize potential disturbance. Most of our mitigation measures are designed to apply as broadly and as simply as possible. The goal of the ITRs is to minimize potential take such that we are able to meet the standards that enable us to issue the regulations, e.g. small numbers, negligible impact, and no unmitigable adverse impact on the availability of the species for subsistence. In these circumstances, operating within the buffer would be in violation of the regulations. It may or may not cause 'take'.
>
> I don't know if Steve would find any of this information particularly satisfying but hopefully it provides you with a little more background for future conversations.
>
> --Jenifer

On Mon, Nov 20, 2017 at 10:29 AM, Siekaniec, Greg <greg_siekaniec@fws.gov> wrote:

> Hi Jenifer,
>
> Could you take a look at this for me? Or have someone take a look?
>
> Thanks,
>
> greg
> ---------- Forwarded message ----------
> From: **Stephen Wackowski** <stephen_wackowski@ios.doi.gov>
> Date: Fri, Nov 17, 2017 at 12:26 PM

Subject: Fwd: GMA Story Airing Friday & Nightline TBD
To: gregory_siekaniec@fws.gov, karen_clark@fws.gov

Please have Christopher or one of you other biologists take a look at 1:45. That looks like the definition of a “take” to me.

Sent from my iPhone

Begin forwarded message:

From: "Leonetti, Crystal" <crystal_leonetti@fws.gov>
Date: November 17, 2017 at 9:10:23 AM AKST
To: Gregory Siekaniec <gregory_siekaniec@fws.gov>, Karen Clark <karen_clark@fws.gov>, "sara_boario@fws.gov" <sara_boario@fws.gov>, Amee Howard <amee_howard@fws.gov>, Andrea Medeiros <andrea_medeiros@fws.gov>, "Damberg, Doug" <doug_damberg@fws.gov>, Mary Colligan <mary_colligan@fws.gov>, Patrick Lemons <patrick_lemons@fws.gov>, James Wilder <James_Wilder@fws.gov>, Jenifer Kohout <jenifer_kohout@fws.gov>, Stephen Wackowski <steve_wackowski@ios.doi.gov>, Susanne Miller <susanne_miller@fws.gov>, Jennifer Reed <jennifer_reed@fws.gov>, Steve Berendzen <steve_berendzen@fws.gov>, Joanna Fox <joanna_fox@fws.gov>
Subject: Re: GMA Story Airing Friday & Nightline TBD

Here's the 5 minute piece that ran this morning on GMA - no FWS coverage thus far: http://abcnews.go.com/US/alaskan-towns-polar-bear-problem-leads-tourism-boom/story?id=51123121

Crystal Leonetti
Alaska Native Affairs Specialist
Alaska Region - R7 External Affairs tEAm
U.S. Fish & Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99503

Direct: 907-786-3868
Mobile: 907-230-8419

“Consultation is a process that aims to create effective collaboration with Indian tribes and to inform Federal decision-makers. Consultation is built upon government-to-government exchange of information and promotes enhanced communication that emphasizes trust, respect, and shared responsibility. Communication will be open and transparent without compromising the rights of Indian tribes or the government-to-government consultation

process." –S.O. 3317 (Department of the Interior Policy on Consultation with Indian Tribes)

On Thu, Nov 16, 2017 at 2:56 PM, Crystal Leonetti <crystal_leonetti@fws.gov> wrote:

> Hi All,
> A couple false starts, but it sounds like the story will first air tomorrow morning now. See Note below.
>
> Sent from my iPhone
>
> Begin forwarded message:
>
> **From:** "Dawson, Durrell" <Durrell.Dawson@abc.com>
> **Date:** November 16, 2017 at 2:22:12 PM AKST
> **To:** "Leonetti, Crystal" <crystal_leonetti@fws.gov>
> **Subject: GMA Story Airing Friday & Nightline TBD**
>
> Hi Crystal,
>
> Just a heads up that Good Morning America is planning to air their polar bear story tomorrow (Friday) morning and Nightline will go sometime next week. I'll check in once we get a solid airdate for the longer Nightline story. Thanks,
>
> Durrell
>
> Durrell Dawson
>
> ABC News | Nightline
>
> (212) 456-4706
>
> http://abcnews.go.com/nightline

--
Jenifer Kohout
Deputy Assistant Regional Director for Ecological Services
Alaska Region
U.S. Fish & Wildlife Service
p. (907) 786-3687
e. Jenifer_Kohout@fws.gov

<pb viewing best practices 2016.pdf>

From: Socheata Lor
To: tracy_fischbach@fws.gov; stephanie_brady@fws.gov; Diane Granfors
Subject: Fwd: People who worked on 1002 EA
Date: Monday, November 20, 2017 11:03:17 PM

FYI

Sent from my iPhone

Begin forwarded message:

> **From:** "Lor, Socheata" <socheata_lor@fws.gov>
> **Date:** November 20, 2017 at 3:56:21 PM AKST
> **To:** Greg Siekaniec <greg_siekaniec@fws.gov>
> **Subject: People who worked on 1002 EA**
>
> Hi Greg,
>
> Here are the folks who helped Tracy with the EA. I'm giving you their email addresses to make it easier to find them when you send out the email, assuming that you are, that is.
>
> MMM:
> ryan_r_wilson@fws.gov,
> christopher_putnam@fws.gov
>
> SA:
> wendy_loya@fws.gov,
>
> REFUGES:
> brian_mccaffery@fws.gov,
> john_w_martin@fws.gov,
> peter_wikoff@fws.gov
> margaret_perdue@fws.gov,
> john_trawicki@fws.gov,
> edward_decleva@fws.gov,
> greta_burkhart@fws.gov,
> roger_kaye@fws.gov,
> sheila_dufford@fws.gov,
> nicole_gustine@fws.gov,
> stephanie_brady@fws.gov
>
> People who helped with review and organize:Doug Damberg, Soch Lor, Sara Boario, and Andrea Madeiros.
>
> Let me know if you have questions.
>
> Thank you!
>
> Soch
> ~~~~~~~~~~~~~~~~~
> *Socheata Lor, Ph.D.*
> *Deputy Assistant Regional Director - Region 7*
> *National Wildlife Refuge System*

U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99503
Office: 907.786.3420
Cell: 907.891.6194
~~~~~~~~~~~~~~~~~
~~~~~~~~~~~~~~~~~

From:	Dufford, Sheila
To:	Steve Berendzen; Joanna Fox
Subject:	Fwd: Arctic NWR map
Date:	Tuesday, November 21, 2017 11:14:35 AM
Attachments:	EAMap_3_1Arctic_National_Wildlife_Refuge_17x11.pdf EAMap_ArcticSpecialDesignated Areas.pdf

---

Sheila J. Dufford
Biologist / GIS Specialist
Yukon Flats National Wildlife Refuge
101 12th Avenue, Room 264
Fairbanks, AK 99701
907-456-0307
sheila_dufford@fws.gov
http://www.fws.gov/refuge/Yukon_Flats/

***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**

---------- Forwarded message ----------
From: **Dufford, Sheila** <sheila_dufford@fws.gov>
Date: Thu, Nov 16, 2017 at 2:07 PM
Subject: Re: Arctic NWR map
To: "Fischbach, Tracy" <tracy_fischbach@fws.gov>

Sorry I did not get the Map # changed last time. Not you can edit text in Adobe Acrobat Pro DC.

But I have a Special Designated Areas Map done

Sheila J. Dufford
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On Thu, Nov 16, 2017 at 1:32 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:

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> We'll need the outline of the 1002 area and the label at the bottom covers Venetie and Fort Yukon which the CCP mentions. We haven't talked in the document about Nuiqsut. Do we need to?
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> Thanks so much for jumping in. -Tracy
>
> Tracyann S Fischbach
> Natural Resources Planner
> National Wildlife Refuge System - Region 7
> Division of Natural Resources & Conservation Planning
> (907) 786-3369
>
> Hours: Mon - Thurs 9:15 am to 3:15 pm
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> Region 7 GeoPDF Map Portal
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>
> > 1st Draft
> >
> > **Sheila J. Dufford**
> > **Biologist / GIS Specialist**
> > **Yukon Flats National Wildlife Refuge**
> > **101 12th Avenue, Room 264**
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> > > I'm on my way out, but I will call you first thing tomorrow when I get in. Thanks for being willing to help out!

My big need is a map of the Refuge with villages noted. I'm sure there will be more in the near future. Thanks - Tracy

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On Wed, Nov 15, 2017 at 2:37 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:

> Tracy,
> Please call me this is easier to talk about than sending emails back & forth.
>
> Sheila
>
> **Sheila J. Dufford**
> **Biologist / GIS Specialist**
> **Yukon Flats National Wildlife Refuge**
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> > I am looping in Tracy so she can answer your questions - I sent her and uploaded the map from the CCP to her google drive -so she has that in pdf. Thanks Sheila. Stephanie
> >
> > stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448

On Wed, Nov 15, 2017 at 2:13 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:

> I pulled a copy of the CCP. Does Tracy have a map in the CCP or Otherwise that she likes that I could try and copy? I need to know what she wants on it. Just NWR boundaries and communities? Land Status? Shaded Relief? Major Rivers?
>
> Does she want an ArcGIS Project to manipulate? Or what format is she looking for?
>
> Sheila
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> > yes I can pull the map from the CCP - figure 1-1 - but Tracy wants to manipulate it -so she does not want a pdf - everyone in cartographer in the RO is out - that is why I asked Sheila - but if it does not exist outside of a pdf - then we will have to work with what we have. thanks.
> >
> > stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448
> >
> > On Wed, Nov 15, 2017 at 1:51 PM, Fox, Joanna <joanna_fox@fws.gov> wrote:
> >
> > > Is there not one in the CCP? I believe Realty would have all of those.
> > >
> > > _____
> > > Joanna L. Fox
> > > Deputy Refuge Manager
> > > Arctic National Wildlife Refuge
> > > 101 12th Avenue, Room 236
> > > Fairbanks, AK 99701
> > > (907) 456-0549
> > >
> > > Follow us on Facebook!
> > > www.facebook.com/arcticnationalwildliferefuge

“Do what you can, with what you have, where you are.” -- Theodore Roosevelt

On Wed, Nov 15, 2017 at 1:43 PM, Dufford, Sheila <sheila_dufford@fws.gov> wrote:

> I will check.
> Sheila
>
> **Sheila J. Dufford**
> **Biologist / GIS Specialist**
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>
> > Hi there Sheila - do you happen to have a map of Arctic refuge with the surrounding communities? We need this for the EA that Tracy is writing for the proposed rule for exploration - unfortunately, we need the map by 10am tomorrow morning - do you have anything that would work? thanks much - Stephanie
> >
> > stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448

Map 3-1

Arctic National Wildlife Refuge

Arctic Refuge Boundary

Area 1002

Roads

U.S.- Canada Border

Miles 0 10 20 30 40 50 60 70 80

Kilometers 0 10 20 30 40 50 60 70 80

Alaska Albers Equal Area Conic Projection, 1983 North American Datum.



156° W 154° W 152° W 150° W 148° W 146° W 144° W 142° W 140° W

70° N 69° N 68° N 67° N

Prudhoe Bay
Kaktovik
Beaufort Sea
Camden Bay
Canning River
Hulahula River
Jago River
Aichilik River
Sagavanirktok River
Dalton Highway
Brooks Range
Canada
Kongakut River
Firth River
Old Crow River
Old Crow
Arctic Village
Wiseman
Coldfoot
Venetie
Fort Yukon
Chalkyitsik
Chandalar River
Middle Fork Chandalar River
East Fork Chandalar River
Wind River
Sheenjek River
Coleen River
Porcupine River
Junjik River
Marsh Fork
Itkillik River

Map

Arctic National Wildlife Refuge

Special Designated Areas

- National Marine Protected Area
- Public Use Natural Area
- Research Natural Area
- Wild and Scenic River

Other Features

- Roads
- U.S. - Canada Border
- Arctic Refuge Boundary
- Wilderness Boundary

Miles
0 10 20 30 40 50 60 70 80
0 10 20 30 40 50 60 70 80
Kilometers

Alaska Albers Equal Area Conic Projection, 1983 North American Datum. 03-0105



154°W 152°W 150°W 148°W 146°W 144°W 142°W 140°W
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Prudhoe Bay
Kaktovik
Beaufort Sea
Camden Bay
Hulahula River
Jago River
Canning River
Sagavanirktok River
Dalton Highway
Sadlerochit Mts
Shublik Mts
Neruokpuk Lakes
Shublik Springs
Ivishak River
Lake Peters
Romanzof Mts
Franklin Mts
British Mts
Kongakut River
Philip Smith Mts
Ivishak River
Brooks Range
Davidson Mts
Firth-Mancha
Canada
Coleen River
Sheenjek River
East Fork Chandalar River
Old Crow River
Wind River
Wind River
Arctic Village
Sheenjek River
Old Crow
Coleen River
Porcupine River
Wiseman
Coldfoot
Chandalar River
Venetie
Porcupine River
Ogilvie Mts

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To:	Steve Berendzen; Joanna Fox
Subject:	Fwd: Arctic NWR map
Date:	Tuesday, November 21, 2017 11:15:12 AM
Attachments:	EAMap_1_1Arctic_National_Wildlife_Refuge_17x11.pdf

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Cc: Steve Berendzen <steve_berendzen@fws.gov>, Joanna Fox <joanna_fox@fws.gov>, Roger Kaye <roger_kaye@fws.gov>, "Brady, Stephanie" <stephanie_brady@fws.gov>

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> > Follow us on Facebook!
> > www.facebook.com/arcticnationalwildliferefuge
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> > > **Yukon Flats National Wildlife Refuge**
> > > **101 12th Avenue, Room 264**
> > > **Fairbanks, AK 99701**
> > > **907-456-0307**
> > > **sheila_dufford@fws.gov**
> > > **http://www.fws.gov/refuge/Yukon_Flats/**
> > >
> > > ***There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.* - Albert Einstein**

On Wed, Nov 15, 2017 at 1:32 PM, Brady, Stephanie <stephanie_brady@fws.gov> wrote:

> Hi there Sheila - do you happen to have a map of Arctic refuge with the surrounding communities? We need this for the EA that Tracy is writing for the proposed rule for exploration - unfortunately, we need the map by 10am tomorrow morning - do you have anything that would work? thanks much - Stephanie
>
> stephanie_brady@fws.gov | Branch Chief, Conservation Planning and Policy | U.S. Fish and Wildlife Service | National Wildlife Refuge System | Alaska | 907.306.7448

Map 1-1

Arctic National Wildlife Refuge

Arctic Refuge Boundary

Area 1002

Roads

U.S.- Canada Border

Miles 0 10 20 30 40 50 60 70 80

Kilometers 0 10 20 30 40 50 60 70 80

Alaska Albers Equal Area Conic Projection, 1983 North American Datum.



156° W 154° W 152° W 150° W 148° W 146° W 144° W 142° W 140° W

70° N 69° N 68° N 67° N

Prudhoe Bay
Kaktovik
Beaufort Sea
Camden Bay
Canning River
Hulahula River
Jago River
Aichilik River
Sagavanirktok River
Dalton Highway
Brooks Range
Canada
Kongakut River
Firth River
Old Crow River
Old Crow
Arctic Village
Wiseman
Coldfoot
Venetie
Fort Yukon
Chalkyitsik
Chandalar River
Middle Fork Chandalar River
East Fork Chandalar River
Wind River
Sheenjek River
Coleen River
Porcupine River
Junjik River
Marsh Fork
Itkillik River