United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Fairbanks Fish and Wildlife Field Office
101 12th Avenue, Room 110
Fairbanks, Alaska 99701

December 2, 2014

Memorandum

To: Lon Kelly, Arctic Field Office Manager, Bureau of Land Management

Through: Debbie Nigro, Wildlife Biologist, Bureau of Land Management

From: Ted Swem, Endangered Species Branch Chief Ted Swem

Subject: Biological opinion on the permitting, construction, and operation of GMT1

This document transmits the Service's biological opinion (BO, attached) in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*, ESA), on the effects of actions resulting from proposed permits issued by the U.S. Army Corps of Engineers (USACE) and the U.S. Bureau of Land Management (BLM) to ConocoPhillips Alaska, Inc. (CPAI) for construction and operation of a satellite oil production development, GMT1, in the Greater Mooses Tooth Unit within the NPR-A. Proposed actions would occur within the National Petroleum Reserve – in Alaska (NPR-A) and may affect polar bears (*Ursus maritimus*), spectacled eiders (*Somateria fischeri*), and Alaska-breeding Steller's eiders (*Polysticta stelleri*).

At the time this BO was written, the BLM and USACE had not issued their Records of Decision (RODs); thus, in this BO we evaluate three alternatives of the *Final Supplemental Environmental Impact Statement for Proposed Greater Mooses Tooth Oil and Gas Project in Alaska* (FSEIS; BLM 2014). While the FSEIS (BLM 2014) evaluates more than three alternatives, the BLM considered the alternatives described in this BO to contain the full suite of potential impacts of GMT1. While the drill site location is the same in all alternatives, the alternatives differ by the type and location of access infrastructure for the drill site. The biological assessment for this project (ABR 2014), the USACE's Public Notice POA-2013-461, and the FSEIS (BLM 2014) contain a complete description of the alternatives.

We tier this BO for GMT1 to the analysis in the BLM's IAP BO (USFWS 2013). To evaluate potential impacts of development, the BLM provided a long-term development scenario in their IAP/EIS (BLM 2012), and the Service analyzed (USFWS 2013, pp. 63-94) a range of potential effects on threatened species based on this scenario. The scenario includes several types of developments, one of which is a satellite oil production development. The proposed GMT1 is a satellite oil production development and the first of several potential development projects in NPR-A.

In this BO for GMT1, we (1) analyzed effects within the Action Area, and (2) assessed if the conclusion we reached in the IAP BO (USFWS 2013, pp. 98-99) – that the development scenario was not likely to jeopardize the continued existence of Alaska-breeding Steller's eiders, spectacled eiders, and polar bears – was also appropriate for GMT1. The biological assessment for this project included information on the yellow-billed loon (*Gavia adamsii*) and Pacific walrus (*Odobenus rosmarus divergens*). When the BLM initiated formal consultation, the yellow-billed loon was a candidate under consideration for listing under the ESA and was classified as "warranted but precluded" for listing. On October 1, 2014, the Service found that the yellow-billed loon does not meet the definition of an endangered or a threatened species under the ESA and determined listing pursuant to the ESA was not warranted (79 FR 59195). The Pacific walrus does not occur within the Action Area and would not be affected by project actions. Thus, we do not consider either species further in this BO.

The Service has determined that the Proposed Action of permitting GMT1 is consistent with the Proposed Action considered in the IAP BO (USFWS 2013). Therefore, the previous conclusion – that the Proposed Action in the IAP BO (USFWS 2013, pp. 98-99) is not likely to jeopardize the continued existence of spectacled eiders and polar bears – is also appropriate for GMT1. Further, we determined the proposed project is not likely to adversely affect Alaska-breeding Steller's eiders. While we do not anticipate incidental take of Alaska-breeding Steller's eiders for this project, the Incidental Take Statement in the IAP BO (USFWS 2013, p. 102) provides the BLM coverage under the ESA should Steller's eiders unexpectedly collide with structures associated with this Proposed Action.

We estimated the level of incidental take for spectacled eiders and polar bears for three of the development alternatives presented for GMT1. Effects differ among alternatives. At the time this BO was written, the BLM and USACE had not issued their Records of Decision (RODs), and we issue only one Incidental Take Statement for a given project. Once the BLM and USACE issue RODs for GMT1, we will amend this BO to include an Incidental Take Statement for spectacled eiders along with Reasonable and Prudent Measures and implementing Terms and Conditions.

The process for authorizing take (incidental or intentional) for marine mammals such as polar bears differs from the process of authorizing incidental take of other threatened and endangered species. Although we have enumerated the extent of anticipated incidental take of polar bears, the Service is not authorizing incidental take of polar bears under the ESA in this BO. Consistent with the ESA and regulations at 50 CFR §402.14(i) Appendix (A), incidental take statements for marine mammals are not included in formal consultations until regulations, authorizations, or permits under the Marine Mammal Protection Act and/or its 2007 amendments (MMPA) until regulations, authorizations, or permits under the MMPA are in effect. Because such take must first be authorized under the MMPA, incidental take under the ESA that results from actions conducted in compliance with all requirements and stipulations set forth in the MMPA authorization will be considered by the Service to also be authorized under the ESA. CPAI has obtained authorization under the MMPA for take of polar bears for their various oilfield projects on the North Slope to date. These LOAs will expire before the end of the development lifespan of this project, but we assume that CPAI continue to receive LOAs in the future.

To re-initiate consultation once the BLM and USACE RODs are signed, please send the RODs and an email or letter describing the selected alternative to Ted Swem at ted_swem@fws.gov or Endangered Species Branch Chief, Fairbanks Fish and Wildlife Field Office, 101 12th Ave., Fairbanks, Alaska, 99701. Thank you for your cooperation in the development of this Biological Opinion. If you have any comments or require additional information, please contact Ted Swem at (907) 456-0441 or the contacts provided above.

Attachment

cc: Harry A. Baij, Jr., U.S. Army Corps of Engineers, Alaska

Literature Cited

ABR. 2014. section 7 consultation for the polar bear, pacific walrus, spectacled eider, Steller's eider, and yellow-billed loon in the GMT1 project area. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska by Charles B. Johnson, Robert M. Burgess, and Jill-Marie Seymour at ABR, Inc.—Environmental Research & Services, Fairbanks, Alaska.

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Biological Opinion for Effects of Greater Moose's Tooth 1 Oil and Gas Development in the National Petroleum Reserve-Alaska on the Polar Bear, Spectacled Eider, and the Alaska-breeding Steller's Eider

Prepared by:
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December 2, 2014

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1 Introduction

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion (BO) in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq*., ESA), on the effects of actions resulting from proposed permits issued by the U.S. Army Corps of Engineers (USACE) and the U.S. Bureau of Land Management (BLM) to ConocoPhillips Alaska, Inc. (CPAI) for construction and operation of a satellite oil production development, GMT1, in the Greater Mooses Tooth Unit. A satellite production development is an oil or gas development removed from a central processing facility (CPF) that requires a gathering system (e.g., pipeline) and roads or an airstrip to connect it to the CPF. Proposed actions would occur within the National Petroleum Reserve – in Alaska (NPR-A) and may affect polar bears (*Ursus maritimus*), spectacled eiders (*Somateria fischeri*), and Alaska-breeding Steller's eiders (*Polysticta stelleri*). The Action Area includes land and water within a 2.5-mi (4.0 km) zone around the proposed GMT1 drill site and support infrastructure (Figure 1).

1.1 Project and Consultation History

Planning efforts for GMT1 began more than a decade ago. The satellite oil development at GMT1 was previously described and evaluated as part of the Alpine Satellites Development as CD6 in an environmental impact statement (BLM 2004), a biological assessment (Johnson et al. 2004), and a biological opinion (USFWS 2004). During subsequent exploration thattook place after the Alpine Satellites Development project was permitted, it was established that the two satellites on federal land (CD6 and CD7) were not located in the same reservoir [Colville River Unit (CRU)] as CD1, CD2, CD3, CD4, and CD5. As a result, CPAI requested that the BLM designate and approve the proposed Greater Mooses Tooth Unit Area (GMTU) so CPAI could perform exploration and development operations in an efficient and logical manner under a unit plan of development. CD6 was renamed to GMT1 after it was determined that it would not be part of the CRU and would be in the newly established GMTU. This consultation for GMT1 evaluates effects on listed species that may occur from selecting Alternative A, B, or D as described in the *Final Supplemental Environmental Impact Statement for Proposed Greater Mooses Tooth Oil and Gas Project in Alaska* (FSEIS; BLM 2014) and the *Final Report* prepared by ABR, Inc. (ABR 2014). The alternatives differ by the type and location of access infrastructure for the drill site (Figure 1, Table 1).

In 2013, the BLM adopted its Record of Decision (ROD) for the Integrated Activity Plan/Environmental Impact Statement (IAP/EIS) for NPR-A (BLM 2013). The IAP ROD (BLM 2013) allocates lands available and unavailable for oil and gas leasing, exploration, and development and includes best management practices (BMPs) and lease stipulations that minimize impacts of these activities. The IAP/EIS (BLM 2012) also included a development scenario, and on February 5, 2013, the Service issued the *Biological Opinion for the National Petroleum Reserve – Alaska Integrated Activity Plan, 2013* (IAP BO, USFWS 2013) for potential effects to listed species resulting from implementation of the IAP. We concluded that the scenario, including the BMPs and lease stipulations, was not likely to jeopardize the continued existence of Alaska-breeding Steller's eiders, spectacled eiders, or polar bears. We also provided the BLM with an Incidental Take Statement for Alaska-breeding Steller's eiders and spectacled eiders.

In this BO for GMT1, we (1) analyzed effects within the Action Area, and (2) assessed if the conclusion we reached in the IAP BO (USFWS 2013, pp. 98-99) – that the development scenario was not likely to jeopardize the continued existence of Alaska-breeding Steller's eiders, spectacled eiders, and polar bears – was also appropriate for GMT1. ABR (2014) included information on the yellow-billed loon (*Gavia adamsii*) and Pacific walrus (*Odobenus rosmarus divergens*). When the BLM initiated formal consultation, the yellow-billed loon was a candidate under consideration for listing under the ESA and was classified as "warranted but precluded" for listing. On October 1, 2014, the Service found that the yellow-billed loon does not meet the definition of an endangered or a threatened species under the ESA and determined listing pursuant to the ESA was not warranted (79 FR 59195). The Pacific walrus does not occur within the Action Area and would not be affected by project actions. Thus, we do not consider either species further in this BO.

Potential impacts of the Proposed Action were evaluated in the context of the status and environmental baseline of the species to provide an aggregative analysis of impacts to listed species. Our analysis includes potential direct and indirect effects, cumulative effects, and effects of interrelated and interdependent actions on listed species in the Action Area, including effects of BMPs and lease stipulations that would govern management of GMT1. Information in this BO is based on a variety of sources, including ABR (2014), published literature, agency and consultant biological surveys and reports, the IAP/EIS (BLM 2012) and IAP BO (USFWS 2013), the FSEIS (BLM 2014) for this project, the USACE's Public Notice POA-2013-461 (dated September 15, 2014), and personal communications with agency staff.

Based on this information, the Service has determined that the Proposed Action of permitting GMT1 is consistent with the Proposed Action considered in the IAP BO (USFWS 2013). Therefore, the previous conclusion – that the Proposed Action in the IAP BO (USFWS 2013, pp. 98-99) is not likely to jeopardize the continued existence of spectacled eiders and polar bears – is also appropriate for GMT1. Further, we determined the proposed project is not likely to adversely affect Alaska-breeding Steller's eiders. While we do not anticipate incidental take of Alaska-breeding Steller's eiders for this project, the Incidental Take Statement in the IAP BO (USFWS 2013, p. 102) provides the BLM coverage under the ESA should Steller's eiders unexpectedly collide with structures associated with this Proposed Action.

We estimated the level of incidental take for spectacled eiders and polar bears for three of the development alternatives presented for GMT1. Effects differ among alternatives. At the time this BO was written, the BLM and USACE had not issued their Records of Decision (RODs), and we issue only one Incidental Take Statement for a given project. Once the BLM and USACE issue RODs for GMT1, we will amend this BO to include an Incidental Take Statement for spectacled eiders along with Reasonable and Prudent Measures and implementing Terms and Conditions.

The process for authorizing take (incidental or intentional) for marine mammals such as polar bears differs from the process of authorizing incidental take of other threatened and endangered species. Although we have enumerated the extent of anticipated incidental take of polar bears, the Service is not authorizing incidental take of polar bears under the ESA in this BO. Consistent with the ESA and regulations at 50 CFR §402.14(i) Appendix (A), incidental take statements for marine mammals are not included in formal consultations until regulations, authorizations, or permits under the Marine Mammal Protection Act and/or its 2007 amendments (MMPA) until regulations, authorizations, or permits under the MMPA are in effect. Because such take must first be authorized under the MMPA, incidental take under the ESA that results from actions conducted in compliance with all requirements and stipulations set forth in the MMPA authorization will be considered by the Service to also be authorized under the ESA. CPAI has obtained authorization under the MMPA for take of polar bears for their various oilfield projects on the North Slope to date. These LOAs will expire before the end of the development lifespan of this project, but we assume that CPAI continue to receive LOAs in the future.

1.2 Effects Determination for Alaska-breeding Steller's Eiders

As described in the IAP BO (USFWS 2013, pp. 31-32), Alaska-breeding Steller's eiders breed almost exclusively on the Arctic Coastal Plain (ACP), and nesting is concentrated in tundra wetlands near Barrow, Alaska. Steller's eiders occur at very low densities elsewhere on the ACP (Larned et al. 2012). Two decades of annual aerial and ground-based surveys on the Colville River Delta and in northeastern NPR-A have not detected this species in the Action Area, and recent records near the Action Area are rare. We conclude that the probability of Steller's eiders occurring in the Action Area is so low as to be discountable. Thus, GMT1 is not likely to adversely affect this species, and effects on Steller's eiders will not be evaluated further in this BO.

2 The Action Area

Regulations implementing the ESA (50 CFR §402.02) define an "Action Area" as "area[s] to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." Potential impacts of GMT1 on threatened species would occur at different geographic scales (e.g., disturbance from aircraft would occur over a larger area than disturbance from ground passenger vehicles). ABR (2014) depicts the Action Area as the 2.5-mi (4.0 km) zone around the proposed GMT1 drill site and all proposed support infrastructure (Figure 1). We expect this zone encompasses all potential effects of the Proposed Action on threatened species, and thus use it as the Action Area.

3 The Proposed Action

We tier this BO for GMT1 to the analysis in the BLM's IAP BO (USFWS 2013). To evaluate potential impacts of development, the BLM provided a long-term development scenario in their IAP/EIS (BLM 2012), and the Service analyzed (USFWS 2013, pp. 63-94) a range of potential effects on threatened species based on this scenario. The scenario includes several types of developments, one of which is a satellite oil production development. The proposed GMT1 is a satellite oil production development and the first of several potential development projects in NPR-A. Uncertainty regarding the extent and location of development that may occur will decrease as the BLM (and other action agencies such as the USACE) propose to permit additional developments.

We evaluate three alternatives in this BO. While the FSEIS (BLM 2014) evaluates more than three alternatives, the BLM considered the alternatives described in this BO to contain the full suite of potential impacts of GMT1. While the drill site location is the same in all alternatives, the alternatives differ by the type and location of access infrastructure for the drill site (Figure 2, Table 1, Table 2). In Alternatives A and B, all-season roads provide drill site access, with a more northern route for Alternative A than Alternative B. Alternative A is most similar to the proposed project described in the USACE's Public Notice POA-2013-461, as CPAI submitted its application to the USACE for only its proposed project. In Alternative D1 an airstrip provides drill site access with ice roads providing additional access when conditions allow. We describe similarities and differences among the alternatives in Sections 3.1 and 3.3, respectively. Please see ABR (2014), the USACE's Public Notice POA-2013-461, and the FSEIS (BLM 2014) for a complete description of the alternatives.

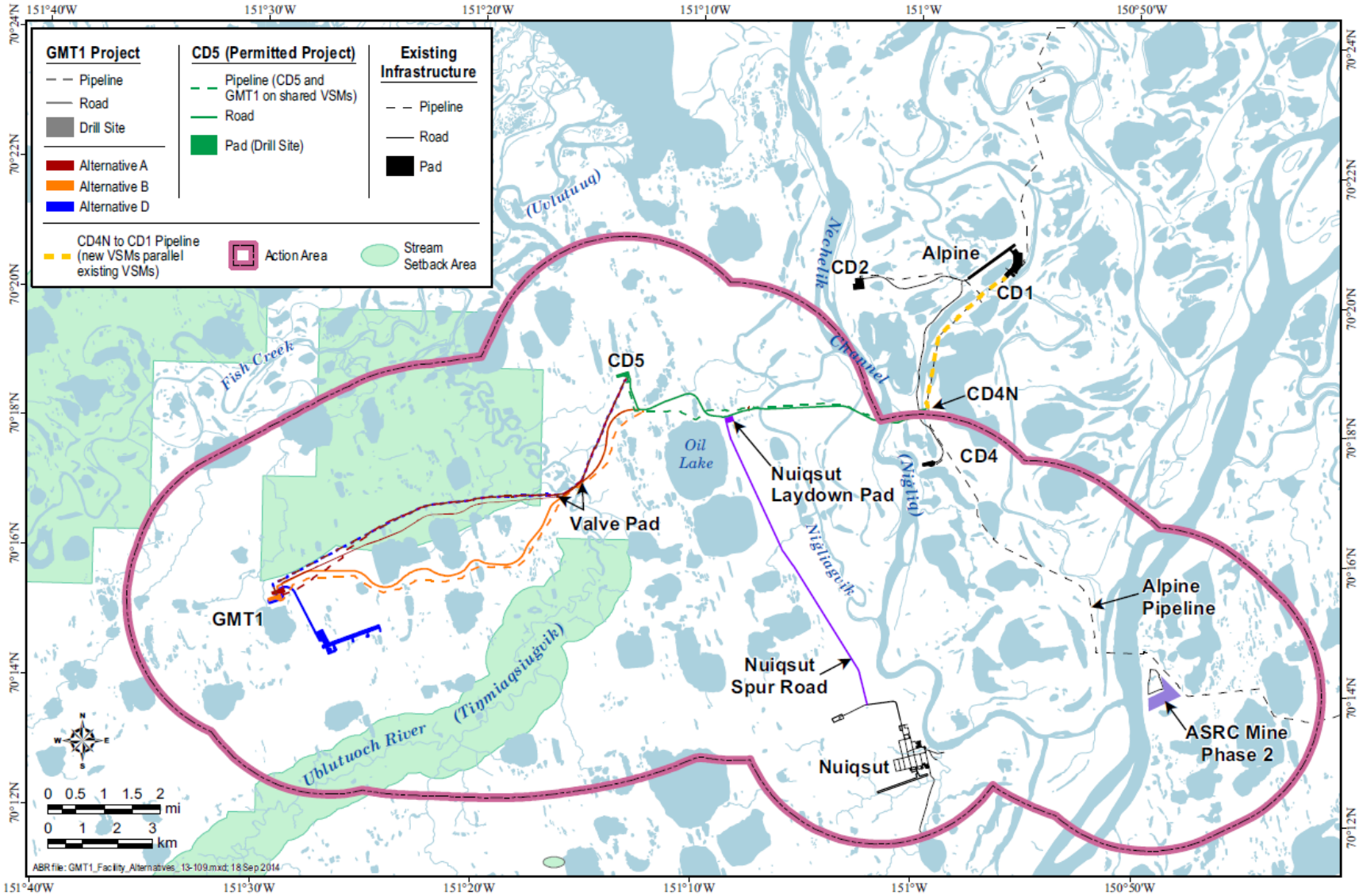

Figure 1. GMT1 facility alternatives and Action Area (2.5 mi zone around the facilities, ice roads, and material source). From ABR (2014).

3.1 Overview of Similarities among Alternatives

GMT1 would develop infrastructure to extract an estimated peak production of 20,000 barrels/day of hydrocarbons from within NPR-A in 2018, declining to 5,000 barrels/day by 2026 (BLM 2014, p. 403). The three alternatives have the following elements in common:

- The drill site is in the same location in all alternatives.
- Alpine (Figure 1) would serve as the main construction camp and supply hub supporting construction and operation of GMT1.
- The project would begin in winter 2015/2016 with:
    - construction of ice roads to facilitate erecting vertical support members (VSMs) for pipelines power and communication cables,
        - 1,488 vehicle trips on ice roads during construction preparation, and
    - excavation of 625,500–845,600 cubic yards (18.3–24.7 ac) of gravel from the Arctic Slope Regional Corporation (ASRC) mine site to facilitate road, pad, and bridge construction.
        - The ASRC mine was previously permitted (POA-1996-869-M4, modification M6 was issued 30 January 2014) and is separate from this action. The mine is approximately 4.5 mi northeast of Nuiqsut, is outside of the NPR-A, and could supply more than the necessary quantity of gravel for the GMT1 project.
- Construction would continue in winter 2016/2017 and would include the construction of the gravel road and drill pad, and bridge piers substructure and superstructure along with the continued installation of VSM's, pipelines, power and telecommunication cables and facilities
- Drilling using a single rig (205 ft tall) would occur from 2017-2021.
- Oil is expected to enter a pipeline connecting GMT1 to CD5 in the final quarter of 2017.
- 115-1,604/ new flights/year would occur after initial construction (Table 4).

Additionally, all alternatives include the following components (ranges indicate variation among alternatives; Figure 1, Figure 2, and Table 2):

- The gravel footprint would total 72.7–87.3 ac comprised of:
    - an 11.8–15.7 ac drill site with 33 well capacity;
    - 7.7–8.5-mi gravel access road or 5,000-ft airstrip with 1.2-mi gravel access road; and
    - 0.7–1.4 ac of manual valve gravel pads.
- 8.3–8.6-mi long pipeline on VSMs that also support power and fiber optic lines between GMT1 and CD5
- 3.3-mi long pipeline rack on new VSMs from CD4N to CD1
- Pipeline tie-ins at CD5 and CD1
- 6–45 mi of ice roads for construction or winter access, varying annually (Table 3)

Table 1. Comparison of GMT1 infrastructure dimensions by alternative. From ABR (2014).

Alternative	Footprint (ac)	Airstrip (ft)	All-season Road Length (mi)	Pipeline length (mi)
A (road access)	72.7	--	7.7	8.3
B (road access conforming to stream setbacks)	80.4	--	8.5	8.6
D (roadless access)	87.4	5,000	1.2	8.4

[a]Values are approximate and may change during final design. VSM footprints total <0.1 acre and are included in each alternative footprint. The footprint is the total area to be covered by gravel in each alternative including pad, road, etc.

3.1.1 Best Management Practices and Lease Stipulations

CPAI would adhere to BMPs and lease stipulations as presented in the IAP ROD (BLM 2013) and CPAI's lease. However, the IAP ROD (BLM 2013) provides the BLM a mechanism to grant "deviations" from BMPs and lease stipulations, provided the alternative procedures would still achieve the objectives of the BMPs and stipulations. If the BLM determines that the alternative procedure proposed by the applicant would meet the objectives of the stipulation or BMP, the BLM could approve the alternative procedure. CPAI, in support of Alternative A, would need BLM to grant deviations from the following BMPs and lease stipulations (CPAI 2014):

- A-5: Refueling within 500 ft of waterbodies;
- E-2: Facilities located within 500 ft of waterbodies;
- E-7 (a): Pipeline height of 7 ft;
- E-7 (c) 500 ft separation distance between pipelines and roads; and
- K-1(e): Fish Creek 3-mi buffer.

Please see *Appendix A* for the deviations that would be required in order to implement each alternative. Deviations to A-5, E-2, K-1(e), and K-1(g) could increase the risk to aquatic resources should a large oil spill occur. However, the BLM has concluded in the FSEIS (BLM 2014) that the alternatives for development of GMT1, including the proposed deviations, are consistent with the IAP/EIS for NPR-A (BLM 2012), and may grant these deviations in cases where the project would still meet the objectives of the BMPs and lease stipulations with these deviations.

3.2 Overview of Differences among Alternatives

In Alternative A, an all-season road would connect the GMT1 drill site pad to CD5. This alternative includes three vehicle pullout pads (50 x 200 ft each; Table 1, Table 2, and Figure 1). Alternative A requires two bridges, one to span the Ublutuoch River (Tiŋmiaqsiuġvik) and one to span Crea Creek. Approximately 3.1 mi of road and 3.6 mi of pipeline (roughly 40% of the total length of each) would be built within the Fish Creek setback.

Alternative B is similar to Alternative A, but the pipeline and road are placed entirely outside the Fish Creek setback (Figure 1, Table 1). This alternative also includes three vehicle pullout pads (50 x 200 ft each; Table 1, Table 2, and Figure 1). Alternative B includes one bridge that crosses the Ublutuoch River (Tiŋmiaqsiuġvik). The access road for Alternative B is slightly longer than the one presented for Alternative A (Table 1).

Alternative D1 is a roadless access alternative where a 5,000-foot airstrip provides access with additional access by ice roads when conditions allow. Alternative D1 has a 1.2 mi all-season road connecting the airstrip to the drill site and a pad to accommodate housing and storage needs when the site is not accessible by ice roads (Table 1, Table 2). The combined gravel footprint is the largest of the alternatives (Table 1), and a substantially longer ice road would be required annually as opposed to just during construction (Table 3).

Under Alternatives A and B, annual vehicle trips peak at 87,847 during the first year of construction in 2016. During the avian breeding season (May–August) in 2016, vehicle trips range from 420 to 2,625/month. Annual vehicle trips in 2017, the second year of construction, are expected to decline slightly to 73,395, with 2,937–3,672 trips/month occurring during May–August. From 2018 to the end of 2021 (drilling), 26,675 annual trips would be needed, which includes 1,753–2,192 trips/month occurring in May–August and 5,698 trips during winter months (February–April) on the annual resupply ice road (6 mi). Beginning in 2022, operation traffic rates would drop to 4,946 trips/year, including 624 trips/year on all-season roads and 4,322 vehicle trips/year on annual resupply ice roads.

Annual vehicle trips would peak at 78,074 under Alternative D1 during the first year of construction in 2016. All travel would be during the ice road season with no traffic during May–November. During 2017, traffic would peak at 94,083 trips/year, with 1,926–3,900 trips/month during May–August. Vehicle trips would decline to 52,411/year in 2018–2021 (drilling) with 3,119–3,899 trips/month in the May–August period. Traffic rates also would decline but still be approximately six times higher than under Alternatives A and B. Beginning in 2022, 32,359 trips/year would occur, including 21,840 trips/year on the gravel road connector and 10,519 trips/year on the annual resupply ice road.

Table 2. Estimated potential footprint areas and gravel volumes by infrastructure type for GMT1. Ranges include wetland fill area and gravel volumes for Alternatives A, B, and D1. From ABR (2014).

Infrastructure Type	Footprint (ac)[a]	Fill Quantity (cu yds)[a]	Notes/dimensions[a]
GMT1 Drill site Pad	11.8–15.7	131,000–157,900	463–290 x 1,200 ft
All-season Access Road, GMT1 to CD5	59.2-66.1	480,000-538,000	7.7–8.5 mi long; 32 ft crown width, minimum 5 ft depth
Vehicle Pullout Pads (Alternatives A and B only)	0.9	8,550	Three 50 x 200-ft (0.3 ac) vehicle pullout pads
Manual Valve and Tie-in Pads (east and west)	0.7-1.4	6,500–13,000	Each pad is 100 ft x 100 ft; with 20 x 25 ft extension
Air Access Facilities (Alt D airstrip, road, and structure pad)	70.9	687,700	46.4 ac airstrip and apron, 9.6 ac airstrip access road, 14.9 ac structure pad
Total Gravel Fill for GMT1	72.7–87.3	628,050–845,600	Pads, roads, airstrip
ASRC Mine Site	18.3-24.7[b]		Estimated from gravel volumes excavated previously at this mine site

[a] Values are approximate and may change during final design.
[b] Material source pit footprint, estimated from a mean 34,180 cubic yards/acre of mine footprint.

Table 3. Estimated ice road lengths (miles) by alternative and year for GMT1. Road lengths may vary as much as a mile depending on final routing. From ABR (2014).

Alternative	Year 1 Construction	Year 2 Construction	Annual Post Construction
A (road access)	45	36	6
B (road access conforming to stream setbacks)	43	36	6
D (roadless access)	33	36	15

Table 4. Annual flight requirements for GMT1 project by alternative. From ABR (2014).

		Number of Flights			
Alternative	Flights[a]	2016	2017	2018	2019 and beyond
A and B	New Flights	539	504	115	115
	Total Flights including Baseline Flights	3,536	3,501	3,112	3,112
D	New Flights	681	1,371	1,604	579-1,604
	Total Flights including Baseline Flights	3,678	4,368	4,601	3,576-4,601

[a]New flights are flights associated with construction, drilling, and operation of the GMT1 project. Baseline flights are flights already occurring in the project area, as part of biological and hydrological surveys, or support of operations at Alpine, but not directly associated with the GMT1 project.

4 Status of the Species

The status of spectacled eiders and polar bears is described in the section captioned *Status of the Species* in the IAP BO (USFWS 2013, pp. 25-41). No significant changes to the status of spectacled eiders or polar bears have occurred since the issuance of the IAP BO (USFWS 2013) on February 5, 2013. Thus, the status of spectacled eiders and polar bears as described in the IAP BO (USFWS 2013) provides the context to analyze effects of GMT1 on these species.

4.1 Climate Change

We used the best available information to discuss how climate change may affect spectacled eiders and polar bears in the IAP BO's Action Area (USFWS 2013, pp. 25, 38, 41, 54-56, 58, 59, 60-61, 89, 90). We addressed uncertainty regarding climate change in the IAP BO (USFWS 2013) by acknowledging that climate change will likely affect individual organisms and communities, but that it is difficult to predict with specificity or reliability how these effects will manifest. If new information regarding how climate change affects listed species occurring within the Action Area becomes available, we will update the *Status of the Species* at that time.

5 Environmental Baseline

Regulations implementing the ESA (50 CFR §402.02) define the environmental baseline to include the past and present impacts of all Federal, State, or private actions and other human actions in the Action Area. Also included are anticipated impacts of all proposed Federal projects in the Action Area that have undergone section 7 consultation and the impacts of State and private actions contemporaneous with the consultation in progress.

5.1 Spectacled Eiders

Spectacled eiders use portions of the Action Area during spring and summer to breed, nest, and raise broods. Two information sources indicate a low density of spectacled eiders occurs in the Action Area: pre-nesting and nesting surveys conducted by ABR (Figure 3) and the Service's annual pre-nesting aerial surveys (Figure 4). We summarize this information below. See ABR (2014) for additional information.

For the portion of the Action Area surveyed by ABR, estimated pre-nesting spectacled eider density ranged from 0.01 birds/km² (0.01 indicated birds/km², SE = 0.004, *n* = 20 years) in the Colville River Delta study area to 0.03 birds/km² (indicated birds/km^2, SE = 0.006, *n* = 14 years) in the NE NPR-A study area (ABR 2014). Additionally, limited nest searches conducted as early as 1958 in a portion of the Action Area located 11 spectacled eider nests, all north of CD5 (Figure 3, ABR 2014). Although not collected systematically, this information corroborates the findings of the Service's aerial surveys indicating that a low density of pre-nesting spectacled eiders occurs in the Action Area.

Annual aerial surveys of the ACP in June (Mallek et al. 2007, Larned et al. 2012, Stehn et al. 2013) provide another source of information for pre-nesting spectacled eider density in the Action Area. Density estimates ranged from 0–0.425 birds/km² in 2009–2012 (Figure 4), with the highest density centered on the northcentral Colville River Delta.

5.1.1 SUMMARY

Spectacled eiders occur in the Action Area at low density, but likely with the highest density occurring in the northern portion of the Action Area, particularly in or near the Colville River Delta. While we do not have information on use of the Action Area for brood rearing, we can infer from the low density of breeding adults that they would also occur at low density of pairs present before and during nesting that few broods would occur in the Action Area.

5.2 Polar Bears

The highest number of polar bears in the Action Area would most likely occur during fall and winter when pregnant females enter the terrestrial environment to search for suitable maternal den sites. Polar bears may also abandon melting sea ice and use the terrestrial environment to transit to other areas during summer and early autumn. Female polar bears typically den from mid-November until mid-April, and transient polar bears could be present in the Action Area at any time.

Portions of the Action Area contain habitat capable of supporting maternal dens. Physical features that generally define potential polar bear denning areas are those that facilitate the capture of sufficient snow to allow den excavation (Durner et al. 2003). An estimated 95% of all dens adjacent to the Beaufort Sea occur within 8 km (5 mi) of the coast (74 FR 56058). The portion of the Action Area within 8 km of the Beaufort Sea coastline that contains suitable denning habitat primarily occurs along the Ublutuoch River (Tiŋmiaqsiuġvik) and Niġliq and Niġliagvik channels of the Colville River (Figure 5, ABR 2014). We expect females would den infrequently in the Action Area because suitable denning habitat within the Action Area is sparse and polar bears generally den at a low density across the landscape (Harington 1968, Lentfer and Hensel 1980, Amstrup and Gardner 1994).

We expect transient polar bears to pass through the Action Area only infrequently, as they generally remain close to the coast. While no systematic polar bear surveys have been conducted in the Alpine Satellites Development project area, the majority of opportunistic sightings (since 1917) occur northeast of the GMT1 Action Area, which is much closer to the coast (Figure 5).

5.2.1 SUMMARY

While polar bears may be present in the Action Area, we expect them to occur infrequently, with the highest numbers occurring in the portion of the Action Area closest to the coast.

5.3 Impacts of Other Potential Factors in the Action Area

Because the Action Area is within NPR-A and managed by the BLM, potential factors affecting threatened species unrelated to the Proposed Action have undergone separate consultation and/or were considered in the IAP BO (USFWS 2013). These potential factors include disturbance of threatened eiders, accidental shooting of threatened eiders, disturbance of polar bears from interactions with humans, avian and polar bear research, subsistence harvest of polar bears, and climate change. Other consultations addressing potential impacts in the Action Area include the:

- annual programmatic consultation for BLM summer activities in NPR-A (e.g., USFWS 2014a);
- annual Intra-Service Section 10 permit for ABR Inc.'s eider survey work on the North Slope (USFWS 2014b);
- Intra-Service Migratory Bird Subsistence Hunting Regulations (USFWS 2014c);
- Intentional harassment of polar bears: Intentional take of polar bears with the Marine Mammals Management Office (MMM; USFWS 2014d);
- Incidental disturbance of polar bears: Beaufort Sea Incidental Take Regulations with MMM (USFWS 2011); and the
- 2004 Alpine Satellite Development Project (USFWS 2004).

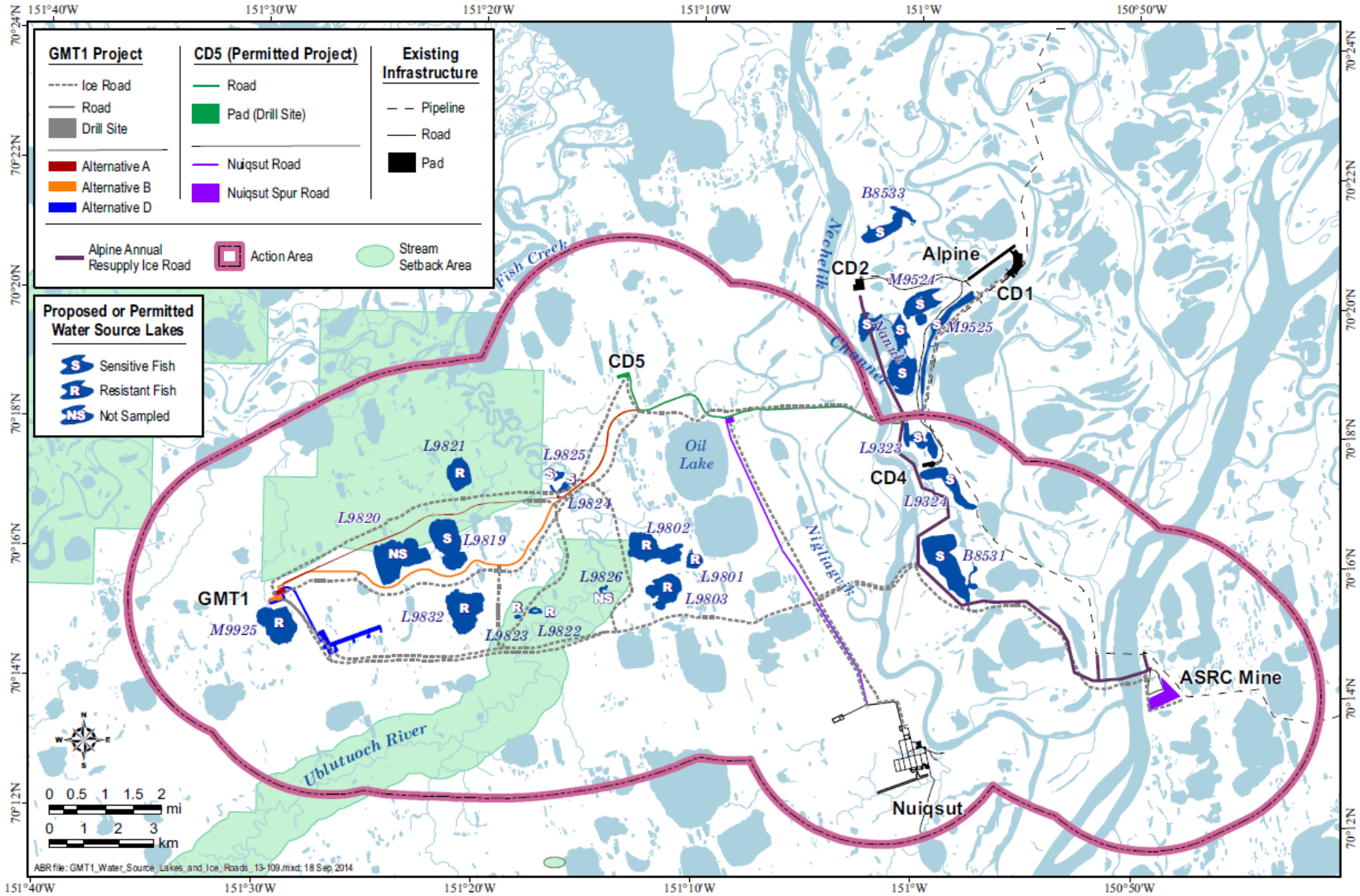

Figure 2. Ice road routes and potential water source lakes for GMT1 project alternatives. From ABR (2014).

6 Effects of the Action

Regulations implementing the ESA (50 CFR §402.02) define the "effects of the Action" as the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that Action. The IAP BO (USFWS 2013) provides a comprehensive analysis of the possible effects of the development scenario, including effects of satellite oil production developments such as GMT1. Because 1) we tier this effects analysis for GMT1 to the analysis in the IAP BO (USFWS 2013, pp. 63-89, 94-96), and 2) our primary goal is to verify that the "no jeopardy" conclusion in the IAP BO (USFWS 2013, pp. 98-99) is also appropriate for GMT1, this analysis only describes effects of GMT1 that may adversely affect spectacled eiders and polar bears. Please see the IAP BO (USFWS 2013, pp. 63-89, 94-96) for a broader discussion of possible effects to threatened species resulting from satellite oil production developments within NPR-A.

6.1 Spectacled Eiders

Based on our analysis for satellite oil production developments in the IAP BO (USFWS 2013) and our review of the Proposed Action for GMT1, we determined that the following factors may cause adverse effects to spectacled eiders:

- Habitat loss with associated increased disturbance, displacement, and predation, and
- Collisions.

In the sections below, we describe how these factors could affect the reproductive potential of spectacled eiders and estimate this lost productivity. Regardless of the alternative selected, the BLM will require CPAI to adhere to many BMPs and lease stipulations, while potentially allowing deviations from some of these BMPs and lease stipulations. The specific deviations granted would vary according to the alternative selected. Thus, we also briefly describe the impact of allowing the deviations listed in the *Proposed Action* section.

We evaluated the effects of oil and other toxic substance spills on spectacled eiders in the IAP BO (USFWS 2013, pp. 77, 98) and concluded that adverse effects to spectacled eiders are unlikely to occur due to the low probability of large spills occurring and because spectacled eiders are unlikely to contact small spills. BMPs, lease stipulations, and development setbacks from the coast reduce the likelihood of a significant quantity of oil spilled in NPR-A reaching concentrations of spectacled eiders in marine waters. Because the deviations the BLM may grant could affect spill risk in aquatic habitats, we discuss their potential impacts in section captioned *6.1.3 Effects of Best Management Practices and Lease Stipulations*.

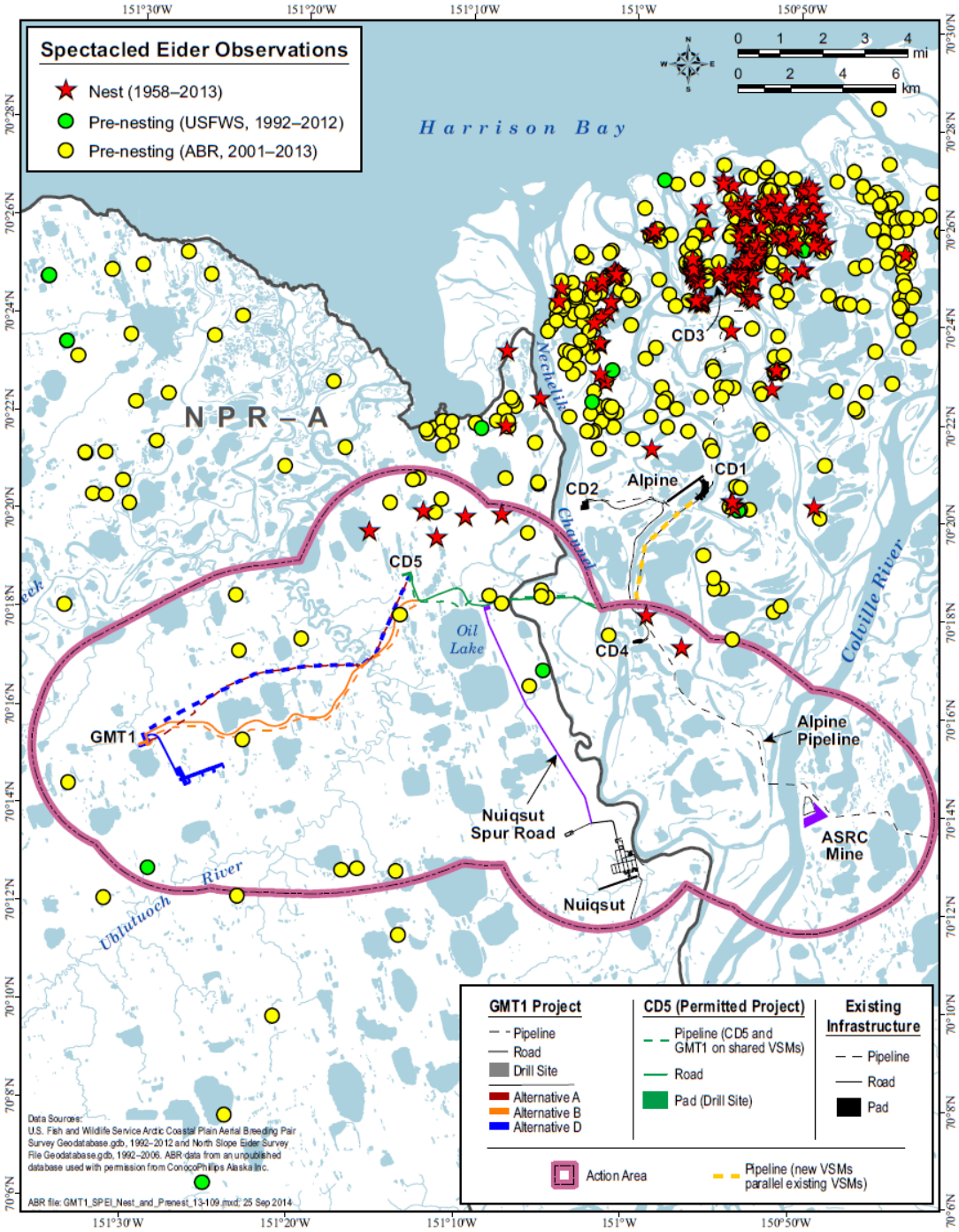

Figure 3. Locations of spectacled eiders from pre-nesting aerial surveys and ground-based nest surveys conducted in the area of GMT1. Aerial surveys were conducted at 50% coverage in NE NPR-A, 2004-2006, 2008–2013, and 100% coverage on the Colville River Delta, 2004–2013. Nest searches were not conducted uniformly over the area. Nest searches were conducted at Alpine during 1995–2001, CD4 during 2000–2002, and CD3 during 2000–2007 and 2009–2013. From ABR (2014).

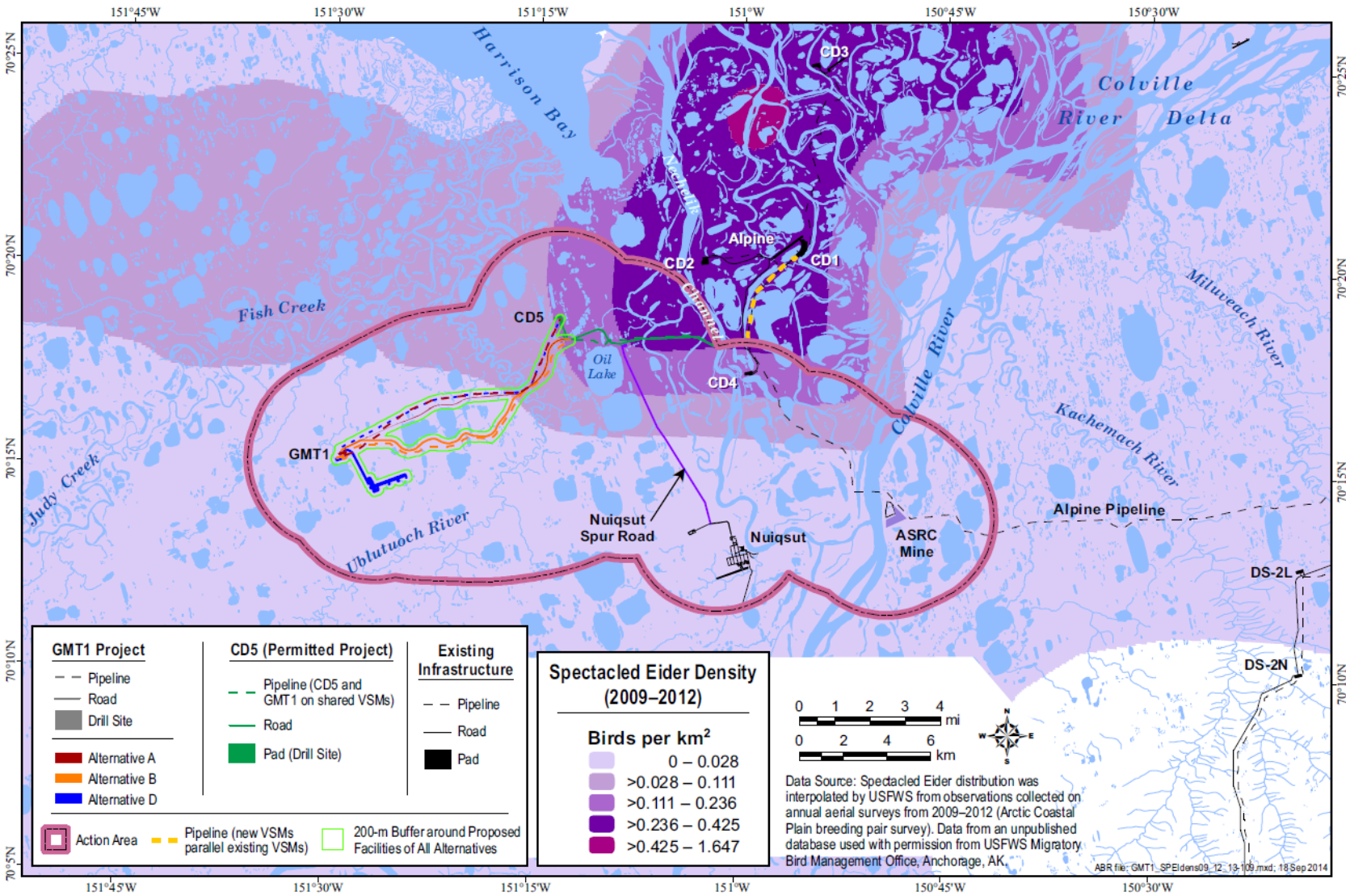

Figure 4. Estimated densities of pre-nesting spectacled eiders from U.S. Fish and Wildlife Service Arctic Coastal Plain surveys, 2009-2012, in the GMT1 Action Area. From ABR (2014).

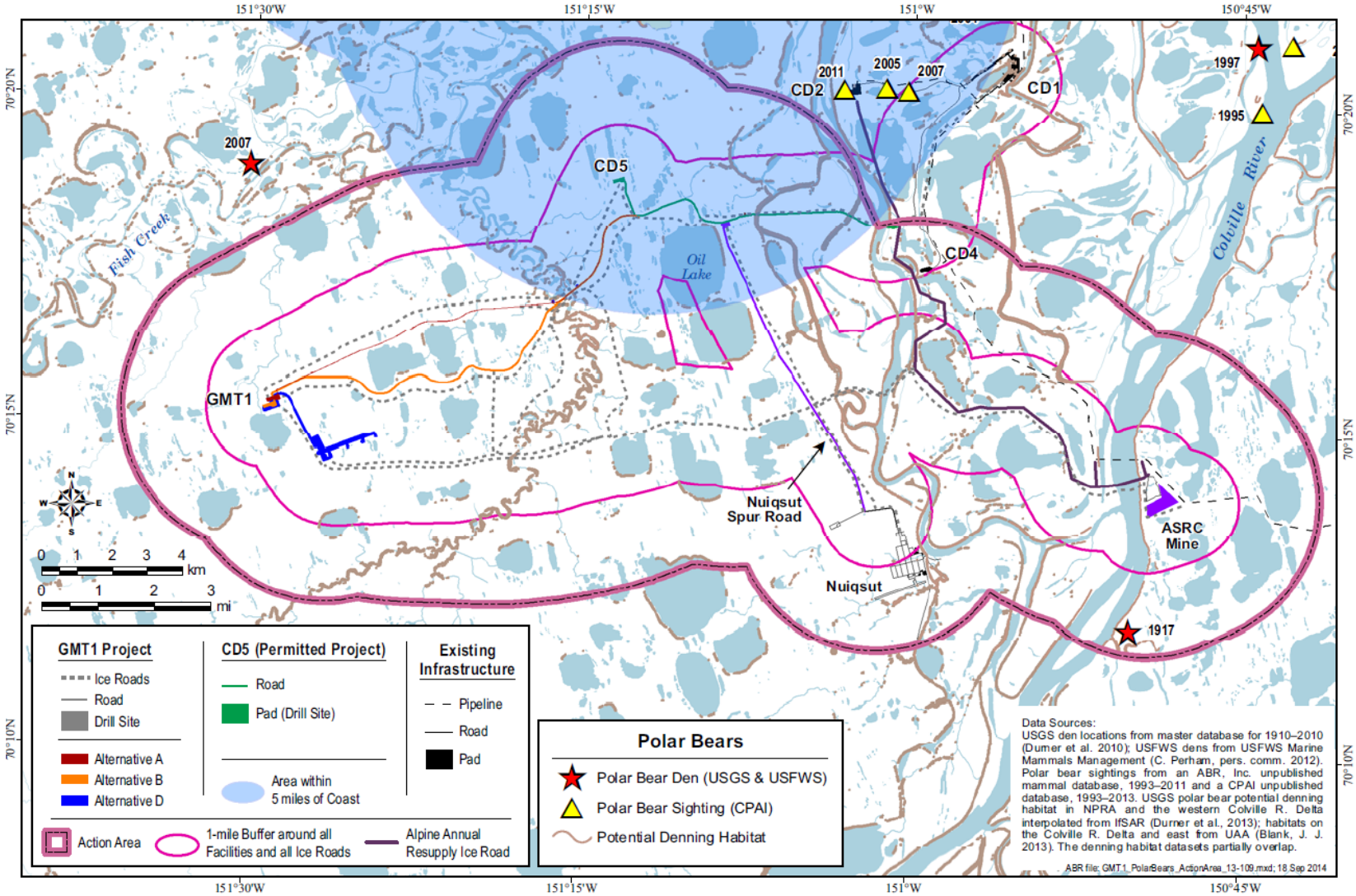

Figure 5. Potential terrestrial polar bear denning and 1-mi potential disturbance zone around alternative infrastructure types in the GMT1 Action Area. From ABR (2014).

6.1.1 HABITAT LOSS

Because spectacled eider density varies across the Action Area (Figure 4), so do the impacts of habitat loss from gravel pads, roads, and material sites. Assuming the gradient in observed density of spectacled eiders (Figure 3) reflects a gradient in habitat quality, and that displacing birds from preferred habitat reduces their reproductive potential, placing fill in areas used by breeding and brood-rearing spectacled eiders would compromise their reproductive potential. The BLM estimated that the Proposed Action would result in the long-term loss of 8.23, 8.11, and 7.77 km^2 in the Action Area for Alternatives A, B, and D1, respectively (Table 5, Table 6), due to fill (e.g., for gravel pads and roads) and associated disturbance in adjacent habitat. Most of the GMT1 Action Area is within a low-density contour for pre-nesting spectacled eiders (Figure 4). We estimate lost productivity of spectacled eiders that could result from the three alternatives in the section captioned *6.1.1.3 Estimated Loss of Spectacled Eider Production*.

Temporary habitat loss for eiders could also result from GMT1. Accumulated snow from ice roads, plowing activities, or unnatural snow drifts could melt slowly and could preclude spectacled eiders from nesting in those areas. Ice roads, pads, and airstrips could also compact vegetation, which could reduce cover for nesting spectacled eiders. The most noticeably-affected areas would include terrain with considerable micro topographic relief caused by mounds, tussocks, hummocks, and high-centered polygons. These areas are used by spectacled eiders for nesting and loafing. Wet areas would be less likely to be affected than drier sites (Walker 1996). However, vegetation generally recovers from this temporary impact within a few years (Yokel et al. 2007). Taking into consideration recovery time for vegetation in affected areas, at any given time, tens (of potentially millions) of acres might have reduced quality for spectacled eiders in the GMT1 Action Area, but we expect the reduction in habitat quality to be minimal and the duration to be short-lived.

6.1.1.1 Disturbance and Displacement

Oil development activities that may result from the Proposed Action could disturb spectacled eiders and potentially prevent them from initiating nests or displace them from preferred nesting habitat. For example, pre-nesting spectacled eiders (observed in groups or pairs) were located an average of 239 m from structures, whereas nests were found an average of 442 m from structures near the Alpine development (Anderson et al. 2007), and the distance between pre-nesting spectacled eiders and the location of Alpine oilfield structures before and after construction did not differ (Johnson et al. 2006). We can infer from this example that nesting birds may be more sensitive to activities occurring at infrastructure than pre-nesting birds, and habitat near facilities may have a lower nesting value compared to distant areas. The severity of disturbance and displacement will likely depend upon the duration, frequency, and timing of the disturbing activity. Gravel mining, material hauling, pad, road, and pipeline construction, and pipeline maintenance are all expected to occur in winter and therefore will not disturb spectacled eiders. However, once pads, staging areas, and roads are constructed these areas will be subject to year-round human activities, including drilling (from 2017-2021), machinery, and facility noise, and vehicle traffic during the breeding, nesting, and brood-rearing periods. Frequent fixed-wing and helicopter flights will also occur, with the highest number of flights occurring if the BLM selects Alternative D1.

Disturbance during the nesting and brood-rearing period (approximately June 5 - August 15) could adversely affect individuals by: 1) displacing adults and or broods from preferred habitats

during pre-nesting, nesting, and brood rearing, leading to reduced foraging efficiency and higher energetic costs; and 2) flushing females from nests or shelter in brood-rearing habitats, exposing eggs or ducklings to inclement weather and predators. Hens may also damage eggs as they are flushed from a nest (Major 1989), and may abandon nests entirely, particularly if disturbance occurs early in the incubation period (Livezy 1980, Götmark and Ählund 1984). Individual tolerance and behavioral response of spectacled eiders to disturbance will likely vary, and the effect of disturbance would vary with facility type; for example, the GMT1 pipelines may have less activity around them than the drilling pad and thus may have less impact. Thus, estimating loss of nesting habitat from disturbance is difficult. Based on best judgment and conservative estimates to benefit the species, we estimate nesting behavior may be disrupted and/or displaced by human activities within 200 m of active facilities.

6.1.1.2 Predators

The effects of predators on spectacled eider reproduction in the Action Area are extremely uncertain, and we are unable to estimate eider productivity effects with any reliability. We expect structures associated with the Proposed Action to increase the number of potential nesting and perching sites for ravens and increase availability of anthropogenic food and nesting/denning resources for predators. We assume that the 200 m zone (for disturbance) included in that calculation of habitat loss for structures also incorporates most potential losses from predators. Thus, we conclude there will be no additional egg or subsequent recruitment losses from predation for spectacled eiders.

6.1.1.3 Estimated Loss of Spectacled Eider Production

We estimated lost productivity of spectacled eiders due to habitat loss for the three alternatives evaluated for GMT1. For each alternative, we calculated this loss annually and for the 32 years of the project (Table 5, Table 6). Lacking a more precise estimate of density in the Action Area, we used the weighted mean of median density estimates from Service surveys (Table 5) as the area-specific density for calculating potential displacement and loss to disturbance. Here, we follow the same logic and assumptions used in the IAP BO (USFWS 2013, pp. 66-71). We assume that project disturbance and direct habitat loss would result in a loss or displacement of nests within that area, but would not result in the loss of adult birds. The area affected includes the habitat permanently lost to the gravel footprint and the area within the 200 m disturbance zone (Table 5, Table 6). We also assume that the number of nests is half the number of indicated total birds recorded on pre-nesting surveys (i.e., one nest for every two birds). Below is an example calculation of annual and life-of-project loss or displacement within 200 m of the gravel footprint based on Alternative A:

Annual

0.03911 indicated birds/km² × 8.23 km² = 0.322 birds/year

0.322 birds/year × 0.5 nests/indicated bird = 0.161 nests/year

Life of Project (2 years construction + 30 years of operation)

32 years × 0.161 nests/year = 5.15 nests

We estimate that on average the project may result in the loss of fewer than one nest annually. Assuming the life of the project is 32 years, three to five nests could be lost over that entire period (Table 6) depending on the alternative selected. We believe these estimates are likely to be conservative overestimates of actual impacts for the following reasons:

1. The 200 m zone around GMT1 is composed primarily of habitats avoided or not used by spectacled eiders for nesting (moist tussock tundra and moist sedge–shrub meadow total 62–74% of the area depending on alternative, Table 11 in ABR 2014);
2. Spectacled eiders can nest successfully within 200 m of active gravel roads, pads, and airstrips (results of CD3 eider studies in Johnson et al. 2008); and
3. Inherent in this approach is the assumption that spectacled eiders displaced by habitat loss or disturbance do not nest successfully elsewhere, which is supposition for the purposes of estimating potential impacts.

6.1.2 COLLISIONS

ABR (2014) identified the drilling rig, a communication tower, and one or two light masts as potential collision risks. Vehicles could pose an additional collision risk (USFWS 2013; for Alternatives A and B only). However, all structures have narrow profiles and lack guywires, which should reduce their risk of causing collisions. To adhere to the BLM's BMP E-10, lights on tall structures would be shielded and pointed downward to minimize attraction and confusion of passing birds. While vehicle collisions could occur, we expect them to occur rarely and affect at most very few individuals.

Despite BLM's BMPs and lease stipulations (BLM 2013), collisions resulting from GMT1 may occur. Collisions could lead to injury (e.g., concussions, wounds, broken bones, internal bleeding) or death. Because we expect few spectacled eiders to migrate through or to nest and rear broods in the GMT1 Action Area, we expect very few eiders to collide with structures in the Action Area.

Table 5. Spectacled eider mean density estimated from density polygon weighted averages in disturbance zones (200 m) around GMT1 alternatives. Spectacled eider density base map of is based on USFWS unpublished data, 2009-2012. Adapted from ABR (2014).

	Alternative A			**Alternative B**			**Alternative D1**		
Median density point[a]	Area (km^2)[a]	Proportion of Area[b]	Weighted density[c]	Area (km^2)	Proportion of Area[b]	Weighted density[c]	Area (km^2)	Proportion of Area[b]	Weighted density[c]
0.014	5.47	0.66	0.0092	5.81	0.72	0.010	5.84	0.75	0.011
0.070	2.27	0.28	0.0195	1.94	0.24	0.017	1.68	0.22	0.015
0.174	0.49	0.06	0.0104	0.36	0.04	0.007	0.26	0.03	0.005
Total	*8.23*	1.00		*8.11*	1.00		*7.77*	1.00	
Mean density[d]			**0.040**			**0.034**			**0.031**

[a]Median point within range of indicated birds/km^2. See Figure 4.

[b]Area of each polygon calculated in GIS by ABR.

[c]Weighted density (indicated birds/km^2) = median density point polygon x proportion of area.

[d]Mean density = sum of weighted densities.

Table 6. Estimated loss of spectacled eider nests among alternatives using mean density estimates of pre-nesting spectacled eiders from USFWS density polygons (2009-2012) in the GMT1 disturbance zone (200-m zone). Adapted from ABR (2014).

			Annual Loss Estimate		**Total Loss Estimate**		
Alternative	Median Density[a]	Area (km^2)[b]	Birds/year[c]	Nests/bird	Nests/year[d]	Project Lifespan[e]	Nests[f]
A	**0.040**	*8.23*	0.322	0.5	0.16	32	5.15
B	**0.034**	*8.11*	0.273	0.5	0.14	32	4.37
C	**0.031**	*7.77*	0.241	0.5	0.12	32	3.85

[a]Median weighted point within range of indicated birds/km^2. See bold numbers in Table 5.

[b]Total area within the 200-m disturbance zones calculated in Table 5 (*see italic numbers*).

[c]Birds/year = density x area

[d]Nests/year – birds/year x 0.5 nests/bird

[e]Assumes 2 years of construction + 30 years of operation

[f]Number of nests lost =nests/year x 32 years

6.1.2.1 Estimate of Collision Risk

Most reported collisions associated with oil and gas developments on the North Slope of Alaska have occurred with offshore structures or those along the coast during autumn (molt) migration (Service unpubl. data). These coastal structures pose a greater risk of collisions to spectacled eiders than inland structures because most spectacled eiders are thought to migrate offshore (http://alaska.usgs.gov/science/biology/seaducks/spei/2009_spei_animation.php) during autumn. Structures on the drilling pad likely pose the greatest collision risk to spectacled eiders due to their height. Project plans place the drilling pad in the southern portion of the Action Area and several miles from the coast away from the typical migration path of spectacled eiders (Figure 1). Thus, we anticipate the collision risk of structures associated with GMT1during autumn migration is low. Additionally, 24-hour daylight during spring would increase structure visibility and would minimize the likelihood of collisions during spring migration.

The drilling rig poses the greatest risk of collision in all three alternatives due to its height and relatively large profile compared to the proposed communication tower and light masts. The drilling rig would be in place from 2017 through 2021. An estimate of the proportion of spectacled eiders vulnerable to collisions with this structure would help us assess collision risk with this structure, but no specific data on spectacled eider collisions are available. Thus, using the method described in the IAP BO (USFWS 2013, pp. 73-75), we used an estimate of the proportion of the North Slope spectacled eider population migrating past the human-built Northstar Island in the Beaufort Sea and the estimated proportion of the North Slope population of common eiders (*Somateria mollissima*) that collided with structures at Northstar Island to estimate this vulnerability. We estimate that less than one spectacled eider may collide with the GMT1 drilling structure while the drilling rig would be in place (from 2017-2021). We believe this is likely a significant overestimate because the calculation is based on reported collisions in the marine environment where collision risk is likely to be higher than at inland locations (such as GMT1), and where spectacled eiders are unlikely to migrate frequently.

GMT1 may pose some risk to locally-nesting or produced spectacled eiders. However, spectacled eiders occur in the Action Area in very low density during the pre-nesting and nesting periods (Figure 4). Thus, the drilling rig poses a very small collision risk to locally-nesting or produced spectacled eiders.

Combining the risk of collisions of autumn migration, spring migration, and locally-nesting or produced spectacled eiders, we roughly estimate that one spectacled eider may collide with the drilling rig at GMT1 while it is in place (from 2017-2021).

6.1.3 Effects of Best Management Practices and Lease Stipulations

As discussed in the IAP BO (USFWS 2013), the BLM would require adherence to almost all of the NPR-A IAP ROD's (BLM 2013) BMPs and lease stipulations, several of which benefit spectacled eiders. In order for either Alternative A or Alternative D1 to be implemented, the BLM would have to grant deviations to A-5, E-7a, E-7(c) and K-1(e). Implementation of Alternative B would require BLM to grant deviations to E-2 and E-7(c). While deviations to E-7(a) and E-7(c) would not impact spectacled eiders, deviations to A-5, E-2, K-1(e), and K-1(g) could slightly increase the risk of oil reaching the marine environment, should a large spill occur.

In spring and autumn, spectacled eiders congregate in ice-free marine waters such as those offshore of river deltas. Spectacled eiders contacting spilled oil could suffer injuries or die.

Based on the large spill scenario analysis in the FSEIS (BLM 2014), large oil spills are unlikely to occur for any alternative. However, the probability of oil reaching the coast is slightly higher for Alternative A than Alternative B, should a large oil spill occur from the pipeline in the ice-free season because the pipeline in Alternative A is slightly closer to the coast, is within a watershed that drains directly into the marine environment, and crosses two rivers. However, selecting Alternative A would not increase the likelihood of a large spill occurring. Thus, the low probability of a large oil spill occurring from a pipeline makes it highly unlikely spectacled eiders would be affected by the deviations.

As explained previously, the deviation to the Fish Creek Exclusion in Alternative A would result in habitat loss for spectacled eiders, but only slightly more than what is estimated for Alternatives B and D1 (Table 5, Table 6).

6.2 Polar Bears

Based on our analysis for satellite oil production developments in the IAP BO (FWS 2013) and the Proposed Action for GMT1, we determined that the following factors may cause adverse effects to polar bears:

- Oil spills
- Disturbance
- Human-polar bear interactions

In the sections below, we describe how these factors could affect polar bears and estimate the number of polar bears potentially affected by them. Regardless of the alternative selected, the BLM will require adherence to many BMPs and lease stipulations and will allow a few deviations from these BMPs and lease stipulations. The specific deviations granted would vary according to the alternative selected. Thus, we also briefly describe the impact of allowing the deviations listed in the *Proposed Action* section.

6.2.1 Oil Spills

In the IAP BO (USFWS 2013, p. 99), we concluded that given the low probability of a large oil spill combined with the infrequent occurrences of polar bears in NPR-A, it is highly unlikely that polar bears would be affected by oil spills in NPR-A should spills occur. Likewise, we do not expect polar bears would be affected by spills within the GMT1 Action Area should spills occur. We continue the discussion of the impacts of oil spills as it pertains to the proposed deviations to BMPs in section *6.2.4 Effects of Best Management Practices and Lease Stipulations*.

6.2.2 Disturbance

Several activities that would occur at GMT1 could disturb polar bears. Possible sources of disturbance could include aircraft, drilling activities, activity at facilities, pipeline construction and maintenance, and gravel and ice road construction and associated vehicle traffic. These disturbances could affect denning and non-denning polar bears.

6.2.2.1 Denning Bears

Under all alternatives, the greatest potential for disturbance to denning polar bears would be during construction in the winters of 2015/2016 and 2016/2017 when noise and activity levels would be greatest. The effect of disturbance at dens diminishes with distance and is thought to be negligible beyond 1.6 km (1 mi) (76 FR 47010). During the first winter, the area of potential maternal denning habitat occurring within 1.6 km (1 mi) of ice roads and facilities is 76–95 ha depending on alternative (Table 7, Figure 5), with only 3.5–9 ha occurring within 8 km of the coastline where denning is most likely (Table 7, Figure 5). The amount of potential denning habitat within 1.6 km of ice roads and facilities is lowest for Alternative D1 and highest for Alternative A, corresponding with the length and location of ice roads in each alternative (Table 7, Figure 5).

During the second winter, the length of ice roads decreases under Alternatives A and B and increases under Alternative D1 (Table 7, Figure 5). Although ice road lengths are the same for Alternatives A and B (58 km), their routes differ and thus are near slightly different amounts of potential denning habitat. Similar areas of denning habitat (88–89 ha) are within 1.6 km of ice roads and facilities under Alternatives A and B in 2016/2017 (year 2), whereas slightly more (92 ha) habitat is within 1.6 km of ice roads and facilities under Alternative D1. Within 8 km of the coastline, where the likelihood of denning is greater, the amount of potential denning habitat within 1.6 km of the ice roads and facilities ranges from 12 to 15 ha; the areal extent is lowest for Alternative B and equivalent for Alternatives A and D1.

During the operational phase of GMT1 (beginning in winter 2017), short annual ice roads would connect GMT1 to the Alpine annual resupply ice road for Alternatives A and B and a longer ice road would be required for Alternative D1 (Table 4). During operations, the areal extent of potential denning habitat with 1.6 km of ice roads, gravel roads, and pipelines is 28, 30, and 81 ha under alternatives A, B, and D1, respectively, although under all alternatives only 3.5 ha of this occurs within 8 km of the coast, where the likelihood of denning is greater.

Regardless of the alternative selected, few if any polar bear dens are likely to be affected by construction and operation of GMT1 because the Action Area is inland from the coast where polar bears occur infrequently, the construction period is short, and because gravel and ice roads cross relatively small areas of potential denning habitat. In addition, the BLM and Service will require CPAI to adhere to minimization measures as described in the IAP BO (USFWS 2013, Appendix A) and explained in sections captioned *6.2.4 Effects of Best Management Practices and Lease Stipulations* and *6.2.5 Minimization measures pursuant to the Marine Mammal Protection Act* below.

Table 7. Areal extent of potential denning habitat for polar bears within 1.6 km (1 mi) of ice roads and facilities by alternative, year, and proximity to coastline for GMT1 (see Figure 12 for map of combined alternatives). From ABR (2014).

	Ice road length (km)	Potential denning habitat[a] (ha)	Ice road length within 8 km of coast[b] (km)	Potential denning habitat within 8 km of coast[a,b] (ha)
Alternative A				
2015/2016	69	95	7	9
2016/2017	58	89	16	15
Operations	35	28	2	3.5
Alternative B				
2015/2016	72	94	7	9
2016/2017	58	88	16	12
Operations	37	30	2	3.5
Alternative D1				
2015/2016	53	76	7	3.5
2016/2017	58	92	16	15
Operations	39	81	2	3.5

[a]Potential polar bear denning habitats mapped in NE NPR-A by USGS from digital elevation models using IfSAR data (Durner et al. 2013) and on the Colville River delta (Blank 2013)
[b]95% of terrestrial maternal dens along this part of the Beaufort Sea coast occur within 8 km (5 mi) of the coastline (75 FR 76086–76137)
[c]Beginning 4th quarter 2017 for approximately 30 years; includes 1.6 km (1 mi) buffer of gravel footprint, pipelines and annual ice roads. Length calculated from cumulative length of gravel roads, pipelines, plus annual ice roads

6.2.2.2 Non-denning Bears

Transient (non-denning) polar bears tend to move along the coast during the late summer–fall open water season and congregate on barrier islands where whale carcasses and other food is available (Miller et al. 2006, Schliebe et al. 2008). To illustrate, only three polar bear sightings have been recorded around Alpine CD1 and CD2 (approximately the same distance from the coast as GMT1) since 1998 (Figure 5, ABR 2014). Thus, we expect very few polar bears would enter the GMT1 Action Area given its inland location. However, if polar bears pass through the Action Area, human-polar bear interactions possibly leading to deterrence actions may occur. We expect the likelihood of interactions to increase with decreasing distance from the coast. In the IAP BO (USFWS 2013, pp. 82-89) we estimated that about 15% of polar bear interactions in NPR-A would result in deterrence actions and that in most cases, the actions would cause only minor, temporary behavioral changes (e.g., causing the bear to flee). We describe these potential deterrence actions below.

6.2.3 Human-polar Bear Interactions

Information regarding human-polar bear interactions occurring at oil and gas developments across the North Slope indicates that the Proposed Action may result in deterrence actions. CPAI maintains a database of polar bear observations (Appendix F in ABR 2014). The 114 records comprise 155 animals (excluding identifiable multiple observations of the same animals). Of these 114 observations and encounters, 35 (31%) involved deterrence events with 51 individual polar bears deterred. Frequently, deterrence was accomplished with more than one type of deterrent; therefore, the sum of all deterrent types exceeds the total number of deterrence

events: 22 deterrence actions involved vehicles, 15 involved noise (horns, sirens, etc.), and 18 involved firearms with non-lethal rounds (18 with cracker shells, two with bean bag rounds), and one involved a spotlight. None of the deterrence actions for CPAI resulted in severe injury or death of polar bears[1].

Thus, we expect that most deterrence events would not involve the use of projectiles and are likely to cause only minor, temporary behavioral changes (e.g., forcing a bear to leave the area). Potential effects of deterrence actions to individual bears likely vary with a bear's physiological and reproductive condition, and the number, type, and duration of deterrence actions used. In the unlikely event that bears are deterred using more aggressive methods (e.g., projectiles such as bean bags and rubber bullets), those bears may be injured (e.g., pain and bruising).

Very rarely, these deterrence actions may be fatal if the projectiles are used incorrectly. In the IAP BO (USFWS 2013, p. 89), we estimated that up to five deterrence events using projectiles may occur annually as a result of the Proposed Action, with no more than five fatalities to polar bears occurring during the 50-year life of the full development scenario. However, predicting the number of deterrence events for individual projects such as GMT1 is difficult. However, given distance from the coast, we expect the use of projectiles would occur fewer than once annually, with up to two injuries and no fatalities over the life of the project.

6.2.4 Effects of Best Management Practices and Lease Stipulations

As discussed in the IAP BO (USFWS 2013), the BLM would require adherence to almost all of the NPR-A IAP ROD's (BLM 2013) BMPs and lease stipulations, several of which benefit spectacled eiders. In order for either Alternative A or Alternative D1 to be implemented, the BLM would have to grant deviations to A-5, E-7a, E-7(c) and K-1(e). Implementation of Alternative B would require BLM to grant deviations to E-2 and E-7(c). While deviations to E-7(a) and E-7(c) would not impact spectacled eiders, deviations to A-5, E-2, K-1(e), and K-1(g) could slightly increase the risk of oil reaching the marine environment, should a large spill occur. Polar bears use the coastal environment and could transit the Fish Creek area. Polar bears contacting spilled oil could suffer injuries or die.

Based on the large spill scenario analysis in the FSEIS (BLM 2014), large oil spills are unlikely to occur for any alternative. However, the probability of oil reaching the coast is slightly higher for Alternative A than Alternative B, should a large oil spill occur from the pipeline in the ice-free season because the pipeline in Alternative A is slightly closer to the coast, is within a watershed that drains directly into the marine environment, and crosses two rivers. However, selecting Alternative A would not increase the likelihood of a large spill occurring. Thus, the low probability of a large oil spill occurring from a pipeline makes it highly unlikely polar bears would be affected by the deviations associated with selecting Alternative A.

6.2.5 Minimization measures pursuant to the Marine Mammal Protection Act

The Service has issued Incidental Take Regulations (ITRs) for the Beaufort Sea and adjacent areas under the MMPA for oil and gas activities since the early 1990s. Oil and gas companies

[1] One deterrence event in 2011 associated with BP Exploration, Alaska resulted in an unintended fatality of a polar bear.

can obtain Letters of Authorization (LOAs) under the ITRs, and these LOAs require adherence to an approved polar bear interaction plan. CPAI has obtained an LOA pursuant to the Beaufort Sea ITRs that authorizes incidental take of polar bears for its oilfields and activities on the North Slope. The Service also issues LOAs for intentional take of polar bears that authorize specific methods of deterring polar bears, and like LOAs for incidental take, intentional take LOAs require adherence to an approved interaction plan. CPAI has obtained LOAs for their various oilfield projects to date. These LOAs will expire before the end of the development lifespan of this project, but we assume that CPAI will obtain new LOAs in the future. Based on the record of the oil and gas industry as a whole and CPAI in particular, we expect that potential impacts of GMT1 on polar bears will be minimized through adherence to their approved interaction plan.

7 Cumulative Effects

Regulations implementing the ESA (50 CFR §402.02) define "cumulative effects" as the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the Action Area. Within the GMT1 Action Area, future oil and gas development, scientific research, and community growth will likely occur. However, these activities would require Federal permits (e.g., from the BLM and USACE) and separate consultation and therefore are not considered cumulative impacts under the ESA.

The new road and ice roads in Alternative A or B may improve access to areas used by subsistence hunters. The new road may increase access to areas used by waterfowl during the waterfowl subsistence hunting season. Although spectacled eiders are closed to hunting, they are occasionally taken by hunters. The new road and ice roads may also increase access for subsistence hunters to harvest polar bears. Promulgation of regulations that govern the subsistence harvest of migratory birds is a Federal action, as is the management of subsistence harvest of polar bears. These actions require separate consultation under the ESA and therefore are not considered cumulative impacts under the ESA.

8 Conclusion

Section 7(a)(2) of the ESA requires Federal agencies to ensure their activities are not likely to: (1) jeopardize the continued existence of any listed species, or (2) result in the destruction or adverse modification of designated critical habitat. Regulations that implement section 7(a)(2) of the ESA define "jeopardize the continued existence of" as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, number, or distribution of that species" (50 CFR 402.02).

As stated in the *Introduction*, we tiered the effects analysis for GMT1 to that in the IAP BO (USFWS 2013, pp. 63-89, 94-96) because we determined that the Proposed Action described for GMT1 is within the scope of the development scenario described in the IAP BO (USFWS 2013, pp. 17-24). Thus, we (1) analyzed effects within the Action Area, and (2) assessed if the conclusion we reached in the IAP BO (USFWS 2013, pp. 98-99) – that the Proposed Action in the IAP BO (USFWS 2013) is not likely to jeopardize the continued existence of spectacled eiders and polar bears – is also appropriate for GMT1.

In evaluating the impacts of the Action to listed species, the Service identified adverse effects that may occur to spectacled eiders and polar bears in the GMT1 Action Area. We analyzed these effects in detail in the *Effects* section of this BO and summarized them below.

8.1 Spectacled Eiders

We discussed in the IAP BO (USFWS 2013, pp. 64-82) that spectacled eiders could be affected by several factors related to satellite oil production developments such as GMT1. In this BO for GMT1, we identified loss of nesting habitat (and associated disturbance and predation) and collisions as the factors most likely to adversely affect this species.

The BLM and USACE determined that 8.23, 8.11, and 7.77 km^2 of nesting habitat for spectacled eiders would be lost due to placement of fill and disturbance (within the 200 m disturbance zone) for GMT1 Alternatives A, B, and D1, respectively. Assuming a 200-m disturbance zone around gravel infrastructure, this habitat loss may result in the production loss of five, four, and four spectacled eider nests for Alternatives A, B, and D1, respectively, for the 32-year life of the project. We also estimated up to one spectacled eider may collide with structures while the drilling rig would be in operation (from 2017-2021).

8.1.1 Summary for Spectacled Eiders

We did not identify new factors for the Proposed Action of GMT1 that could cause adverse effects to spectacled eiders not previously considered in the IAP BO (USFWS 2013). The loss of up to five nests for GMT1 is lower than the 71 nests estimated for all of NPR-A in the IAP BO (USFWS 2013, pp. 68-69). In addition, the loss due to collisions of one spectacled eider during the 32-year project life of GMT1 is lower than the 401 estimated for the 50-year development scenario for NPR-A in the IAP BO (USFWS 2013, pp. 73-75).

8.2 Polar Bears

We discussed in the IAP BO (USFWS 2013, pp. 82-89) that polar bears could be affected by several factors related to satellite oil production developments such as GMT1. In this BO for GMT1, we identified disturbance and human-polar bear interactions leading to deterrence events as the factors most likely to adversely affect this species. Predicting the number of deterrence events for individual projects such as GMT1 is difficult. However, we anticipate the use of projectiles would occur fewer than once annually and up to two times for the 32-year life of the GMT1 development with no deterrence events resulting in deaths.

8.2.1 Summary for Polar bears

We did not identify new factors for the Proposed Action of GMT1 that could cause adverse effects to polar bears not previously considered in the IAP BO (USFWS 2013). The two deterrence events that could cause injury during the 32-year life of GMT1 are fewer than the 10 deterrence events that could lead to injury estimated for all of NPR-A in the IAP BO (USFWS 2013, p. 89). While we identified contact with oil or other toxic chemicals and misuse of firearms as factors that could cause adverse effects in the IAP BO (USFWS 2013, pp. 85-86), we do not expect these factors to cause adverse effects for GMT1.

8.3 Summary

For this BO we must verify that the conclusion for spectacled eiders and polar bears reached in the IAP BO (USFWS 2013, pp. 98-99) is also appropriate for GMT1. After considering the following:

1. The status of spectacled eiders and polar bears has not changed significantly since the IAP BO (USFWS 2013, pp. 25-31, 39-41)[2];
2. The Proposed Action for GMT1 is within the scope of the development scenario described in the IAP BO (USFWS 2013);
3. Proposed deviations would not cause adverse effects to spectacled eiders or polar bears;
4. We did not identify factors that could cause adverse effects to spectacled eiders or polar bears not previously considered in the IAP BO (USFWS 2013, pp. 63-89, 94-96); and
5. The adverse effects identified in this BO are caused by factors previously described in the IAP BO at levels well below the maximum estimated in its Conclusion (USFWS 2013, pp. 96-100),

it is the Service's biological opinion that the conclusion reached in the IAP BO (USFWS 2013, pp. 98-99) – that proposed Action is *not reasonably likely to jeopardize the continued existence of spectacled eiders and polar bears by reducing appreciably the likelihood of their survival and recovery in the wild by reducing their reproduction, numbers, or distribution* – is also the appropriate conclusion for the Proposed Action described for GMT1.

9 Estimated Incidental Take

Biological opinions often have an accompanying Incidental Take Statement. Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, but not for the purpose of, carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Because the BLM and USACE have not yet approved a development project for GMT1 to permit, and estimated effects to spectacled eiders vary among the development alternatives, we

[2] While writing this biological opinion, Bromaghin et al. (2014) pre-released a publication with a new population estimate for the Southern Beaufort Sea stock of polar bears. Previously, the population estimate for this stock was 1,526 polar bears (95% CI: 1,200-1,811; Regehr et al. 2006). The new estimate is 900 polar bears (90% C.I. 606-1,212). Polar bears are listed as threatened throughout their range under the Act; therefore, their status for the purposes of this biological opinion is their rangewide global status. Anticipated effects of the Proposed Action would likely impact only a small proportion of the worldwide population and would not cause population declines.

do not provide an Incidental Take Statement for spectacled eiders at this time. The estimated incidental take for GMT1 for spectacled eiders and polar bears is detailed below.

9.1 Estimated Incidental Take for Spectacled Eiders

9.1.1 Habitat Loss with Associated Increased Disturbance, Displacement, and Predation

Our estimates of incidental take are based on the acreage of gravel fill and the 200-m zone surrounding infrastructure, the lifetime of this infrastructure, and the density of spectacled eiders in the Action Area. Using the methodology described in the *Effects* section, we anticipate the following incidental take for the 32-year life of the project:

- Alternative A (and the USACE's Proposed Action): five nests,
- Alternative B: four nests, or
- Alternative D1: four nests.

9.1.2 Collisions

Our methods for estimating incidental take are described the *Effects* section for spectacled eiders. We estimated up to one spectacled eider may collide with the drilling rig during while it will operate (from 2017-2021). Given the inland location of proposed GMT1 structures compared to the principally marine autumn migration route of eiders and the comparatively small profile of structures within the path of migrating eiders, we likely significantly overestimated incidental take. Additionally, BLM's BMPs will likely reduce collision risk but to an unknown degree; thus, we have not adjusted our incidental take estimates to reflect this likelihood.

9.2 Estimated Incidental Take for Polar Bears

Based on records reported from previous human-polar bear operations, we estimate that:

- Up to two deterrence events that lead to injury (e.g., pain and bruising) during the 32-year life of development, but that do not cause severe injury or death

The process for authorizing take (incidental or intentional) for marine mammals such as polar bears differs from the process of authorizing incidental take of other threatened and endangered species. Although we have enumerated the extent of anticipated incidental take of polar bears, the Service is not authorizing incidental take of polar bears under the ESA in this BO. Consistent with the ESA and regulations at 50 CFR §402.14(i) Appendix (A), incidental take statements for marine mammals are not included in formal consultations until regulations, authorizations, or permits under the MMPA until regulations, authorizations, or permits under the MMPA are in effect. Because such take must first be authorized under the MMPA, incidental take under the ESA that results from actions conducted in compliance with all requirements and stipulations set forth in the MMPA authorization will be considered by the Service to also be authorized under the ESA. CPAI has obtained authorization under the MMPA for take of polar bears for their various oilfield projects on the North Slope to date. These LOAs will expire before the end of the development lifespan of this project, but we assume that CPAI continue to receive LOAs in the future.

10 Reasonable and Prudent Measures & Terms and Conditions

Reasonable and Prudent Measures (RPMs) and their implementing Terms and Conditions (T&Cs) aim to minimize the incidental take anticipated to result from the Proposed Action. As described above, activities resulting from GMT1 may lead to the incidental take of spectacled eiders through habitat loss, disturbance, and collisions. Because the Service expected that adherence to the lease stipulations and BMPs included in the IAP ROD (BLM 2013) would effectively minimize incidental take of spectacled eiders, the Service did not include RPMs and T&Cs in the IAP BO (USFWS 2013). However, the Service will include RPMs and T&Cs in the amended BO once the BLM and USACE select an alternative to permit. Both the USACE and the BLM would be responsible for implementation of the RPMs and T&Cs.

11 Re-initiation Notice

This concludes formal consultation on the Action described. As provided in 50 CFR 402.16, re-initiation of formal consultation is required where discretionary BLM or USACE involvement or control over the action has been retained (or is authorized by law). Thus, the BLM and USACE must re-initiate consultation for GMT1 once a development plan is approved. The BLM and USACE must also re-initiate consultation if:

- Project plans for GMT1 are subsequently modified in a manner that causes an effect not considered in this biological opinion; or
- If a new species is listed or critical habitat is designated that may be affected by the Action.

Thank you for your cooperation in the development of this BO. If you have any comments or require additional information, please contact Ted Swem, Endangered Species Branch Chief, Fairbanks Fish and Wildlife Field Office, 101 12th Ave., Fairbanks, Alaska, 99701.

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Appendix A: Deviations Requested by CPAI by Alternative

(Text provided by BLM)

In a letter dated October 14, 2014, CPAI formally requested that BLM grant deviations to five stipulations/BMPs (See Final SEIS Appendix F). These deviations are already built into the design of CPAI's proposed project, Alternative A. Project alternatives assume granting of the applicable stipulations/ROP deviations.

Alternative A and Alternative D1 would require that BLM approve the following deviations from Stipulations and Required Operating Procedures (ROP):

1. ROP A-5 (Refueling within 500 feet of water bodies)
    - ROP A-5 prohibits the refueling of equipment within 500 feet of the active flood plains of water bodies.
    - This exception would have to be granted for the construction of the Crea Creek bridge. As the Ublutuoch River bridge is on Kuukpik land where BLM has no authorizations to apply stipulations.

2. Lease Stipulation E-2 (Facilities within 500 feet of water bodies)
    - The objective of Lease Stipulation E-2 is to protect fish-bearing water bodies, water quality, and aquatic habitats. In the 2013 ROD, BLM modified this Lease Stipulation to apply only to water bodies that are fish bearing.
    - Three named lakes (L9819, L9820, and L9824) fall within the 500-foot buffer.

3. E-7(a) and E-7(c) (elevation of pipeline less than 7 feet and less than 500 feet between pipelines and roads). *This deviation would not be needed for Alternative D1*.
    - Listed below are the accepted design practices:
        - Above ground pipelines should be elevated a minimum of 7 feet as measured from the ground to the bottom of the pipeline at vertical support members.
        - A minimum distance of 500 feet between pipelines and roads shall be maintained. Separating roads from pipelines may not be feasible within narrow land corridors between lakes and where pipelines and roads converge on a drill pad. Where it is not feasible to separate pipelines and roads, alternative pipeline routes, designs and possible burial within the road will be considered by the authorizing officer.
    - This alternative would require some lengths of pipeline less than 7 feet in order to bury the pipeline as it enters the pad as proposed in this alternative. .
    - There are places along this route where the pipeline and road cannot be separated by 500 feet due to the terrain characteristics.

4. ROP K-1(e) (Fish Creek setback)
    - A 3-mile setback from the highest high water mark of the creek downstream from the eastern edge of section 31, T11 N, R1 E., UM and a 2 mile setback from the banks highest high watermark further upstream.

- Deviation for 3.1 miles of road and pipeline placed in the Fish Creek setback would have to be approved.

Alternative B would require that BLM approves the following deviations from stipulations and Required Operating Procedures (ROP):

1. Lease Stipulation E-2 (Facilities within 500 feet of water bodies)
    - One named lake (L9824) falls within the 500-foot buffer.
2. E-7(c) (less than 500 feet between pipelines and roads)
    - There are places along this route where the pipeline and road cannot be separated by 500 feet due to the terrain characteristics.

Biological Opinion
for the
National Petroleum Reserve – Alaska
Integrated Activity Plan
2013

Prepared by:
U.S. Fish and Wildlife Service
Fairbanks Fish and Wildlife Field Office
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February 5, 2013

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Introduction

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion (BO) in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq*., ESA), on the effects of the Bureau of Land Management's (BLM's) proposed Integrated Activity Plan (IAP; hereafter referred to as the Proposed Action or Action) for activities occurring within the National Petroleum Reserve – Alaska (NPR-A) on polar bears (*Ursus maritimus*), polar bear critical habitat[1], spectacled eiders (*Somateria fischeri*), and Alaska-breeding Steller's eiders (*Polysticta stelleri*).

This document assesses potential impacts resulting from the IAP as described in Alternative B-2 of the Final Integrated Activity Plan/Environmental Impact Statement (FIAP/EIS; BLM 2012b). The Action Area for this consultation includes all lands and waters within and adjacent to NPR-A boundaries that might be affected by the described Proposed Action, regardless of landownership or availability for leasing (Figure 1). This comprehensive analysis includes

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[1] On October 29, 2009, the Service proposed critical habitat for polar bears (74 FR56058). A final rule designating critical habitat for polar bears, comprised of three critical habitat units, was issued on December 7, 2010 (75 FR 76086). On January 11, 2013, the final rule was vacated and remanded to the Service by the US District Court for the District of Alaska in *Alaska Oil and Gas Association et al. v. Salazar et al* (D. Alaska)(3:11-cv-00025-RRB). Service decisions regarding the District Court's order are currently pending, and the scope and description of a final critical habitat designation for polar bears are unresolved at this time. Nevertheless, prior to the District Court's decision, the Service conducted an analysis of the potential effects of the Proposed Action on the three critical habitat units set forth in the vacated final rule. For advisory purposes, we are providing that analysis in this biological opinion.

We also compared the vacated final rule to the 2009 proposed rule, for the purpose of conducting an analysis of the potential effects of the Proposed Action on the 2009 proposed critical habitat area. Specifically, in the now vacated final rule, the town sites of Barrow and Kaktovik were excluded; existing manmade structures were not included (because they lack the habitat features essential to the bear); five coastal radar sites were excluded because existing resource management plans were deemed to provide comparable conservation benefit to polar bears; and the description of marine waters included to protect sea ice was modified slightly to correct identification of U.S. territorial waters. The differences between the proposed and vacated final rule are minor in regard to total areal extent [200,541 mi^2 (519,403 km^2) proposed; 187,157 mi^2 (484,734 km^2) in final rule] and composition of the three units, with the majority of the differences lying outside the Action Area. We note that the minor differences between the proposed and final rules for polar bear critical habitat have no effect upon the outcome of our analyses and conclusions regarding the potential effects of the proposed Action upon critical habitat, regardless of whether we are evaluating the effects of the proposed Action upon the critical habitat, as set forth in the vacated final rule, or as originally proposed.

We note that our analyses in this biological opinion may ultimately need to be revised and consultation reinitiated to reflect changes that may be made in a final critical habitat designation.

We also note that throughout this document, the term "critical habitat" refers to critical habitat as defined by the vacated final rule except where it is explicitly states that we are referring to critical habitat as originally proposed.

potential direct and indirect effects, cumulative effects, and effects of interrelated and interdependent activities on listed species and critical habitat based upon the constraints imposed by the lease stipulations, and best management practices (BMPs) that would govern management of exploration and development in NPR-A. Potential impacts of the Proposed Action were evaluated in the context of the current status of the species and environmental baseline to provide an aggregative analysis of impacts to listed species and critical habitat.

Three threatened species and critical habitat for polar bears occur in the NPR-A. The NPR-A contains virtually all currently-occupied nesting habitat for the listed population of Steller's eiders, and most of the North Slope breeding population of spectacled eiders. These species are not evenly distributed across the NPR-A, but rather are found along its northern portion. While spectacled eiders are more abundant and broadly distributed across this area, Steller's eiders are less abundant and occur in greater density near Barrow than other areas. Polar bears predominantly use the northern portion of the NPR-A, where a small number of females establish maternity dens along coastal and river bluffs, and individual, non-denning polar bears use the coastline of the NPR-A, particularly during ice-free periods of late summer and fall.

This BO is based on information from a variety of sources including the BLM's Biological Assessment (BLM 2012a), published literature, agency and consultant biological surveys and reports, the Final EIS for this project, and personal communications with species experts. Based on this information, the Service has determined that the Action is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. Section 7(a)(2) of the ESA states that Federal agencies must ensure that their activities are not likely to: 1) jeopardize the continued existence of any listed species; or 2) result in the destruction or adverse modification of designated critical habitat. Regulations adopted pursuant to section 7(a)(2) further clarify "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). To arrive at this "non-jeopardy" determination, we used a five-step approach for applying the section 7(a)(2) standards. The steps are as follows:

1. Define the biological requirements and current status of each listed species;
2. Evaluate the relevance of the environmental baseline to the species' current status;
3. Determine the effects of the proposed or continuing Action on listed species;
4. Determine whether the species can be expected to survive with an adequate potential for recovery under the effects of the Action when added to the environmental baseline, and any cumulative effects, and considering measures for survival and recovery specific to other life stages; and
5. Identify reasonable and prudent alternatives (RPAs) to a proposed and/or continuing Action when that Action is likely to jeopardize the continued existence of a listed species. Thus, this step is relevant only when the conclusion of the previously described analysis for Step 4, above, is that the proposed Action would jeopardize listed species. The RPAs would have to reduce the impacts associated with the proposed Action to a level that does not jeopardize the species.

In applying this analysis to the Proposed Action, the Service did not reach this last step because the Action is not likely to jeopardize the continued existence of any listed species or result in adverse modification or destruction of critical habitat[2]. However, adverse impacts to listed species are anticipated to result from the Proposed Action. The likelihood that impacts would occur, and the severity and magnitude of impacts that do occur, are expected to be reduced by a number of BMPs and stipulations.

This BO evaluates potential impacts on listed species and critical habitat of the following:

- onshore oil and gas leasing, exploration, and a development scenario on listed species in areas available for leasing resulting from the implementation of a modified version of Alternative B, named Alternative B-2, as the Preferred Alternative;
- implementation of performance-based best management practices (BMPs) and lease stipulations relevant to new leases;
- application of BMPs to newly-permitted activities conducted pursuant to existing leases;
- management of areas unavailable for leasing (UL);
- possible development within the NPR-A that supports offshore oil and gas activities in marine waters outside of the NPR-A; and
- management of activities other than those related to oil and gas leasing, such as travel by land-based vehicles, vessels, and aircraft.

This BO provides incidental take authorization for listed eiders that may occur through habitat loss, disturbance, and collisions resulting from the Action. Although adverse effects to polar bears are anticipated, incidental take authorization is not provided in this BO because activities

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[2] As noted previously, a final rule designating critical habitat for polar bears, comprised of three critical habitat units, was issued on December 7, 2010 (75 FR 76086) but vacated and remanded to the Service by the US District Court for the District of Alaska in *Alaska Oil and Gas Association et al. v. Salazar et al* (D. Alaska)(3:11-cv-00025-RRB) on January 11, 2013. Thus, the scope and description of a final critical habitat designation for polar bears are unresolved at this time. Prior to the District Court's decision, the Service conducted an analysis of the potential effects of the Proposed Action on the three critical habitat units set forth in the vacated final rule. For advisory purposes, we are providing that analysis in this biological opinion. The analysis concluded the Proposed Action is not likely to destroy or adversely modify any of the three units designated in the vacated final rule pursuant to Section 7(a)(2) of the ESA. We also compared the vacated final rule to the 2009 proposed rule, for the purpose of conducting an analysis of the potential effects of the Proposed Action on the 2009 proposed critical habitat area. The differences between the proposed and vacated final rule are minor in regard to total areal extent and composition of the three units, with the majority of the differences lying outside the Action Area. We found that the minor differences between the proposed and final rules for polar bear critical habitat have no effect upon the outcome of our analyses and conclusions regarding the potential effects of the proposed Action upon critical habitat, regardless of whether we are evaluating the effects of the proposed Action upon the critical habitat, as set forth in the vacated final rule, or as originally proposed. Thus, as with the final vacated rule, we concluded that the effects of the Proposed Action on critical habitat as defined by the proposed rule would not be likely to destroy or adversely modify critical habitat.

that may cause take as defined under the ESA must first be authorized under the Marine Mammal Protection Act (MMPA).

Although the Service concludes the Action is not likely to jeopardize the continued existence of listed species and that the Proposed Action is not likely to destroy or adversely modify critical habitat, considerable uncertainty exists at the IAP stage regarding the type, location, and magnitude of activities that may result from the Proposed Action. The no jeopardy conclusion assumes: 1) the development scenario does not underestimate the level of development that will actually occur; 2) the BMPs and lease stipulations will be fully implemented; and 3) other assumptions (e.g., regarding the oil spill analysis, see also BLM 2012a) used for the analysis in this BO remain valid. If changing conditions prove these assumptions wrong and suggest impacts to listed species or critical habitat have been underestimated, it may be necessary for BLM to reinitiate section 7 consultation in accordance with 50 CFR 402.16.

The Action Area

The Action Area for this consultation includes all lands and waters within and adjacent to NPR-A boundaries that might be affected by the described Proposed Action, regardless of landownership or availability for leasing (Figure 1).

The Proposed Action

The BLM considered five alternatives for the IAP in the FEIS. The Preferred Alternative, Alternative B-2, constitutes the Proposed Action for which the BLM requested ESA consultation. The Preferred Alternative, which would become the IAP, allocates lands available and unavailable for oil and gas leasing, exploration, and development. The Proposed Action would make available for oil and gas leasing approximately 11.8 million acres (52%) of federally-owned subsurface in the NPR-A (Figure 1). The remaining 11 million acres (48%) would be unavailable for leasing. Of the lands currently deferred from leasing by the previous IAPs, some in northwestern NPR-A would be made available for leasing after expiration of the deferrals in 2014 (compare Figure 1 with Map 2-1 of BLM 2012b). Other currently-deferred lands would not become available because, under the IAP, they would be unavailable for leasing. Within the lands made unavailable, oil and gas drilling would be prohibited except where valid existing leases already occur. Any such existing leases would remain valid until they expire or are relinquished, and they would be subject to stipulations and BMPs, as appropriate, to the area and activity under review (e.g., exploratory drilling or production pad construction).

The IAP (hereafter referred to as the Proposed Action or Action) would remain in place indefinitely until it is determined that it is no longer adequate under NEPA. This could extend through the end of the century, or perhaps more relevant to listed species, through full implementation (i.e., abandonment phase) of the oil and gas development scenario (approximately 50 years, ending in or near 2062). This BO evaluates effects of full implementation.

The BLM estimates that production of discovered oil and gas resources in the eastern NPR-A could begin by 2023. This includes the Moose's Tooth and Bear Tooth units, and an area near

Umiat. The discovery and production of additional commercial fields elsewhere in the NPR-A would likely occur gradually, with the first resulting production facilities estimated to open by 2032 and the last facilities closing by 2057 (FEIS Vol. 2 on p. 62 and on p. 66 [Figures 4-17 and 4-18]). Full decommissioning could require an additional five years, concluding all oil- and gas-related activities except some monitoring (such as vegetation recovery) by 2062.

The Proposed Action would also:

- Allow the use of temporary hunting, fishing, and trapping structures (e.g., tents, blinds) throughout the NPR-A. The proposed action would also allow travel within the NPR-A by motorized vehicles, including motorboat, snowmobile, off-highway vehicle (OHV), and aircraft (including use of unimproved landing areas), provided that such use is consistent with the Off-Highway Vehicle use designation (see BLM 2012b, Table 2.2) and would not detrimentally impact resources.

- Modify existing Special Areas and create one new Special Area. The Teshekpuk Lake Special Area would gain approximately 1.9 million acres to protect caribou calving and insect-relief areas, and waterbird and shorebird breeding, molting, staging, and migration habitats. Approximately 3.1 million acres would be added to the Utukok River Uplands Special Area to more fully encompass prime caribou calving and insect-relief habitat within the NPR-A. The 107,000-acre Peard Bay Special Area would be created to protect haul-out areas and nearshore waters for marine mammals, and high use staging and migration areas for shorebirds and waterbirds. The boundaries of the Colville River Special Area would not change, but its purpose would be modified to protect all raptors, rather than only arctic peregrine falcons.

- Include performance-based BMPs to mitigate the impacts of BLM-authorized activities not bound by a valid lease. The Proposed Action also allows objectives and requirements/standards of lease stipulations to be applied to activities not bound by a valid lease when the objective of the stipulation applies to the activities; in these situations, the stipulations would function similarly to BMPs. Please see *Appendix A. BLM's Lease Stipulations and Best Management Practices* for a list of these lease stipulations and BMPs.

To analyze the impacts of its Proposed Action, BLM created a development scenario that estimates the number of exploration, development, and production operations, as well as development footprints and activities that support these operations.

In the following sections, we discuss potential oil and gas activities followed by other activities included in the Proposed Action. We begin by describing actions common to all stages of oil and gas activities. We then outline the different stages of oil and gas development, from exploration through abandonment and restoration. For a more complete description, the reader is referred to BLM (2012a and 2012b).

Actions Common to Multiple Oil and Gas Activities

Staging Areas

Staging areas are used to store equipment and material until further transport is feasible. They typically contain fuel storage tanks, warehouses, housing units, and permanent gravel airstrips capable of handling large capacity aircraft and can be used year-round. In winter, staged materials are moved by temporary roads (ice or packed snow) or aircraft. The BLM's development scenario contains an estimate of construction of three new 50-acre staging areas. Other existing gravel pads could also be used for staging, such as Camp Lonely, Cape Simpson, Ikpikpuk, Inigok, or Umiat. New coastal staging areas are unlikely.

Aircraft Flights

Helicopters and fixed-wing aircraft would provide access for many oil and gas activities. This could include air support for seismic surveys and exploratory drilling; aerial surveys of and support for ground surveys of wildlife, archaeological, and other resources; road and pipeline route surveys; pipeline inspections; and support for other development, operations, and abandonment activities. The location, timing, and frequency of such flights and the type of aircraft used would be influenced by the phase of oil exploration, development and operations, the location of any oil discovered, the type of development that might occur, and the restrictions that the BLM and other regulators might place on the lessee or permittee. While an exact projection of the number of flights is not possible, see BLM (2012b, Vol. 2 pp. 11-12) for examples that give indication of the number of flights at different stages of oil and gas development.

Construction of Roads (gravel and winter ice roads)

Most overland transportation in the NPR-A would occur on temporary ice roads or snow-packed trails in winter (December to April). The BLM estimates in the development scenario that 50 miles of ice roads/snow packed trails would be constructed in the NPR-A annually. Once pad construction and development are completed, air transportation of maintenance equipment and personnel to the development complex via a gravel airstrip located at the central processing/gas compressor facility will suffice, and the necessity of building ice roads will be limited to circumstances in which air transport is not feasible or cost-effective. Ice roads/snow packed trails would also be used to support construction, maintenance, and monitoring of oil and gas pipelines running from development complexes in the NPR-A to transmission pipelines east of the NPR-A.

Gravel roads would primarily connect permanent infrastructure within an oil or gas production field (i.e., in-field developments). They would not be used to connect production fields to each other or to other North Slope facilities. The development scenario contains an estimate of construction of 510 miles (3,825 acres) of gravel roads.

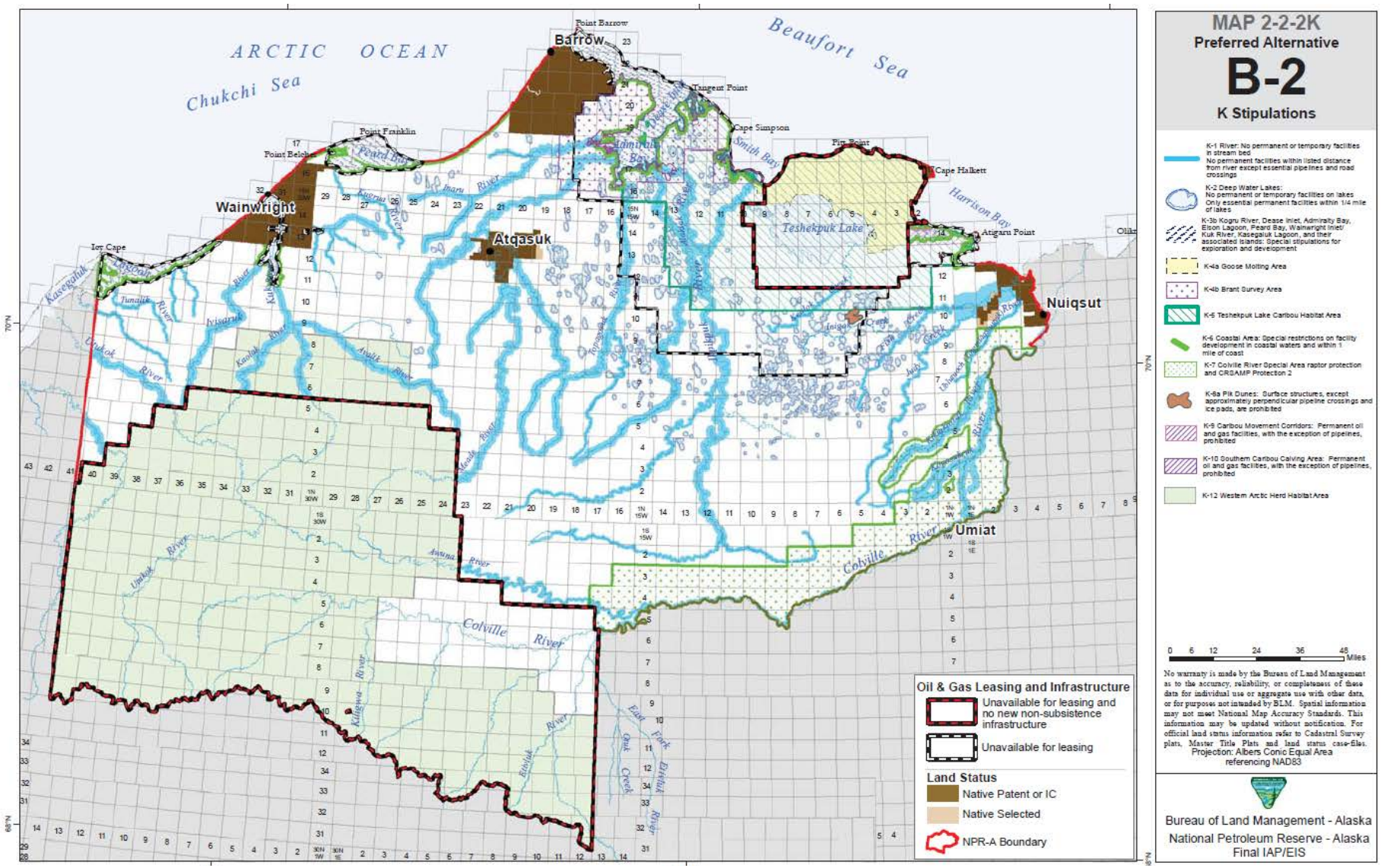

Figure 1. Land allocations and surface occupancy restrictions of the Proposed Action. From Map 1 of BLM (2012a).

Table 1. Development timeframe for a typical oil/gas field (from BLM 2012a, Table 2-1)

Project phase	Duration of activity (years)	Activities
Exploration	1 to 10	conduct seismic surveys to define prospects conduct well-site surveys drill exploration wells
Discovery	Can occur anytime during or after exploration	drill additional wells to delineate the extent of the hydrocarbon reservoir conduct additional seismic survey (3-D) construct hydrocarbon reservoir models carry out baseline environmental studies, monitoring, and survey work
Design & permitting	Can occur anytime during or after economic discovery is affirmed and project is sanctioned by lessees	apply for permits complete conceptual engineering complete preliminary engineering complete detailed engineering obtain financial approval for project and procure long lead time materials carry out environmental studies and monitoring
Construction and transportation to site	Can occur any time after authorization for expenditures is approved	obtain permits to construct fabricate facilities install roads and marine facilities to access site build gravel drilling and production facility pads transport materials and facilities to site install piping and facilities continue to carry out environmental studies and monitoring
Development	Normally takes 3 to 6 years past the initial discovery	obtain drilling, and operational permits drill disposal wells establish construction base camp begin drilling development wells install pipelines and pump stations install production facilities and hookup
Production	10 to 50 years post-development	continue development-well drilling ramp-up production (2 to 5 years) reach peak production plateau (oil: 3 to 5 years; gas: 12 to 13 years) expect production declines well workovers (every 3 to 5 years) conduct infill drilling (well spacing reduced) employ tertiary recovery methods progressively shut-in wells reach an economic limit

Project phase	Duration of activity (years)	Activities
Abandonment	Individual wells can take 2 to 5 years	plug and abandon wells remove production equipment dismantle facilities decommission pipeline restore and re-vegetate sites phase out environmental monitoring

Summer Support Work

Some off pad travel by low-ground-pressure vehicles may occur after July 15. Summer vehicle tundra travel is commonly used during spill response training, prevention, and preparedness measures such as transport, placement, and retrieval (before freezeup) of floating booms across streams downstream from pipelines. Pipeline inspections may also entail summer vehicle travel on the tundra. Off-pad travel would be conducted in accordance with BMP L-1, which would limit such travel to low ground pressure vehicles, and is designed to minimize impacts to tundra soils and vegetation.

Management of Wastes

The Proposed Action does not include establishment of new landfills. The landfill at Deadhorse most likely would be used for materials not requiring additional treatment. Organic wastes would be disposed of in accordance with federal law, and the disposal of liquid or solid waste would not be permitted on site.

Development and Production Scenario

Exploration

Seismic Surveys

The majority of the Action Area has been mapped by 2-dimensional (2-D) seismic surveys, and additional seismic work likely would involve more intensive 3-dimensional (3-D) surveys. Up to one 2-D and ten 3-D surveys would be conducted before production ceases (estimated to occur by 2057). Most surveys would not occur for at least 10 years; only one 3-D survey would occur in the next 10 years. The BLM assumes in the development scenario that seismic activities would not occur in areas unavailable for leasing because no drilling would be allowed. In the development scenario, the BLM also assumes that exploration-focused seismic surveys would not be repeated where data are already available (see BLM 2012b, Figure 4.1).

Following the end of each winter seismic season, equipment would be transported to a staging area for storage and maintenance. In summer, crews would fly to these staging areas via fixed-wing planes or helicopters to conduct equipment repairs and maintenance before the equipment is cold stacked until winter.

Exploratory Drilling

Exploratory drilling would take place in winter. Access to drill sites would occur via ice roads constructed by spreading water and ice chips from lakes along the route. Ice pads would then be constructed using similar methods. Ice airstrips may also be constructed near drill sites to allow transportation of supplies, equipment, and personnel to and from the site. Drilling materials (mud and cuttings) would be re-injected into dry drill holes. If drilling is successful, the well would be temporarily capped, and mud and cuttings would be removed from the site and transported to an approved disposal facility.

At the end of the exploration season, ice pads and drill equipment may be over-summered *in situ*, or equipment may be moved to a staging area. As with seismic surveys, crews would fly to staging areas/summer pads via fixed wing or helicopters and carry out equipment repairs and maintenance. The ice road right-of-way and ice pad locations are surveyed the summer before construction, and cleanup crews remove all debris and garbage along the routes with the aid of helicopters the summer after construction. Ice pads typically cover six acres; the development scenario contains an estimate that up to 20 exploration wells on 120 acres, 56 delineation wells on 120 acres, and two drilling rigs would be needed for oil exploration. The same number of wells would be drilled for gas exploration using three drilling rigs.

Location of Development

Predicting where oil and gas development would ultimately occur is difficult at and before the leasing stage. Geological mapping of the Action Area suggests the northeastern quadrant has a high potential for the occurrence of petroleum resources, and most of the western half has a much lower economic potential on a per-acre basis than the northeastern quadrant.

Eight lease sales have been held in the NPR-A since 1999. Some lease blocks sold have subsequently been relinquished. Nearly 1.5 million acres were held in valid leases as of October 2012 (BLM 2012c), although no development has yet occurred. Lease sales suggest highest industry interest in the northern and eastern portions of the NPR-A. In the development scenario, the BLM assumes that no economically recoverable oil exists in the southern two "economic zones" (BLM 2012a, Map 2); thus, interest and subsequent activity in the southern portion of NPR-A is likely to be lower than in the northern portions. The Proposed Action would not allow oil and gas leasing in the immediate offshore area, including areas such as Dease Inlet, Admiralty Bay, and Elson Lagoon. As previously mentioned, development cannot occur on lands designated as unavailable for leasing, and may be limited in other areas by surface occupancy restrictions imposed by lease stipulations and BMPs.

Field Development

A production operation complex would minimally contain a pad with dozens of wells and a central processing facility (CPF) for an oil field or a combined central processing/gas compressor facility (CPGCF) for a gas field. Under the development scenario, it is estimated that oil and gas would be developed at different locations, and therefore separate footprints would result. Gas incidentally extracted with oil (i.e., associated gas) would be re-injected to promote oil recovery or used to power operations at the CPF.

The CPF typically includes living quarters and offices, maintenance shops, storage tanks for fuel and water, power generators, waste-treatment units, and a communications center. An airstrip near the CPF would allow transport of supplies and personnel. The CPF would also include feeder lines, regional pipelines, booster pump (oil) or additional compression stations (gas), a high-pressure gas trunk line, a gas conditioning facility, and an oil-sale or gas-sale pipeline to transport the resource to market. Components of the CPF may be constructed as transportable modules in offsite locations, perhaps outside Alaska, barged to the North Slope, then moved over gravel roads or winter ice roads to the field and assembled. All buildings would be supported above ground on pilings to accommodate ground settling or frost heaving.

Power, telephone, and other communication lines would be buried in roads or installed on the pipeline vertical support members (VSMs), to the extent practicable. Communication tower design would follow BMP E-11, which requires that tower guy wires be marked, increasing visibility to reduce potential strikes by birds.

Depending on the size of a field or the presence of nearby fields, a production complex may also include an outlying (satellite) oil production pad or one or more gas production pads. With such joint development, a gathering system and road or an airstrip would be needed between the CPF or CPGCF and the satellite pad. A borrow site for supplying gravel for pads, roads, and an airstrip may be a part of each production operation; but, depending on the availability of gravel and the proximity of production operations, some borrow sites may provide gravel for multiple production operations.

In the development scenario, the BLM estimates that eight CPFs could be developed for oil production in the NPR-A, most of which would require 40 acres plus an additional 11 acres for a gravel airstrip (Appendix B in BLM 2012a). The BLM estimates construction of 14 satellite oil production pads, each requiring about 10 acres and a 10-15 mile gravel road to connect to a CPF for a total footprint of 408 acres. These estimates include development of discovered oil in the Moose's Tooth and Bear Tooth units (northeastern NPR-A) and near Umiat. Non-associated gas production is expected to require 21 CPGCFs and 47 satellite pads, each requiring 10 and 6 acres, respectively, for a total footprint of 492 acres. All oil production wells and processing facilities have a maximum expected lifespan of 25 years, whereas comparable gas facilities have a maximum 22 year lifespan. Facilities would be dismantled and removed during the field abandonment phase.

Gravel Drill-Pad and Road Construction

Gravel pad construction would be needed for wellheads, production and support facilities, roads, and airstrips. Borrow pits are relatively common east of the Colville River, but gravel is scarce in the NPR-A. Gravel could be extracted from existing or to-be-discovered borrow sites and then trucked over winter ice roads. The proposed Clover A Mine Site is located in the NPR-A, approximately 10.8 miles southwest of the Alpine development. Gravel could be barged to coastal staging areas, and stockpiled for later transport by trucks over winter ice roads or snow-packed trails.

New gravel sites could impact 20 to 50 acres or more with mining and overburden. The BLM estimates in the development scenario one acre of gravel removal for every five acres of oil and

gas development for a total footprint of 1,125 acres (e.g., a 10-acre gravel production pad would result in two acres of borrow pit disturbance), and estimates that 566 miles of in-field gravel roads would be needed in the NPR-A for a total footprint of 4,245 acres.

Production

BLM anticipates aircraft and vehicle traffic will be lower during production than during development. Activities would be centered at CPFs. Planned pipeline maintenance would take place in winter when pipelines are accessible by ice road or hardened snow trail. Weekly inspection overflights would occur throughout the year. Oil spill response training involving up to 40 personnel and some aircraft and possibly vessels would occur. The duration and frequency of these training events is uncertain, but BLM would work with the Service to minimize impacts (see BMP E-18). No solid or liquid wastes would be disposed of at a CPF or satellite facility; they will be transported to a permitted landfill, and organic wastes may be incinerated. During construction and production phases, compliance inspections by BLM and other resource agencies may occur.

Oil Pipeline Infrastructure

The locations of new pipelines would depend on the location and sequence of commercial-sized discoveries. Currently, predicting exactly where or when new commercial fields would be discovered and developed is not possible. The BLM anticipates that all oil produced in the NPR-A would be moved east to Pump Station 1 of the Trans-Alaska Pipeline System (TAPS). Existing oil and gas discoveries (i.e., known accumulations) within the Greater Moose's Tooth and Bear Tooth units (near the eastern NPR-A boundary) would be developed as satellite to the existing Alpine Project facility, which has infrastructure available to connect to the TAPS. In the development scenario, the BLM estimates that 154 miles of oil gathering/feeder pipelines and 451 miles of regional pipelines would be required for oil transportation (Appendix B in BLM 2012a).

Pipeline construction is expected to occur during winter concurrent with construction of the development and production facilities. Pipelines would be installed above ground on VSMs spaced 35 to 70 feet apart. Pipelines would be placed a minimum of 7 feet above the tundra. Clearance is generally higher (up to 20 feet) over topographic lows (stream valleys) to maintain a nearly-level pipeline route. Pipelines could cross small, shallow lakes using VSMs, whereas pipelines would be setback in VSMs around large or deep lakes. Pipelines crossing large rivers, such as the Colville River, could be on bridges or buried using horizontal directional drilling. Elevated pipelines would likely cross narrow streams on suspension spans to minimize impacts to streambanks and riparian vegetation and to avoid potential problems associated with corrosion, maintenance, and abandonment of buried pipelines. The development scenario estimates that two pump stations could be required along the new mainline route. Powerlines would be placed in cable trays on or suspended from VSMs. Routine pipeline maintenance would occur during winter via ice roads or hardened snow trails; summer activities would occur on an emergency basis only. Pipelines would be monitored electronically (remotely) and visually (e.g., with overflights).

Gas Pipeline Infrastructure

For this analysis, if commercial non-associated gas were developed, it would be transported via gathering lines from the respective gas field to regional pipelines located at economic zone (regional) hubs. Regional lines would converge into one line that would proceed to a future gas conditioning plant near Pump Station 1 of the TAPS. It is not possible to determine potential routes at this time. However, none of the oil or gas development would be established as subsea infrastructure, nor would any pipeline terminate on the Beaufort or Chukchi coastlines for processing or off-loading onto tankers.

Gas pipelines would likely be offset from oil pipelines by approximately 75 to 100 feet. Gas would be chilled at compression stations to a temperature equal to the mean annual ground temperature to avoid melting permafrost and to avoid changes to the thermal regime of the *in situ* soil. The development scenario includes BLM's estimate that for gas development, 557 miles of gathering/feeder lines, 290 miles of regional pipelines, and 50 miles of high pressure lines would be required.

Gas pipelines would likely be constructed and maintained during winter, and buried so that the top of the pipe is about 30 inches below grade. Trenches would be approximately 5 feet deep and 4 feet wide, with a surface-disturbed area 15 feet wide along the length of the pipeline route. River crossing methods would be determined by characteristics of the river. For example, it is most likely that elevated spans would be used across narrow, deep rivers; burial would occur across wide, shallow rivers, and horizontally drilled tunnels could be used across wide, deep rivers. Depending on the throughput and other factors of pipeline design, stations for compressing and cooling gas would be built at regular intervals (120 miles) along the pipeline route to maintain optimum operating conditions. The footprint of the compression station pad would be 5 to 10 acres.

Watercraft Support to Production Facilities

CPF modules and equipment would be delivered by sealift in summer (mid-July to late September). The BLM estimated in the development scenario that each sealift would consist of up to 30 barges, and that one to two sea lifts would be required per CPF. The first development operations in the NPR-A would likely be mobilized from the Greater Prudhoe Bay Unit or Kuparuk River Unit. These basecamps have all-season airports, are connected by road systems, and have marine loading sites (West Dock and Oliktok Point). There are currently no docks in the NPR-A, and none are predicted for construction in the development scenario. The Lonely Dew-Line station, however, provides high ground, which can best be accessed by barge at higher tides. Modules and equipment would be offloaded from barges in three to five days and stored on the staging pad until winter, when transportation could resume via ice road or snow-packed trail.

Non-recreational airboat use would be allowed on streams, lakes, and estuaries that are seasonally accessible by motorboats. The development scenario does not include construction of facilities adjacent to waterways that could support non-recreational use of watercraft because of setbacks required by various stipulations (see *Appendix A. BLM's Lease Stipulations and Best Management Practices*).

Abandonment and Restoration

All oil and gas facilities and equipment would be removed via winter ice roads. Well casings would be cut at least 3-feet below ground surface and wells plugged. Lease stipulation G-1 requires sites to be reclaimed to ensure eventual restoration of ecosystem function. The BLM estimates that post abandonment monitoring, consisting of a one-day site visit via helicopter, would take place no more than once per year for up to 15 years post-abandonment.

Non-oil and Gas Activities

Predicting if, when, and where non-oil and gas activities would occur is difficult. However, the activities described below are likely to occur, usually during summer. These activities would be subject to BMPs through BLM's permitting process.

Aircraft Use, Takeoffs, and Landings

The BLM expects various entities to obtain access to the NPR-A via aircraft. Aircraft activity includes point-to-point transport of personnel or supplies and survey or monitoring activities. Activities include those previously mentioned, non-oil and gas, as well as oil and gas companies conducting environmental studies to collect baseline information prior to development of infrastructure for development outside NPR-A boundaries (e.g., in the Chukchi Sea; see BLM 2012b). Most aircraft activity would take place during spring, summer, and fall. While it is likely that aircraft would fly over nearly all of the NPR-A, monitoring wildlife and human use is often focused in river drainages. Use of aircraft to complete cultural and paleontological surveys would most likely occur along river drainages and coastal areas. Aerial wildlife surveys would be most common during late June through July, over caribou and waterfowl habitat areas. The BLM estimated 1,888 helicopter take offs and landings would occur during summer 2012 (USFWS 2012a, USFWS 2012b), and the BLM expects similar numbers in future years, The BLM also estimated field crews (currently 20 to 50 personnel) and helicopters would be based at previously established commercial camps at Wainwright, Atqasuk, or Umiat. Temporary camps at yet to be determined sites could be established. On-tundra studies are likely to increase in scope and intensity during the planning stages of large-scale onshore and offshore development.

Watercraft Use

Watercraft use during summer would be permitted or authorized, and would likely be used by researchers near or in large water bodies such as the sea, rivers, or large, deepwater lakes.

Excavation and Collection

Excavating and collecting archaeological, paleontological, geologic, and soil resources usually occurs during summer using hand tools, and is generally limited to small areas (several square feet), and rarely extends more than three feet below the surface. Some excavations require heavy machinery and blasting and if an archaeological site is studied in detail or if a geologic section is mapped larger areas might be excavated. Excavations are backfilled, and in most cases, the vegetative layer is replaced atop the excavation. Most excavation would probably occur along the primary drainages of the NPR-A.

Ground Activities and Camps

Ground activities include small groups of scientists or recreationists (including guided hunting parties) hiking across tundra or floating down rivers. Ground camps range from those supplied

by backpack to those supported by aircraft. Larger camps include a fuel tank or bladder of up to 5,000 gallons, or fuel in drums, and might have 20 or more people. Smaller parties use "fly" camps that are set up and moved every few days by boat, raft, or aircraft, and have nothing more than stove fuel. Backpack camps require fewer supplies than fly camps and tend to relocate daily.

Small camps might be located throughout the NPR-A. Larger camps would most likely be placed at the Inigok airstrip or associated gravel pads, the Lonely DEW-Line site, and temporary camps on the Kiligwa River. A frequently used large camp at Ivotuk is approximately 9 miles outside of NPR-A. All large camps would have fuel facilities, and fuel caches might be established at other sites even if a camp was not present. Human waste at small temporary camps is disposed of as recommended in the National Outdoor Leadership School's Leave No Trace, Alaskan Tundra guidelines. Use of the Inigok airstrip and pad is likely to remain at current levels or increase slightly over the next few years to support management activities.

The BLM may issue minimum-impact permits that allow activities such as research and monitoring. Because of the fragile nature of thawed tundra during summer, large camps are normally restricted to durable areas such as gravel bars, beaches, or existing gravel pads.

Overland Moves and Other Land Use Permits

The BLM issues minimum impact rights-of-way for overland moves for transport of supplies to villages. The BLM allows only activities that would have a negligible impact on the environment. Permafrost underlies the entire NPR-A, and wetlands cover the majority of the NPR-A. Therefore, the BLM does not issue permits for summer inter-village overland travel in the NPR-A. Vehicles allowed for use in overland moves would exert low ground pressure and be permitted to travel only over snow-covered ground frozen to a sufficient depth to minimize soil and vegetation impacts. Typically, overland moves would originate in Prudhoe Bay or Barrow and would use pre-established overland travel routes or sea ice. Streams are commonly crossed at dry streambeds, on grounded ice, or ice thick enough to support crossing vehicles. Overland moves would typically begin in December when there is adequate snow cover and the ground is frozen, and end in early May. Overland travel could include 4 to 60 trains of four to 15 vehicles with attached sleds annually. The width of overland trails is approximately 12 feet.

Contaminated Sites

Human and industrial activity in NPR-A have introduced hazardous or solid wastes into the environment. The list includes U.S. Department of Defense (DOD) Defense Early Warning Stations (1950s through the 1980s), Long Range or Short Range Radar Sites (1990s to present), and antennae. There have also been staging areas, transportation corridors, and research and oil and gas exploration programs conducted by or for the U.S. Navy from the 1940s through the 1970s, and by the U.S. Geological Survey (USGS) from 1977 through 1982 through a contractor (Husky). The BLM has assessed the condition of the USGS legacy wells and embarked on a program to plug and abandon those wells that may pose a risk; 14 of 19 wells have been plugged and abandoned to date. Small landfills and/or reserve pits are associated with some legacy wells and DOD sites, and may include camp wastes, empty drums, drilling muds, petroleum products, foam and other items. These sites are limited in occurrence and extent. Remediation of these sites is included in the Proposed Action. A phased approach would be used to address sites with

solid waste and known releases of regulated substances in the NPR-A. The cleanup process includes verification, site characterization and remediation of soil, air and water impacted by uncontrolled releases of regulated substances. The process used to address contaminated sites would be consistent with applicable federal and state guidance and regulations. Remediation will likely occur over several years.

Recreation and Film Permits

The BLM issues special recreation permits to commercial recreation operators, such as hunting and float-trip guides, who generally focus their activity along large rivers such as the Colville Utukok, and Kokolik. Hunting or float trips would consist of about 10 people, and commonly occur from March through September. Some special recreation permits could also be associated with other activities, such as filming-making. Float-equipped aircraft could be used to take hunters or sightseers to lakes or rivers. These flights could result in camping within the NPR-A at a level similar to that of "fly" camps or backpack camps.

Boating parties along rivers would carry fuel for small stoves and boat engines. They would typically camp for no more than one night in any one place, and camping practices and impacts would generally be similar to those of fly camps or backpack camps described previously. In addition, small parties use the rivers for non-commercial recreational hunting and fishing or float trips, and there is a limited amount of backpacking in the NPR-A. The frequency and locations of these activities are not quantified and permits are not required. Nevertheless, such activities will continue.

Pre-Development Environmental Studies for Offshore Development

In addition to ongoing research and monitoring in the NPR-A, the BLM expects environmental studies to be conducted to collect baseline information prior to development of infrastructure outside its boundaries (e.g., in the Chukchi Sea). For example, in 2012 BLM issued permits to Shell Gulf of Mexico Inc. (Shell) to conduct summer studies on surface hydrology, coastal processes, terrestrial and coastal habitat assessments, fish and wildlife surveys, and surveys of cultural resources in NPR-A (BLM 2012c). Access to NPR-A is typically by aircraft, and approximately 1,000 helicopter take offs and landings were expected for the 2012 environmental studies. Field crews (currently 20 to 50 personnel) and helicopters are based at previously established commercial camps at Wainwright, Atqasuk, or Umiat. Temporary camps at yet to be determined sites could be established. These types of studies will likely continue and increase in scope and intensity while large-scale infrastructure projects are in the planning phase.

Lease Stipulations and BMPs

The BLM has created lease stipulations and best management practices (BMPs) to minimize the effects of activities, both oil and gas and non-oil and gas, occurring in NPR-A. The stipulations and BMPs set performance objectives for the activities, as well as requirements/standards for meeting the objectives. The BLM incorporates stipulations into the oil and gas leases that govern lease holders and their contractors. Some lease stipulations have spatial restrictions on surface occupancy that constrain where lease-specific infrastructure or activities may occur. While stipulations apply to oil and gas leases, the objectives of the stipulations are equally valid for oil and gas activities taking place off the lease and for analogous non-oil and gas activities occurring in the NPR-A, and may be imposed at the permitting stage. Our effects analysis below

considers the extent to which these stipulations and BMPs are likely to mitigate impacts to listed species. Whether imposed as a condition of a permit or as a lease stipulation, requirements are binding. For a list of BLM's stipulations and BMPs and their content, see *Appendix A. BLM's Lease Stipulations and Best Management Practices*.

Status of the Species and Critical Habitat

This section presents biological and ecological information relevant to the BO. Appropriate information on species' life history, habitat and distribution, and other factors necessary for their survival is provided for analysis in later sections.

Our BO includes consideration of ongoing and projected changes in climate using terms as are defined by the Intergovernmental Panel on Climate Change (IPCC). "Climate" refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007, p. 78). The term "climate change" thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007, p. 78). Various types of changes in climate can have direct or indirect effects on species. These effects may be positive, neutral, or negative and they may change over time, depending on the species and other relevant considerations, such as the effects of interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007, pp. 8–14, 18–19). In our BO, we use our expert judgment to weigh relevant information, including uncertainty, in our consideration of climate change.

Spectacled Eiders

Status and Distribution

The spectacled eider was listed throughout its range as threatened on May 10, 1993 (58 FR 27474) because of documented population declines on the Yukon Kuskokwim Delta. Historically, spectacled eiders nested in Alaska discontinuously from the Nushagak Peninsula north to Barrow, and east nearly to Canada's Yukon Territory (Phillips 1922-1926, Bent 1925, Bailey 1948, Dau and Kistchinski 1977, Derksen et al. 1981, Garner and Reynolds 1986, Johnson and Herter 1989). Currently, this species consists of three primary breeding populations: those on Alaska's North Slope (or Arctic Coastal Plain), the Yukon-Kuskokwim Delta (Y-K Delta), and northern Russia (Figure 2). The Y-K Delta population had declined 96% between the 1970s and early 1990s (Stehn et al. 1993, Ely et al. 1994). Research and spring aerial surveys have provided data on spectacled eider populations on Alaska's Arctic Coastal Plain (ACP Survey) since 1992. The aerial population index obtained from ACP Surveys suggests population growth rate is approximately stable over the long term (0.99, 90% CI 0.98-1.01) and last 10 years (1.00, 90% CI 0.97-1.03) on the ACP (Figure 19 in Larned et al. 2012a).

After breeding, spectacled eiders migrate to several discrete molting areas (Figure 2), with birds from the different populations and genders apparently favoring different molting areas (Petersen et al. 1999). After molting, spectacled eiders migrate to openings in the pack ice of the central

Bering Sea south/southwest of St. Lawrence Island (Petersen et al. 1999; Figure 2), where they remain until March or April (Lovvorn et al. 2003).

Figure 2. Distribution of spectacled eiders. Molting areas (green) are used July through October. Wintering area (yellow) are used October through April. The full extent of molting and wintering areas is not yet known and may extend beyond the boundaries shown.

Life History

Breeding–North Slope Population

Spectacled eiders arrive on the ACP breeding grounds in late May to early June. Breeding density varies across the North Slope (Figure 3). Numbers of breeding pairs peak in mid-June and decline 4–5 days later when males begin to depart from the breeding grounds (Smith et al. 1994, Anderson and Cooper 1994, Anderson et al. 1995, Bart and Earnst 2005). Mean clutch size reported from studies on the Colville River Delta was 4.3 (Bart and Earnst 2005). Spectacled eider clutch size near Barrow has averaged 4.1 to 4.7 (Safine 2011, Safine 2012). Incubation lasts 20–25 days (Kondratev and Zadorina 1992, Harwood and Moran 1993, Moran and Harwood 1994, Moran 1995), and hatching occurs from mid- to late July (Warnock and Troy 1992). On the nesting grounds, spectacled eiders feed on mollusks insect larvae, small freshwater crustaceans, and plants and seeds (Kondratev and Zadorina 1992) in shallow freshwater or brackish ponds, or on flooded tundra. Young fledge approximately 50 to 55 days after hatch, and females with broods move from freshwater to marine habitats just prior to or after fledging (Safine 2011).

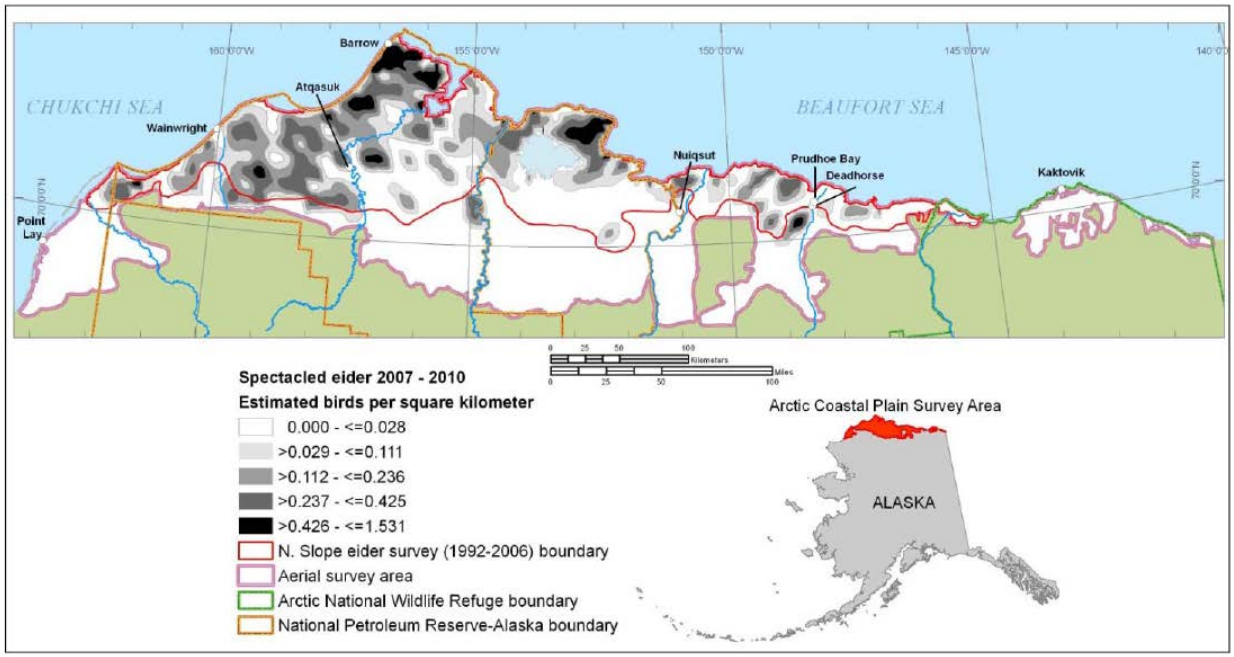

Figure 3. Density distribution of spectacled eiders (*Somateria fischeri*) observed on aerial transects sampling 57,336 km^2 of wetland tundra on the North Slope of Alaska during early to mid-June, 2007-2010. From Larned et al. 2011.

Nest success is highly variable and greatly influenced by predators. In arctic Russia, apparent nest success was estimated as <2% in 1994 and 27% in 1995; predation was believed to be the cause of high failure rates, with foxes, gulls and jaegers the suspected predators (Pearce et al. 1998). Apparent nest success in 1991 and 1993-1995 in the Kuparuk and Prudhoe Bay oil fields on the ACP varied from 25-40% (Warnock and Troy 1992, Anderson et al. 1998). Nest survival probability for spectacled eiders in an area near Barrow employing fox control in 2011 was 72 % (95% CI, 27-92%; Safine 2012).

Post-breeding – North Slope

Males generally depart breeding areas when females begin incubation in late June (Anderson and Cooper 1994, Bart and Earnst 2005). Use of the Beaufort Sea by departing males is variable. Some appear to move directly to the Chukchi Sea over land, while the majority moved rapidly (average travel of 1.75 days), over nearshore waters of the Beaufort Sea from the breeding grounds to the Chukchi Sea (TERA 2002). Males seem to prefer large river deltas such as the Colville River containing open water in early summer when much of the Beaufort Sea is still frozen. About half of the adult males marked in northern and western Alaska in a satellite telemetry study migrated to northern Russia to molt (Matt Sexson, USGS, unpublished data). Results from this study also suggested that male eiders follow coast lines and migrate straight across portions of the northern Bering and Chukchi seas in route to northern Russia (Matt Sexson, USGS unpublished data).

Females generally depart the breeding grounds after males; more of the Beaufort Sea is ice-free at this time, allowing more use of marine waters (Peterson et al. 1999, TERA 2002). Females spent an average of two weeks in the Beaufort Sea (range 6-30 days) mostly in its western

portion (TERA 2002). Females also appeared to migrate through the Beaufort Sea an average of 10 km further offshore than males (Peterson et al. 1999). Telemetry data indicates that molt migration of failed/non-breeding females from the Colville River Delta through the Beaufort Sea is relatively rapid (two weeks) compared to two to three months spent by these females in the Chukchi Sea (Matt Sexson, USGS unpublished data).

Molt

Avian molt is energetically demanding, especially for species such as spectacled eiders that complete molt in a few weeks. Spectacled eiders use four molting areas from July to late October (Figure 2; Larned et al. 1995, Peterson et al. 1999). Females generally use molting areas nearest their breeding grounds. Males did not show strong molting site fidelity; males from all three breeding areas molted in Ledyard Bay, Mechigmenskiy Bay, and the Indigirka/Kolyma River Delta. Males reached molting areas first, beginning in late June, and remained through mid-October. Non-breeding females and those that nested but failed arrived at molting areas in late July, while successfully-breeding females and young of the year reached molting areas in late August or September and remained through October.

Wintering

After molting, spectacled eiders migrate offshore in the Chukchi and Bering Seas to a single wintering area in openings in pack ice of the central Bering Sea south/southwest of St. Lawrence Island (Figure 2). Hundreds of thousands of spectacled eiders (Petersen et al. 1999) rest and feed by diving up to 70 m to eat benthic bivalves, mollusks, and crustaceans (Cottam 1939, Petersen et al. 1998, Petersen and Douglas 2004). Sampling over several decades suggests that the benthic community in the overwintering area has shifted from larger to smaller species of clams (Lovvorn et al. 2000, Richman and Lovvorn 2003).

Late Winter/Spring

Spectacled and other eiders probably make extensive use of the eastern Chukchi spring lead system between departure from the wintering area in March and April and arrival on the North Slope in mid-May or early June (Figure 4). Limited spring aerial observations in the eastern Chukchi have documented dozens to several hundred common eiders (*Somateria mollissima*) and spectacled eiders in spring leads and several miles offshore in relatively small openings in rotting sea ice (W. Larned, USFWS; J. Lovvorn, University of Wyoming, *pers. comm.*). Woodby and Divoky (1982) documented large numbers of king eiders (*S. spectabilis*) and common eiders using the eastern Chukchi lead system, advancing in pulses during days of favorable following winds, and concluded that an open lead is probably requisite for spring eider passage in this region. Preliminary results from an ongoing satellite telemetry study conducted by the USGS Alaska Science Center (Figure 4, Figure 14; USGS, unpublished data) suggest that spectacled eiders also use this lead system during spring migration.

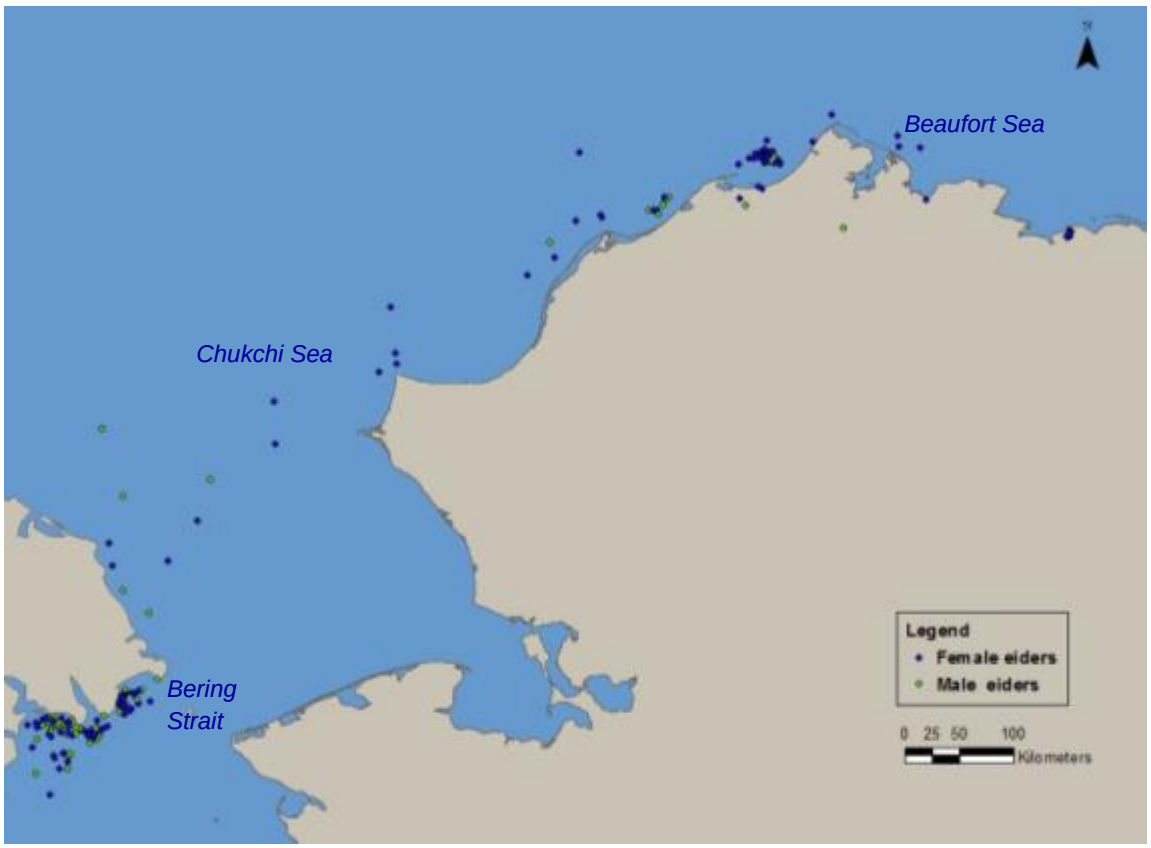

Figure 4. Spectacled eider satellite telemetry locations for 12 female and 7 male spectacled eiders in the eastern Chukchi Sea from 1 April – 15 June 2010 and 1 April – 15 June 2011. Additional locations from the northern coast of Russia are not shown. Eiders were tagged on the North Slope during the 2009 and 2010 breeding seasons. Data provided by Matt Sexson, USGS Alaska Science Center (USGS, unpublished).

Adequate foraging opportunities and nutrition during spring migration are critical to spectacled eider productivity. Like most sea ducks, female spectacled eiders do not feed substantially on the breeding grounds, but produce and incubate their eggs while living primarily off body reserves (Korschgen 1977, Drent and Daan 1980, Parker and Holm 1990). Clutch size, a measure of reproductive potential, was positively correlated with body condition and reserves obtained prior to arrival at breeding areas (Coulson 1984, Raveling 1979, Parker and Holm 1990). Body reserves must be maintained from winter or acquired during the 4-8 weeks (Lovvorn et al. 2003) of spring staging, and Petersen and Flint (2002) suggest common eider productivity on the western Beaufort Sea coast is influenced by conditions encountered in May to early June during spring migration through the Chukchi Sea (including Ledyard Bay). Common eider female body mass has been found to increase 20% during the 4-6 weeks prior to egg laying (Gorman and Milne 1971, Milne 1976, Korschgen 1977, Parker and Holm 1990). For spectacled eiders, average female body weight in late March in the Bering Sea was 1,550 ± 35 g (n = 12), and slightly (but not significantly) more upon arrival at breeding sites (1,623 ± 46 g, n = 11; Lovvorn et al. 2003), indicating that spectacled eiders maintain or enhance their physiological condition during spring staging.

Abundance and Trends

The first range-wide estimate of the total number of spectacled eiders was 363,000 birds (333,526–392,532 95% CI), obtained by aerial surveys of the wintering area in the Bering Sea in late winter 1996–1997 (Petersen et al. 1999). Winter/spring aerial surveys using aerial photo census techniques were repeated in 2009 and 2010. The minimum global population estimate from these surveys was 369,122 (90% CI, ± 4,932; Larned et al. 2012b), suggesting global population stability over the interval.

Population indices for North Slope-breeding spectacled eiders are unavailable prior to 1992. However, Warnock and Troy (1992) documented an 80% decline in spectacled eider abundance from 1981 to 1991 in the Prudhoe Bay area. Since 1992, the Service has conducted annual aerial surveys for breeding spectacled eiders on the ACP. The 2011 population index based on these aerial surveys was 7,952 birds (95% CI, 6,258-9,646), which is 21% higher than the 18-year mean (Larned et al. 2012a). The estimated average density of spectacled eiders was 0.1468 eiders/km^2 within the ACP survey area (from all observation strata) in 2011 (Larned et al. 2012a). The ACP breeding population's growth rate as of 2011 is thought to be approximately stable, as the growth rate does not differ significantly from 1.0 (0.99, 90% CI 0.98-1.01).

The Y-K Delta spectacled eider population was thought to be about 4% of historical levels in 1992 (Stehn et al. 1993). Evidence of the dramatic decline in spectacled eider nesting on the Y-K Delta was corroborated by Ely et al. (1994) with the documentation of a 79% decline in eider nesting between 1969 and 1992 for areas near the Kashunuk River. Aerial and ground survey data indicated that spectacled eiders were undergoing a decline of 9–14% per year from 1985–1992 (Stehn et al. 1993). Further, from the early 1970s to the early 1990s, the number of pairs on the Y-K Delta declined from 48,000 to 2,000, apparently stabilizing at that low level (Stehn et al. 1993). Before 1972, an estimated 47,700–70,000 pairs of spectacled eiders nested on the Y-K Delta in average to good years (Dau and Kistchinski 1977).

Fischer et al. (2011) used combined annual ground-based and aerial survey data to estimate the number of nests and eggs of spectacled eiders on the coastal area of the Y-K Delta in 2011 and evaluate long-term trends in the Y-K Delta breeding population from 1985 to 2011. The estimated total number of nests measures the minimum number of breeding pairs in the population in a given year and does not include potential breeders that did not establish nests that year or nests that were destroyed or abandoned at an early stage (Fischer et al. 2011). The total number of nests in 2011 was estimated at 3,608 (SE 448) spectacled eiders nests on the Y-K Delta, the second lowest estimate over the past 10 years. The average population growth rate based on these surveys was 1.049 (90% CI = 0.994–1.105) in 2002–2011 and 1.003 (90% CI = 0.991–1.015) in 1985–2011 (Fischer et al. 2011). Log-linear regression based solely on the long-term Y-K Delta aerial survey data indicate positive population growth rates of 1.073 (90% CI = 1.046–1.100) in 2001–2010 and 1.070 (90% CI = 1.058–1.081) in 1988–2010 (Platte and Stehn 2011).

Spectacled Eider Recovery Criteria

The Spectacled Eider Recovery Plan (USFWS 1996) presents research and management priorities with the objective of recovery and delisting so that protection under the ESA is no longer required. Although the cause or causes of the spectacled eider population decline is not

known, factors that affect adult survival are likely to be the most influential on population growth rate. These include lead poisoning from ingested spent shotgun pellets, which may have contributed to the rapid decline observed in the Y-K Delta (Franson et al 1995, Grand et al. 1998), and other factors such as habitat loss, increased nest predation, overharvest, and disturbance and collisions caused by human infrastructure (factors discussed in the *Environmental Baseline*). Exposure to other contaminants, including petroleum-related compounds, organochlorine compounds, and elements, may also be a factor contributing to spectacled eider population declines. Under the Recovery Plan, the species will be considered recovered when each of the three recognized populations (Y-K Delta, North Slope of Alaska, and Arctic Russia): 1) is stable or increasing over 10 or more years and the minimum estimated population size is at least 6,000 breeding pairs; or 2) number at least 10,000 breeding pairs over 3 or more years, or 3) number at least 25,000 breeding pairs in one year. Spectacled eiders do not currently meet these recovery criteria.

Steller's Eiders

Status and Distribution

Steller's eiders are divided into Atlantic and Pacific populations; the Pacific population is further divided into the Russia-breeding population, which nests along the Russian eastern arctic coastal plain, and the Alaska-breeding population. The Alaska breeding population of the Steller's eider was listed as threatened on July 11, 1997 based on substantial contraction of the species' breeding range on the Arctic Coastal Plain (ACP) and on the Y-K Delta in Alaska, reduced numbers of Steller's eiders breeding in Alaska, and the resulting vulnerability of the remaining breeding population to extirpation (62 FR 31748). In Alaska, Steller's eiders breed almost exclusively on the Arctic Coastal Plain (ACP) and molt and winter, along with the majority of the Russia-breeding population, in southcentral Alaska (Figure 5). Periodic non-breeding of the entire population of Steller's eiders breeding near Barrow, AK, the species' primary breeding grounds, coupled with low nesting and fledging success, has resulted in very low productivity (Quakenbush et al. 2004) and may make the population particularly vulnerable to extirpation. In 2001, the Service designated 2,830 mi^2 (7,330 km^2) of critical habitat for the Alaska-breeding population of Steller's eiders at historic breeding areas on the Y-K Delta, a molting and staging area in the Kuskokwim Shoals, and molting areas in marine waters at Seal Islands, Nelson Lagoon, and Izembek Lagoon (66 FR 8850). No critical habitat for Steller's eiders has been designated on the ACP.

The best available estimate of North Slope breeding Steller's eiders is 576 birds (Stehn and Platte 2009); however, as mentioned previously obtaining a reliable population estimate is difficult for this species. Following assessment of potential biases inherent in the two USFWS surveys, Stehn and Platte (2009) identified a subset of the North Slope Eider (NSE) survey data (1993–2008) that they determined was "least confounded by changes in survey timing and observers." Based on this subset, the average population index for Steller's eiders was 173 (90% CI 88–258) with an estimated population growth rate of 1.011 (90% CI 0.857–1.193). The average population size of Steller's eiders breeding in the ACP was estimated at 576 (90% CI 292–859; Stehn and Platte 2009) assuming a detection probability of 30%. Currently, this analysis provides the best available estimate of the Alaska-breeding Steller's eider population

size and growth rate from the ACP. Note that these estimates are based on relatively few observations of Steller's eiders each year with none seen in many survey years.

Steller's eiders generally occur in low densities throughout the ACP (Figure 6), but their density increases south to north, with the highest density occurring near Barrow (Obritschkewitsch and Ritchie 2012, Larned et al. 2012a). To illustrate, their estimated density in the Barrow area was 0.0307 total birds/km^2 (Figure 7; Obritschkewitsch and Ritchie 2012), while their density estimate in the larger, more inclusive ACP north coastal area (Figure 6) was 0.0047 indicated total bird/km^2 (calculated using in Figure 22 of Larned et al. 2012a). This suggests the Steller's eider density near Barrow may be approximately 6.5 times higher near Barrow than that in the north coastal area of the ACP.

Life History

North Slope Breeding

Steller's eiders arrive in pairs on the ACP in early June, but nests have been found near Barrow in only 64% of the years since 1991 (14 of 22 years; USFWS, unpublished data). Non-breeding has been observed in long-lived eider species and is typically related to inadequate body condition (Coulson 1984), but reasons for Steller's eiders variable nesting effort may be more complex. Periodic non-breeding by Steller's eiders near Barrow seems to be associated with fluctuations in lemming populations and related breeding patterns in pomarine jaegers (*Stercorarius pomarinus*) and snowy owls (*Nyctea scandiaca*) (Quakenbush et al. 2004). In years with high lemming abundance, Quakenbush et al. (2004) reported that Steller's eider nesting success was a function of a nest's distance from pomarine jaeger and snowy owl nests. These avian predators nest only in years of high lemming abundance and defend their nests aggressively against arctic foxes. By nesting within jaeger and owl territories, Steller's eiders may benefit from protection against arctic foxes even at the expense of occasional partial nest depredation by the avian predators themselves (Quakenbush et al. 2002, Quakenbush et al. 2004). Steller's eiders may also benefit from the increased availability of alternative prey for both arctic foxes and avian predators in high lemming years (Quakenbush et al. 2004).

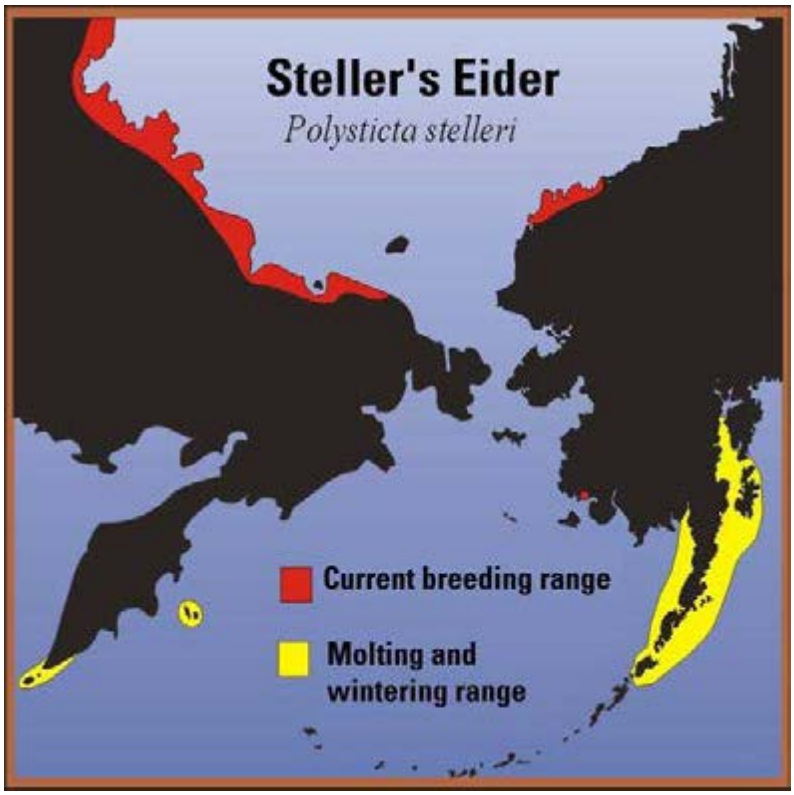

Figure 5. Steller's eider distribution in the Bering, Beaufort and Chukchi seas.

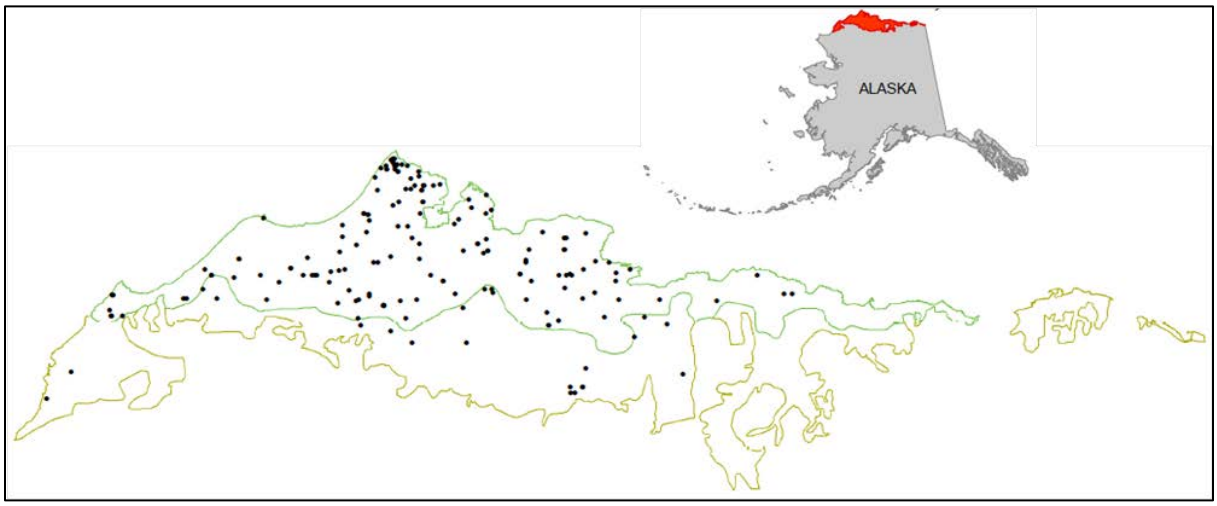

Figure 6. All sightings from the Arctic Coastal Plain (ACP) survey (1989–2008) and the North Slope eider (NSE) survey (1992–2006). The ACP survey encompasses the entire area shown (61,645 km^2); the NSE includes only the northern portion outlined in green (30,465 km^2). Modified from Stehn and Platte 2009.

When they do nest, Alaska-breeding Steller's eiders use coastal tundra adjacent to small ponds or within drained lake basins, occasionally as far as 90 km inland. Nests are initiated in the first half of June (Quakenbush et al. 2004). Mean clutch size near Barrow was 5.4 ± 1.6 (range = 1-8) in 1991-1999 (Quakenbush et al. 2004). In years with fox control near Barrow, clutch size

averaged ranged from 5.8 to 6.6 eggs (2006-2011; Rojek 2007, Rojek 2008, Safine 2011, and Safine 2012).

As with spectacled eiders, nest and egg loss was attributed partially to predation by jaegers, common raven (*Corvus corax*), arctic fox, and possibly glaucous gulls (*Larus hyperboreus*; Quakenbush et al. 1995, Obritschkewitsch et al. 2001). During 2008-2011, nest cameras near Barrow documented partial and complete nest predation of sea duck nests, including those of Steller's eiders, by pomarine and parasitic jaegers, arctic fox, glaucous gulls, and polar bears (Safine 2011, Safine 2012).

Predator population levels likely influence the probability that females will be able to hatch at least one egg (termed "mean nest survival") across the landscape. Near Barrow, mean nest survival was 0.23 (± 0.09 SE) from 1991–2004, before implementation of fox control. During breeding seasons with fox control (2008-2012), mean nest survival was 0.47 (±0.08 SE; USFWS, unpublished data). Thus, predator control may be a useful tool in reducing egg loss of Steller's eiders.

Hatching occurs from mid-July through early August (Rojek 2006, 2007, and 2008). Within about one day after hatch, hens move their broods to adjacent ponds with emergent vegetation, particularly *Carex aquatilis* and *Arctophila fulva* (Rojek 2006, Rojek 2007, Safine 2011, Safine 2012). Here, they feed on insect larvae and other wetland invertebrates. Broods may move up to several kilometers from the nest prior to fledging (Rojek 2006). Fledging occurs from 32-37 days post hatch (Obritschkewitsch et al. 2001, Rojek 2006).

Limited information from intra-year recapture of females suggests Steller's eiders may exhibit breeding site fidelity in the Barrow area, their primary breeding location in Alaska (USFWS, unpublished data, September 2012). Breeding site fidelity could limit nesting effort in other suitable habitat by displaced females, which in turn could decrease breeding effort.

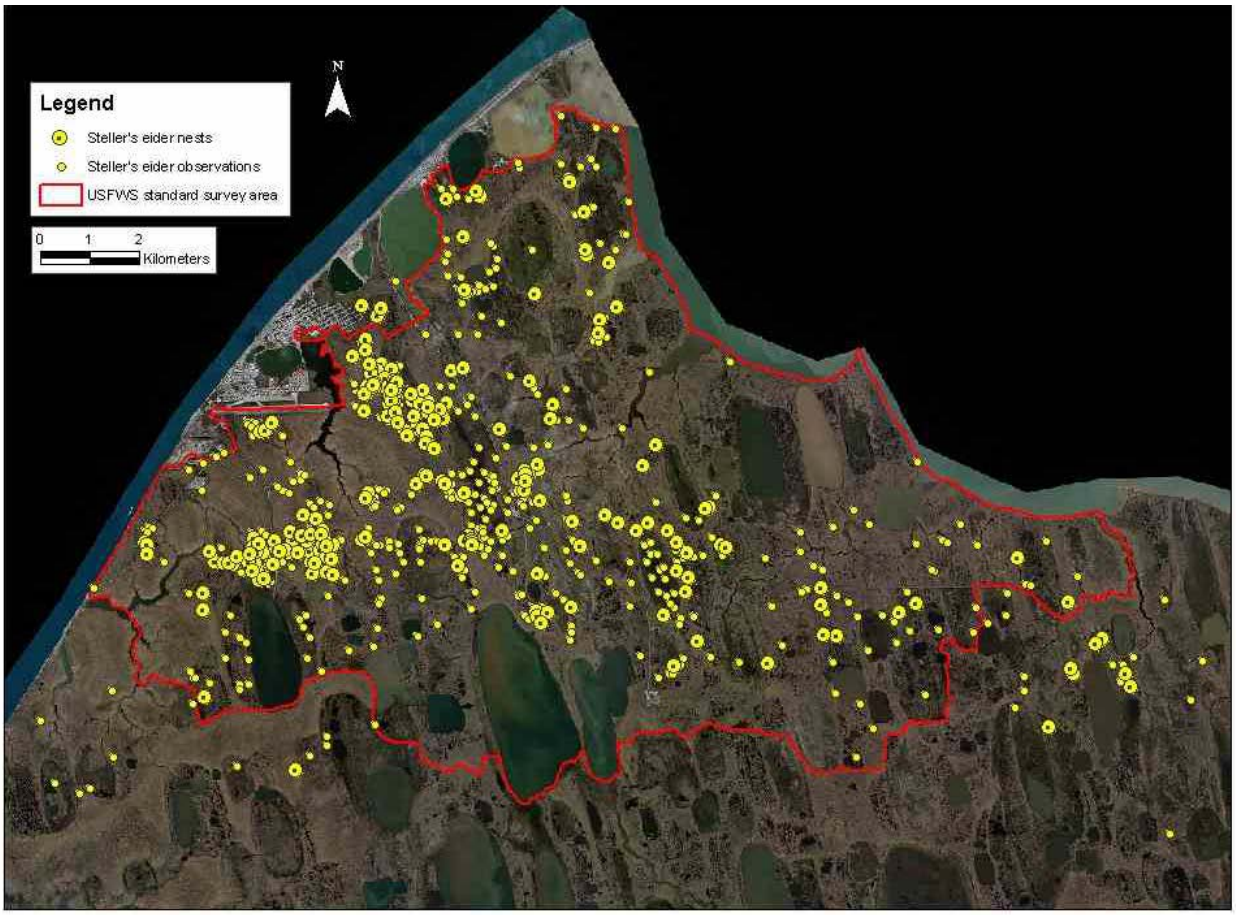

Figure 7. Steller's eider nest locations (1991–2010) and breeding pair observations (1999–2010). The standard survey area is surveyed annually. The survey area is expanded beyond the standard area in some years.

Use of Non-breeding Habitats

Departure from the breeding grounds differs by sex, breeding status, and nesting success; fpr example, female departure time depends on whether or not a female has nested and her success. Migration generally begins with most Steller's eiders near Barrow staging in areas such as Elson Lagoon, North Salt Lagoon, Imikpuk Lake, and the Chukchi Sea both north and south of Pigniq ("Duck Camp;" Figure 8). For example, satellite telemetry data indicated at least 5 of 14 birds used Elson Lagoon (Martin et al. *in prep*.).

Males and non- or failed breeding Steller's eider females typically depart the breeding grounds before successfully nesting females. In late June and early July, male and female (non- or failed breeding) Steller's eiders dispersed across the area between Wainwright and Admiralty Inlet with most birds entering marine waters by the first week of July (Martin et al. *in prep*.). In years when nests were found near Barrow, flocks of males and non- or failed breeding female Steller's eiders were comprised of mostly males and persisted until about the second week of July (J. Bacon, North Slope Borough Department of Wildlife Management [NSBDWM], *pers. comm.*).

Later in the season adult females and juveniles will use the areas listed above. In a post-fledging and post-failure movements study of radio-marked nesting Steller's eider females in 2011

(N=10), most females reared their brood until fledging, one female failed to fledge young, and one female failed to hatch a nest (Safine 2012). For the females whose broods fledged, females and broods were first located post-fledging near their brood-rearing areas; later, most were found in nearby marine areas. Over half of the successful adult females were located subsequently in marine areas near Barrow, and the remaining females could not be located after leaving brood rearing areas (Safine 2012). From late August through early September when telemetry monitoring ceased, females and fledged juveniles were sighted on the Chukchi and Beaufort sea sides of the narrow spit extending to Point Barrow (Safine 2012). During this time, adult females and juveniles were also observed further south along the Chukchi Sea coast, near the City of Barrow (Safine 2012). One of the two failed females was also recorded in the same marine areas as the successful females and fledged juveniles (Safine 2012). A single failed nesting female equipped with a satellite transmitter in 2000 near Barrow remained near the breeding site until the end of July and stayed in the Beaufort Sea off Barrow until late August (Martin et al. *in prep*).

In years when nests are not found near Barrow, groups of Steller's eiders have been opportunistically sighted just off the shoreline of the Chukchi Sea from the gravel pits (southwest of the Barrow Airport) north to Pt. Barrow; they were absent earlier in the season and the sex ratios were more even compared to breeding years (J. Bacon, NSBDWM, *pers. comm.*).

The above information indicates coastal lagoons and nearshore waters of the Chukchi Sea near Barrow are important to adult and juvenile Steller's eiders.

Figure 8. Location of Steller's eider post-breeding staging areas in relation to Pigniq (Duck Camp) hunting area north of Barrow, Alaska.

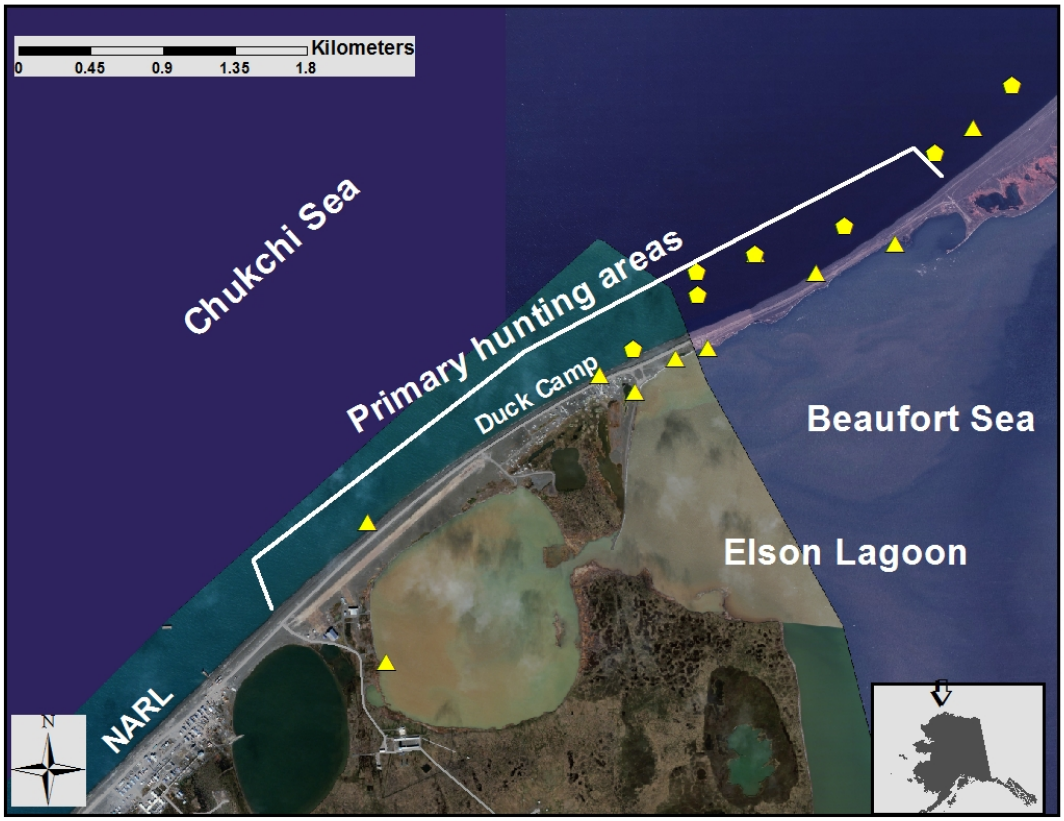

Figure 9. Marine locations of successful (triangles) and failed (pentagons) adult Steller's eiders (and juveniles) in the immediate vicinity of areas commonly used for subsistence hunting near Barrow, Alaska from mid-August to early September 2011.

Limited information on the migratory movements of Steller's eiders is available, particularly connecting breeding populations with migratory routes or specific molting or wintering areas. The best information available is from two satellite telemetry studies of Steller's eiders. One study marked Steller's eiders wintering on Kodiak Island, Alaska and followed birds through the subsequent spring (N=24) and fall (N=16) migrations from 2004 –2006 (D. Rosenberg, Alaska Department of Fish and Game [ADFG]). Most of the birds marked on Kodiak returned to eastern arctic Russia during the nesting period, and none of these birds (all presumed to be from the Russian breeding population) were relocated on land or the nearshore waters of Alaska north of the mouth of the Yukon River (ADFG, unpublished data). The second (but earlier) study marked birds (N=14) near Barrow, Alaska in 2000 and 2001 (Martin et al. *in prep*.). Birds from this study were relocated along arctic coast of Alaska southwest of Barrow to areas near Point Hope, on the Seward Peninsula, and in southern Norton Sound (Martin et al. *in prep.*). The birds marked near Barrow were also relocated further south in Alaska and in eastern arctic Russia in similar locations to birds marked in Kodiak. These studies did not delineate where the Russia and Alaska breeding populations merge and diverge during molt and spring migrations.

Molt and Winter Distribution

During post-breeding migration, Steller's eiders move towards molting areas in the nearshore waters of Southwest Alaska where they undergo a complete flightless molt for about three

weeks. The combined (Russian and Alaskan-breeding) Pacific population molts in numerous locations in Southwest Alaska, with exceptional concentrations in four areas along the north side of the Alaska Peninsula: Izembek Lagoon, Nelson Lagoon, Port Heiden, and Seal Islands (Gill et al. 1981, Petersen 1981, Metzner 1993). However, Kuskoskwim Shoals, in northern Kuskokwim Bay, may also be an important molting location for Alaska-breeding Steller's eiders (Martin et al. *in prep*), especially considering the high molting site fidelity reported by Flint et al. (2000). , pg 38 also reported >2,000 eiders molting in lower Cook Inlet near the Douglas River Delta, and smaller numbers of molting Steller's eiders have been reported from around islands in the Bering Sea, along the coast of Bristol Bay, and in smaller lagoons along the Alaska Peninsula (e.g., Dick and Dick 1971, Petersen and Sigman 1977, Wilk et al. 1986, Dau 1987, and Petersen et al. 1991).

After molt, many of the Pacific-wintering Steller's eiders disperse to areas in the eastern Aleutian Islands, the south side of the Alaskan Peninsula, Kodiak Island, and as far east as Cook Inlet, although thousands may remain in lagoons used for molting unless or until freezing conditions force them to move (USFWS 2002). The USFWS estimates the Alaska-breeding population comprises only ~ 1% of the Pacific-wintering population of Steller's eiders. Wintering Steller's eiders usually occur in shallow waters (< 10 m deep), which are generally within 400 m of shore or at offshore shallows (USFWS 2002). However, Martin et al. (*in prep*) reported substantial use of habitats > 10 m deep during mid-winter. Use of these habitats by wintering Steller's eiders may be associated with night-time resting periods or with shifts in the availability of local food resources (Martin et al. *in prep*).

Northward Spring Migration

During spring migration thousands of Steller's eiders stage in estuaries along the north side of the Alaska Peninsula, including some molting lagoons, and at the Kuskokwim Shoals near the mouth of the Kuskokwim River in late May (Larned 2007, Martin et al. *in prep*.). Like other eiders, Steller's eider may use spring leads for feeding and resting, but there is little information on habitat use during spring migration. Steller's eiders are thought to generally move along coastlines, although some cut across Bristol Bay (W. Larned, USFWS, *pers. comm*. 2000). Interestingly, despite many daytime aerial surveys, Steller's eiders have not been seen in migratory flights (W. Larned, USFWS, *pers. comm*. 2000*b*). Larned (1998) concluded that Steller's eiders show strong fidelity to "favored" sites during migration, where they congregate in large numbers to feed.

Recovery Criteria

The Steller's Eider Recovery Plan (USFWS 2002) presents research and management priorities, that are re-evaluated and adjusted every year, with the objective of recovery and delisting so that protection under the ESA is no longer required. When the Alaska-breeding population was listed as threatened, factors causing the decline were unknown, but possible causes identified were increased predation, shooting, ingestion of spent lead shot in wetlands, and habitat loss from development. Since listing, other potential threats have been identified, including exposure to other contaminants, impacts from scientific research, and climate change but causes of decline and obstacles to recovery remain poorly understood.

Criteria used to determine when species are recovered are often based on historical abundance and distribution, or on the number needed to ensure the risk of extinction is tolerably low (with

extinction risk estimated by population modeling). For Steller's eiders, information on historical abundance is lacking, and demographic parameters needed for accurate population modeling are poorly understood. Therefore, the Recovery Plan for Steller's eiders establishes interim recovery criteria based on extinction risk, with the assumption that numeric population goals will be developed as demographic parameters become better understood. Under the Recovery Plan, the Alaska-breeding population would be considered for reclassification to endangered if the population has ≥ 20% probability of extinction in the next 100 years for 3 consecutive years, or the population has ≥ 20% probability of extinction in the next 100 years and is decreasing in abundance. The Alaska-breeding population would be considered for delisting from threatened status if it has ≤ 1% probability of extinction in the next 100 years, and each of the northern and western subpopulations are stable or increasing and have ≤ 10% probability of extinction in 100 years.

Polar Bear

Status and Distribution

Due to threats to its sea ice habitat, on May 15, 2008 the Service listed the polar bear (*Ursus maritimus*) as threatened (73 FR 28212) throughout its range under the ESA. In the U.S., the polar bear is also protected under the MMPA and the Convention on International Trade in Endangered Species of Wildlife Fauna and Flora (CITES) of 1973.

Polar bears are widely distributed throughout the Arctic where the sea is ice-covered for large portions of the year (Figure 10). The number of polar bears is estimated to be 20,000-25,000 with 19 recognized management subpopulations or "stocks" (Obbard et al. 2010). The International Union for Conservation of Nature and Natural Resources, Species Survival Commission (IUCN/SSC) Polar Bear Specialist Group ranked 11, four, and three of these stocks as "data deficient," "reduced," and "not reduced," respectively (Obbard et al. 2010). The status designation of "data deficient" for 11 stocks indicates that the estimate of the worldwide polar bear population was made with known uncertainty.

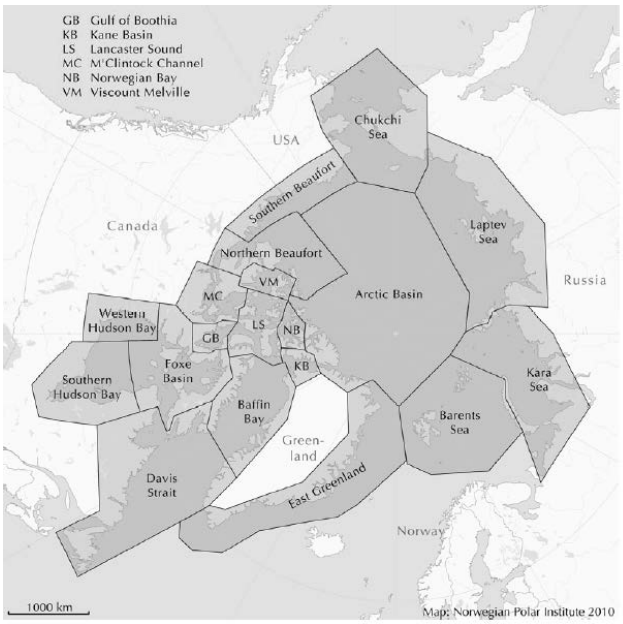

Figure 10. Distribution of polar bear stocks throughout the circumpolar basin (from Obbard et al. 2010).

Life History

For a complete life history of the polar bear, please see 73 FR 28212. We briefly describe the polar bear's food habits below.

Sea ice provides a platform for hunting and feeding, for seeking mates and breeding, for denning, for resting, and for long-distance movement. Ringed seals are polar bear's primary food source, and areas near ice edges, leads, or polynyas where ocean depth is minimal are the most productive hunting grounds (Durner et al. 2004). While polar bears primarily hunt seals for food, they may occasionally consume other marine mammals (73 FR 28212). While the main food source of polar bears is ice seals, bowhead whale carcasses have been available to polar bears as a food source on the North Slope since the early 1970s (Koski et al. 2005) and therefore may affect their distribution locally. Barter Island (near Kaktovik) has had the highest recorded concentration of polar bears on shore (17.0 ± 6.0 polar bears/100 km) followed by Barrow (2.2 ± 1.8) and Cross Island (2.0 ± 1.8; Schliebe et al. 2008). Record numbers of polar bears were observed in 2012 in the vicinity of the bowhead whale carcass "bonepile" on Barter Island; the USFWS observed a minimum, maximum, and average of 24, 80, and 52 bears respectively (USFWS 2012c). The high number of bears on/near Barter Island compared to other areas is thought to be due in part to the proximity to the ice edge and high ringed seal densities (Schliebe et al. 2008), the whale harvest is at Kaktovik is lower than that at Barrow or Cross Island.

The use of whale carcasses as a food source likely varies among individuals and between years. Stable isotope analysis of polar bears in 2003 and 2004 suggested that bowhead whale carcasses comprised 11%-26% (95% CI) of the diets of sampled polar bears in 2003, and 0%-14% (95% CI) in 2004 (Bentzen et al. 2007). Polar bears depend on sea ice to hunt seals, and temporal and spatial availability of sea ice will likely decline. Thus, polar bear use of whale carcasses may increase in the future.

Threats to the Polar Bear

The arctic is losing sea ice, which will likely negatively affect polar bear populations. The loss rate of ice thickness is increasing (Haas et al. 2010), and trends in arctic sea ice extent and area (see http://nsidc.org/arcticseaicenews/faq/#area_extent for explanation of these terms) are negative (-12.2% and -13.5 %/decade, respectively; Comiso 2012). Summer declines in sea ice are more pronounced in summer (Figure 16) than winter (NSIDC, 2011a, b). Positive feedback systems (i.e., sea-ice albedo) and naturally occurring events, such as warm water intrusion into the Arctic and changing atmospheric wind patterns, can cause fragmentation of sea ice, reduction in the extent and area of sea ice in all seasons, retraction of sea ice away from productive continental shelf areas throughout the polar basin, reduction of the amount of heavier and more stable multi-year ice, and declining thickness and quality of shore-fast ice (Parkinson et al. 1999, Rothrock et al. 1999, Comiso 2003, Fowler et al. 2004, Lindsay and Zhang 2005, Holland et al. 2006, Comiso 2006, Serreze et al. 2007, Stroeve et al. 2008). These climatic phenomena may affect seal abundances, the polar bear's main food source (Kingsley 1979, DeMaster et al. 1980, Amstrup et al. 1986, Stirling 2002).

Warming-induced habitat degradation and loss are negatively affecting some polar bear stocks, and unabated global warming could reduce the worldwide polar bear population (Obbard et al. 2010). Loss of sea ice habitat due to climate change is identified as the primary threat to polar bears (Schliebe et al. 2006, 73 FR 28212, Obbard et al. 2010). Patterns of increased temperatures, earlier spring thaw, later fall freeze-up, increased rain-on-snow events (which can cause dens to collapse), and potential reductions in snowfall are also occurring. However, threats to polar bears will likely occur at different rates and times across their range, and uncertainty regarding their prediction makes management difficult (Obbard et al. 2010).

Because the polar bear depends on sea ice for its survival, loss of sea ice due to climate change is its largest threat worldwide, although polar bear subpopulations face different combinations of human-induced threats (Obbard et al. 2010). Arctic summer sea ice reached its lowest average extent in 2012 and has declined 13% since 1979 (NSIDC; Figure 16). The largest human-caused loss of polar bears is from subsistence hunting of the species, but for most subpopulations where subsistence hunting of polar bears occurs, it is a regulated and/or monitored activity (Obbard et al. 2010). Other threats include accumulation of persistent organic pollutants in polar bear tissue, tourism, human-bear conflict, and increased development in the Arctic (Obbard et al. 2010). Because uncertainty exists regarding the numbers of bears in some stocks and how human activities interact to ultimately affect the worldwide polar bear population, conservation and management of polar bears at the worldwide population level is challenging.

Polar Bear Critical Habitat

The Service designated polar bear critical habitat on December 7, 2010 (75 FR 76086). A final rule designating three critical habitat units for polar bears was issued on December 7, 2010 (75 FR 76086). On January 11, 2013, the US District Court for the District of Alaska issued a decision vacating and remanding the final rule to the Service in *Alaska Oil and Gas Association et al. v. Salazar et al.* (D. Alaska)(3:11-cv-00025-RRB). Decisions regarding the District Court's order are currently pending, and the scope and description of a final critical habitat designation for polar bears are unresolved. Nevertheless, prior to the District Court's decision, the Service conducted an analysis of the potential effects of the Proposed Action on the three

critical habitat units set forth in the 2010 vacated rule. Thus, we provide a description of the status of polar bear critical habitat which was evaluated prior to the District Court's decision. The polar bear's critical habitat units and corresponding Primary Constituent Elements (PCEs) were:

1) **Sea-ice Habitat Unit:** This Unit is used for feeding, breeding, denning, and movements, which is sea ice over waters 300 m (984.2 ft) or less in depth that occurs over the continental shelf with adequate prey resources (primarily ringed and bearded seals) to support polar bears.
2) **Terrestrial Denning Habitat Unit:** This Unit which includes topographic features, such as coastal bluffs and river banks, with the following suitable macrohabitat characteristics:
   a) Steep, stable slopes (range 15.5–50.0), with heights ranging from 1.3 to 34 m (4.3 to 111.6 ft), and with water or relatively level ground below the slope and relatively flat terrain above the slope;
   b) Unobstructed, undisturbed access between den sites and the coast;
   c) Sea ice in proximity to terrestrial denning habitat prior to the onset of denning during the fall to provide access to terrestrial den sites; and
   d) The absence of disturbance from humans and human activities that might attract other polar bears.
3) **Barrier Island Habitat Unit:** This Unit is used for denning, refuge from human disturbance, and movements along the coast to access maternal den and optimal feeding habitat, which includes all barrier islands along the Alaska coast and their associated spits, within the range of the polar bear in the United States, and the water, ice, and terrestrial habitat within 1.6 km (1 mi) of these islands (no-disturbance zone).

As described in the status section for polar bears, sea ice is diminishing. Terrestrial denning locations in Alaska do not appear to be a limiting factor. However, (Liston 2012) used meteorological (e.g., wind direction and speed, snow amount and timing) and geographic (e.g., cut-bank steepness, orientation) information to estimate suitable denning habitat (defined as snow depths over 1.25-m resulting from northeast and southwest winds occurring during September, October, and November). He estimated that within the North Slope study area denning habitat occurred on 0.047% of the northwest side of slopes (when winds were out of the northeast) and 0.021% of the southeast side of slopes (when winds were out of the southwest). Liston's (2012) estimate of suitable denning habitat is much smaller than Durner's (2006) estimate (about 0.29%). The Durner (2006) model reflected habitat characteristics supporting snow drifting, generally in northward flowing drainages within a portion of the Arctic National Wildlife Refuge, but did not model snow drifting explicitly. Thus, while denning habitat may not be a limiting factor, its availability on the landscape may be scarcer than previously thought.

Climate change may also be affecting denning habitat. Rain-on-snow events may decrease den quality, and later onset of freeze-up in the fall may limit access to terrestrial denning habitat (75 FR 76086). Erosion of barrier islands and the Arctic Ocean shoreline, presumably caused by climate change (Mars and Houseknecht 2008), may be changing terrestrial denning habitat by creating or destroying bluffs. ADFG and Service biologists made observations of erosion of Pingok Island using markers to document the rate of erosion; their entire array of markers disappeared the first year. From GPS coordinates and markers, they estimated 80 m of bank

erosion on Pingok Island since August 2010 (R. Shideler, ADFG, email *pers. comm.*, 10 October 2012).

Human activities such as ground-based vehicular traffic and low-flying aircraft occur in polar bear critical habitat. These activities may temporarily create disturbance between den sites and the coast (e.g., disturbance from ice roads), and may temporarily degrade the ability of barrier island habitat from use as a refuge from human disturbance. For example, vessels may need to use barrier islands to weather out a storm, and this may interfere with a polar bear's ability to use barrier islands for the same purpose. However, these activities are infrequent and have short-term effects.

Three main types of contaminants in the arctic are thought to pose the greatest potential threat to polar bears: petroleum hydrocarbons, persistent organic pollutants (POPs), and heavy metals. A large spill of 68,000 gallons (1,619 barrels) of heating fuel occurred on August 21, 1988 from a Crowley Barge Tanker 570 en route to Kaktovik 3-6 miles north of the barrier islands off Brownlow Point. However, no large oil spills from oil and gas activities have occurred in the arctic OCS to date. Arctic ecosystems are particularly sensitive to environmental contamination due to the slower rate of breakdown of POPs, including organochlorine compounds (OCs), relatively simple food chains, and the presence of long-lived organisms with low rates of reproduction and high lipid levels that favor bioaccumulation and biomagnification. Consistent patterns between OC and mercury contamination and trophic status have been documented in Arctic marine food webs (Braune et al. 2005). Contaminants are likely present in polar bear habitat, but current concentrations are not likely to substantially affect the capacity of habitat to support polar bears.

Environmental Baseline

Regulations implementing the ESA (50 CFR §402.02) define the environmental baseline to include the past and present impacts of all Federal, State, or private actions and other human activities in the Action Area. Also included are anticipated impacts of all proposed Federal projects in the Action Area that have undergone section 7 consultation and the impacts of State and private actions contemporaneous with the consultation in progress.

Spectacled and Steller's Eiders

Spectacled and Steller's eiders breed in and migrate through the Action Area, and use it for some post-breeding activities. Spectacled eiders nest throughout much of the ACP, whereas Steller's eiders have limited distribution across the ACP and highest breeding density near Barrow (Figure 11). Data from the ACP survey indicate most of the North Slope breeding population of spectacled eiders occurs in the NPR-A (Figure 12); therefore, we used information from the ACP survey area as a surrogate for the baseline of spectacled eiders in the Action Area. For Steller's eiders, we used information obtained from surveys in the "Barrow Triangle" for baseline information (Figure 13). Both species are present in the Action Area from approximately April 15 to November 15.

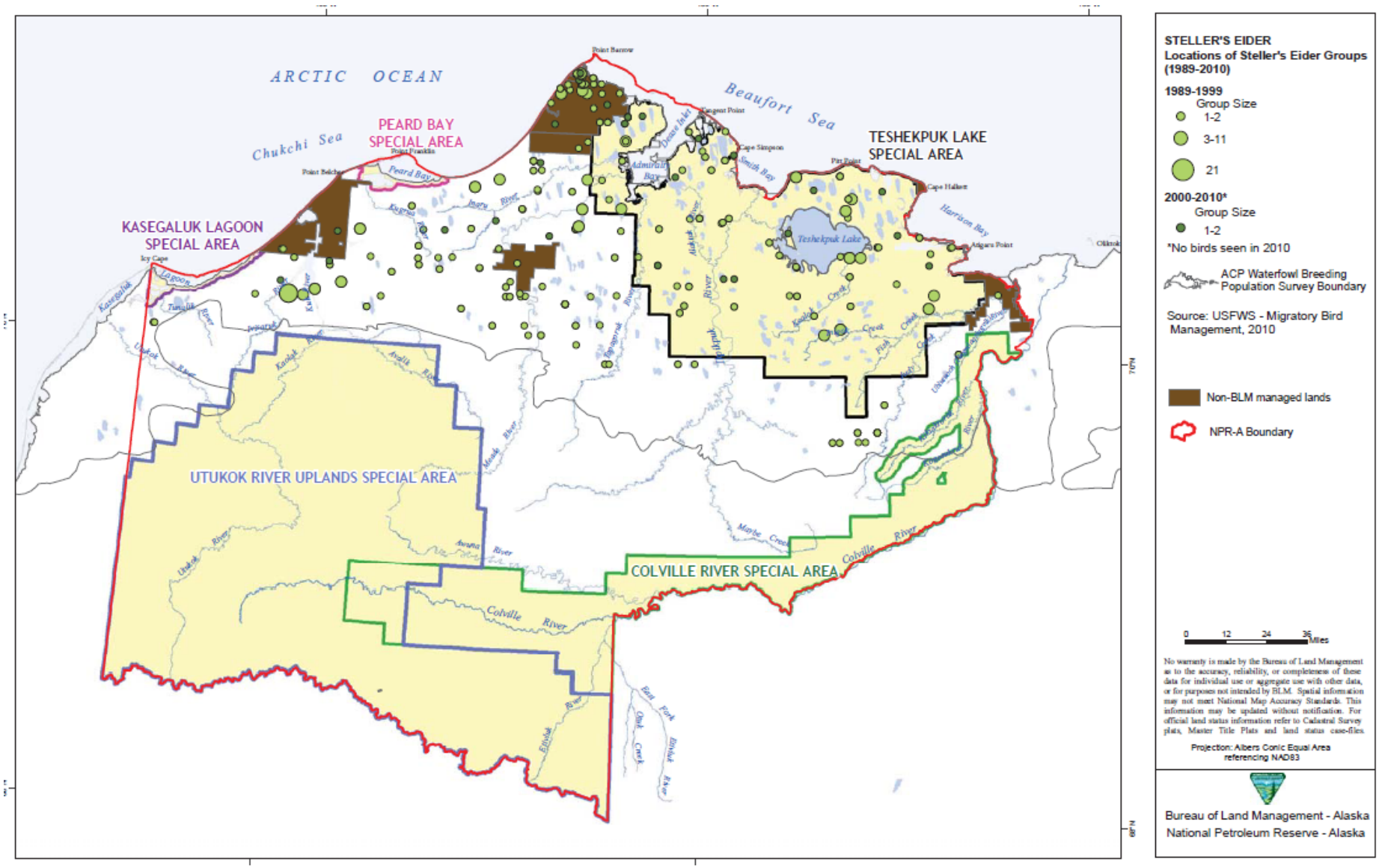

Figure 11. Locations of Steller's eiders within NPR-A. From Map 4 in BLM (2012a).

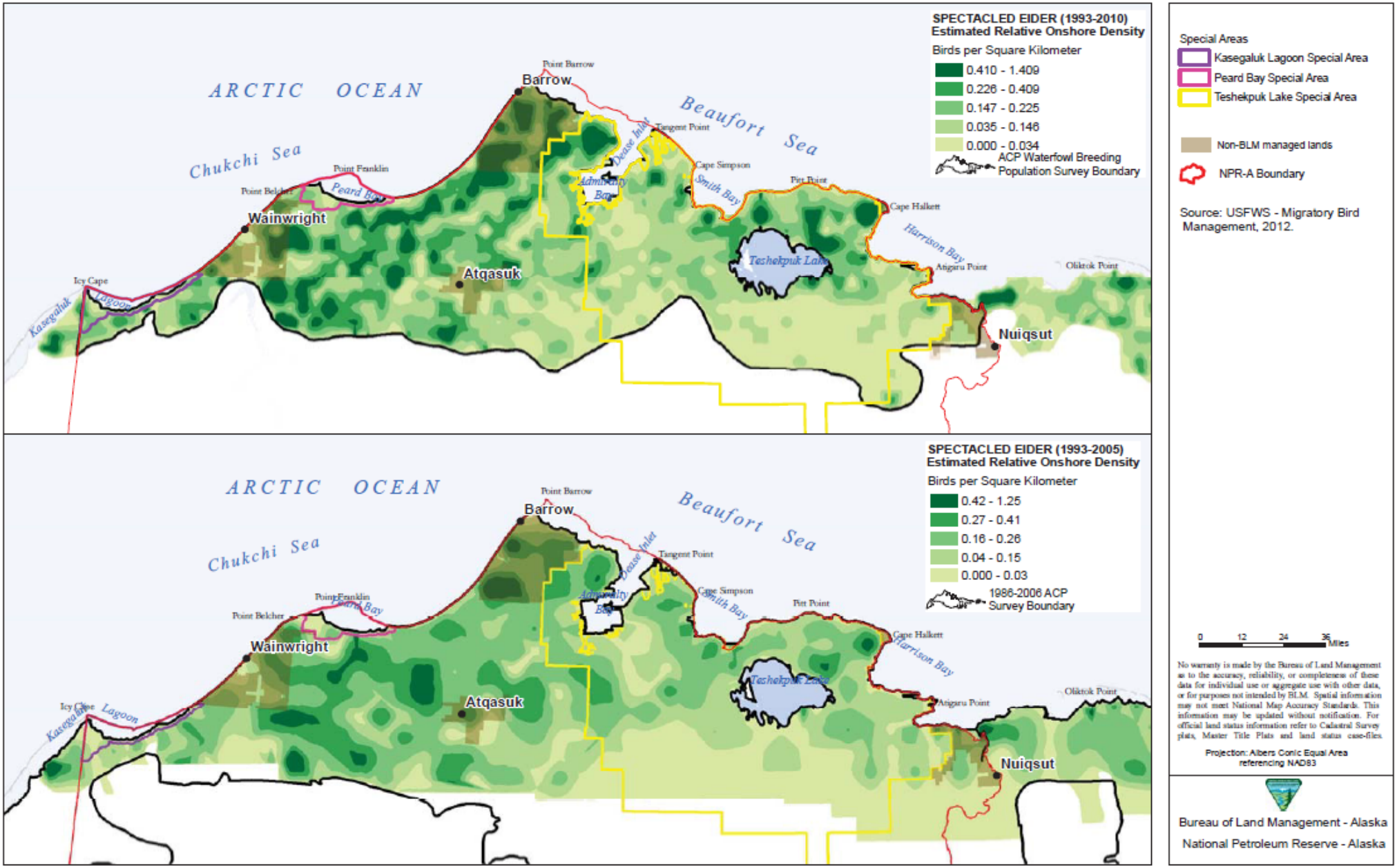

Figure 12. Changes in spectacled eider abundance during ACP surveys in the NPR-A. From Map 3 in BLM (2012a).

Spring Migration

Spectacled eiders – From April until arrival on breeding grounds in May or June, some North Slope-breeding spectacled eiders use staging areas in the spring ice lead system in the eastern Chukchi Sea southwest of Barrow) (*pers. comm*. between Debora Nigro [BLM] and Matt Sexson, [USGS-Alaska Science Center] July 2012). Spring migration routes of spectacled eiders after departure from Bering Sea wintering areas are not well documented. Counts of eiders passing Point Barrow in late May and early June include observations of spectacled eiders (Woodby and Divoky 1982, Suydam et al. 1997, and Suydam et al. 2000). Johnson and Richardson (1982) also reported small numbers of spectacled eiders offshore during spring migration east of the Colville River, although some of these birds may have been breeding nearby rather than migrants. Minimal data exists regarding the numbers of migrating birds on inland areas of the ACP, but Myers (1958) reported that the spectacled eider was the most abundant eider species migrating along river systems south of Barrow in spring. Recent information about spectacled and other eiders indicates that they probably make extensive use of the eastern Chukchi Sea spring lead system (Matt Sexson, unpublished data). Spring aerial observations have documented dozens to several hundred common and spectacled eiders in open water leads and several miles offshore in relatively small openings in rotting sea ice in the eastern Chukchi Sea (USFWS 2010). The USGS conducted a multi-year satellite telemetry study; information on spectacled eider movements is available at http://alaska.usgs.gov/science/biology/seaducks/spei/index.php.

Steller's eiders – We have no specific information regarding the use of the Action Area in spring by Steller's eiders but it is likely that they use the eastern Chukchi Sea spring lead system during spring migration along with other eider species.

Breeding and Brood-rearing

Spectacled eiders – For specific information regarding estimates of spectacled eider population estimates, please see the *Breeding–North Slope Population* in the Status section. To summarize, spectacled eiders arrive in the terrestrial environment in the Action Area in late May to early June, nest initiation begins mid June, incubation begins in mid to late June, and hatch occurs in early to mid July. The ACP population index estimate for 2011, based on extensive aerial surveys, was 7,952 (95% CI 6,258-9,646; Larned et al. 2012a; index not adjusted for detection probability).

Safine (2012) observed that spectacled eider females moved their broods 565 ± 191 m (N=7, range 44-1,601 m) 2-3 days post-hatch and 2,176 ± 342 m (N=3, range 1,538-2,710 m) about 35 days post-hatch. Thus, spectacled eiders may select a nest site proximal to suitable brood-rearing habitat (Petersen et al. 2000). Multiple hens with broods may coalesce into crèches (Derksen et al. 1981, Ehrlich et al. 1988).

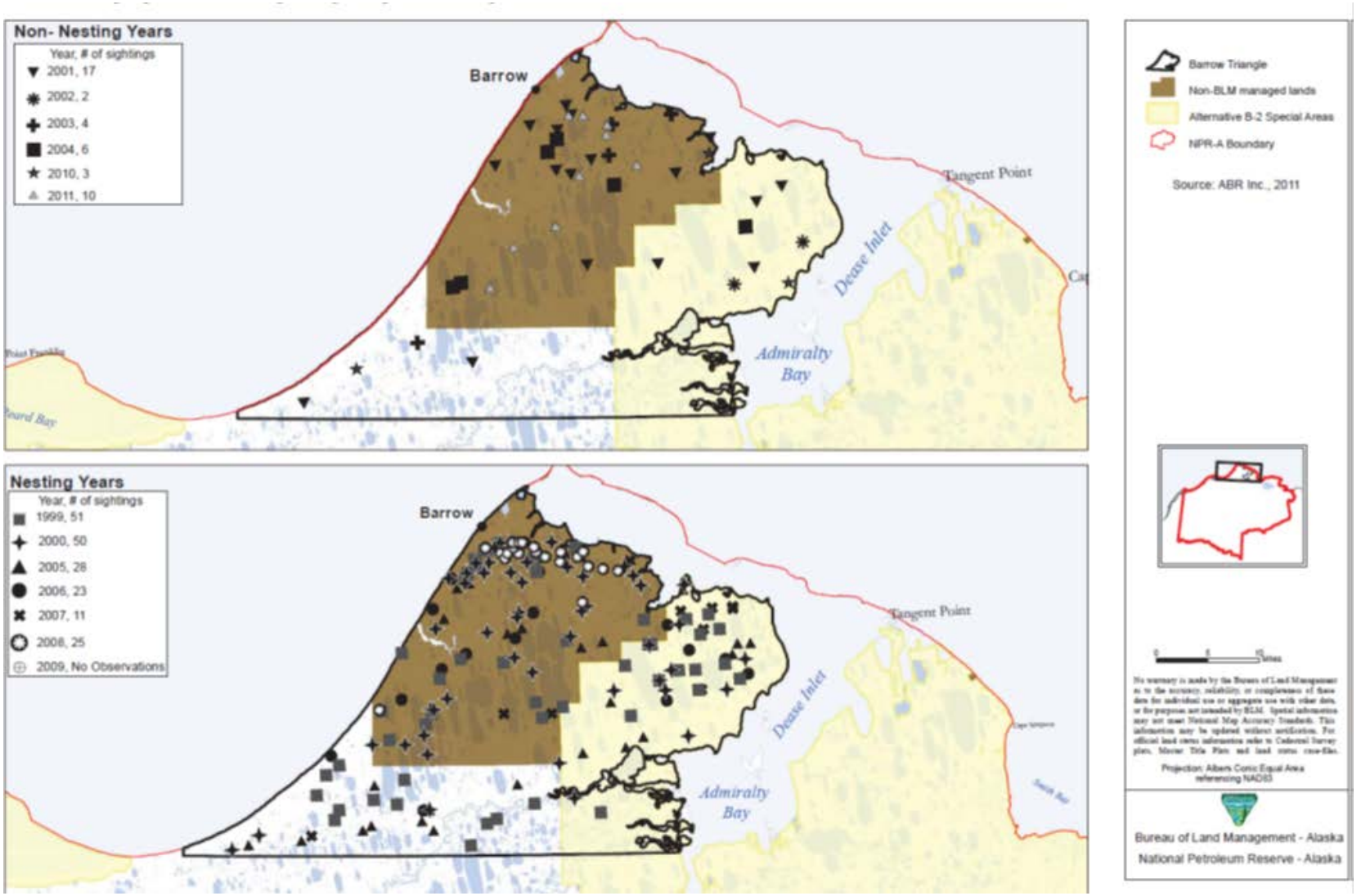

Figure 13. Steller's eiders sightings in the Barrow Triangle during nesting and non-nesting years, 1999-2011. From Map 6 in BLM (2012).

Steller's eiders – For specific information regarding Steller's eider population estimates, please see the *Status and Distribution* section. To summarize, Steller's eiders arrive in the Action Area in late May to early June, initiate nesting in mid-June, incubation begins in late June, and hatching begins in early to mid-July and continues through early August (Safine 2012). They nest in greatest density near Barrow (see Safine 2012); Steller's eider densities in the Barrow Triangle average about 0.03 birds/km^2, and estimated population index in the Barrow Triangle ranged from 0-224 birds (1999-2011; Obritschkewitsch and Ritchie 2012). The population index for the ACP as a whole has averaged 144 Steller's eiders (1992-2011; Larned et al. 2012a). Neither of these indices have been adjusted for detection probability, so are likely significant underestimates of actual abundance.

Steller's eider brood movements can vary, with some females making long movements soon after hatching to a rearing area, while others use wetlands near their nest sites during brood rearing (Safine 2010). Pre-fledgling Steller's eider broods use shallow wetlands with dense emergent vegetation that likely provides cover from predators and invertebrate food resources (Safine 2011). After fledging (≥ 36 days of age), most hatch year Steller's eiders remain near brood rearing areas in freshwater wetlands for 2-12 days, then either move to nearby marine waters or depart the area altogether (Safine 2012).

Post-breeding

Spectacled eiders – As stated in the *Use of Non-breeding Habitats* section for this species, spectacled eiders use nearshore marine waters after breeding, with males seeming to prefer open water near river deltas (Figure 14).

Steller's eiders – As stated in the section, *Post-breeding – North Slope* for this species, breeding and non-breeding individuals use nearshore marine waters in the Chukchi and Beaufort seas prior to migrating to molting areas. Some Steller's eiders also likely use areas of the Chukchi Sea outside of the Action Area during migration. As indicated by the loss of telemetry signals, females presumably begin migrating southward to molting areas in early September (Safine 2011).

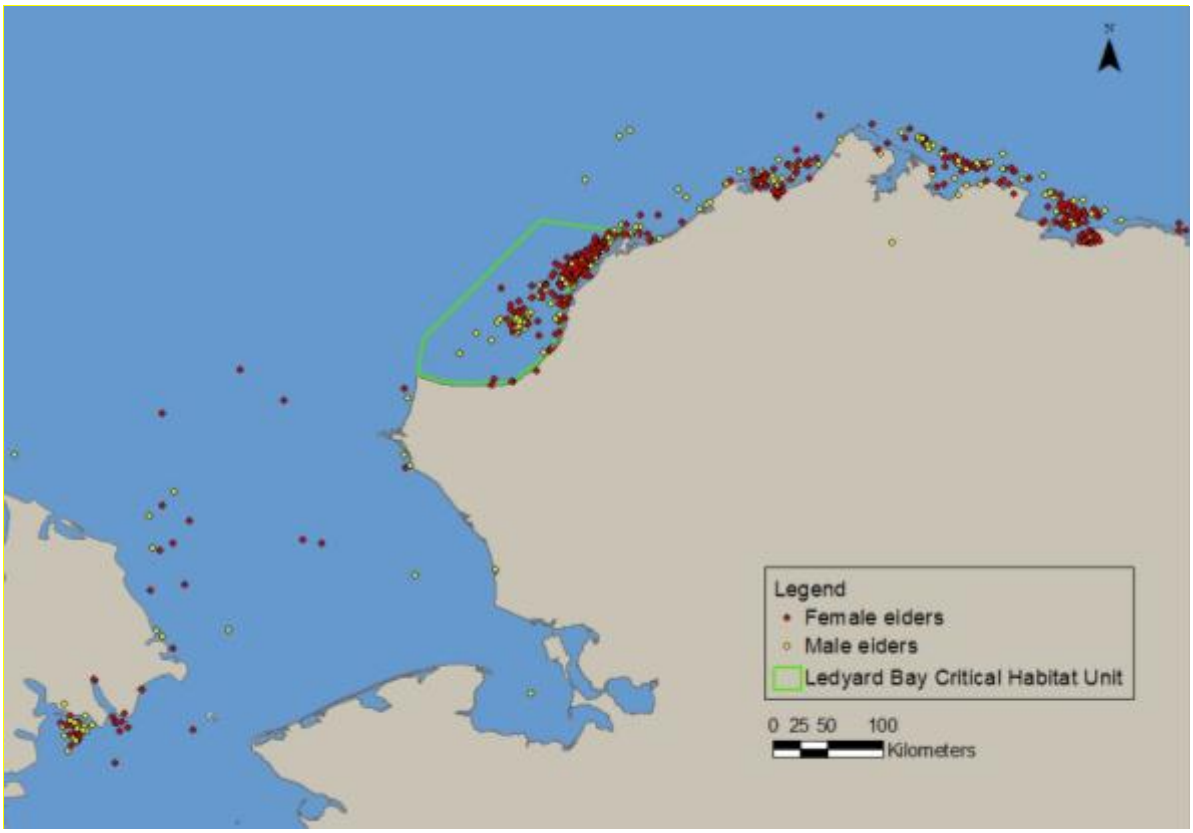

Figure 14. Satellite telemetry locations for 32 female and 23 male spectacled eiders in the eastern Chukchi and western Beaufort seas during 15 June – 15 November 2009, 15 June – 15 November 2010, and 15 June – 4 October 2011. Satellite transmitters were deployed on the North Slope during the 2009-2011 breeding seasons. Data provided by Matt Sexson, USGS Alaska Science Center (USGS, unpublished data for use only in this BO).

Possible Threats in the Action Area

Both species have undergone significant, unexplained declines in their Alaska-breeding populations. Factors that may have contributed to the current status of spectacled and Steller's eiders are discussed below and include, but are not limited to, toxic contamination of habitat, increased predator populations, harvest, impacts of development, impacts from scientific studies, and climate change. Factors that affect adult survival may be most influential on population growth rates. Recovery efforts for both species are underway in portions of the Action Area. Steller's and spectacled eiders have similar life histories in the Action Area; both species breed in tundra habitats and use nearshore waters just prior to and during migration. Thus, we discuss possible threats together for Steller's and spectacled eiders.

Toxic Contamination of Habitat

The primary known contaminant threat to spectacled and Steller's eiders in the Action Area is ingestion of spent lead shot that has been deposited in tundra wetlands or nearshore marine waters used for foraging. The effect of exposure varies but both lethal and sublethal responses can occur (Hoffman 1990). Lead is likely available to eiders, particularly breeding hens and ducklings, that feed in areas used for hunting on the ACP, especially in shallow freshwater wetlands near villages. Blood samples from hens breeding near Barrow in 1999 showed that all

(7 of 7) had been exposed to lead (indicated by > 0.2 ppm lead in blood) and one had experienced lead poisoning (> 0.6 ppm; Figure 15). Lead isotope analysis confirmed the lead in these samples originated from lead shot rather than other potential environmental sources (Trust et al. 1997, Matz et al. 2004). Use of lead shot for hunting waterfowl is prohibited statewide, and its use for hunting all birds is specifically prohibited on the North Slope. Collaborative efforts to reduce use of lead shot appear to be effecting improvement; and, indices of use, which include monitoring the availability of lead shot in stores and spent shell casings at popular hunting sites, suggest that the use of lead shot has been greatly reduced and continues to decline on the North Slope (and elsewhere in the state).

While the NPR-A contains a few contaminated legacy industrial and military sites, these sites pose minor if any, contamination risk to listed eiders.

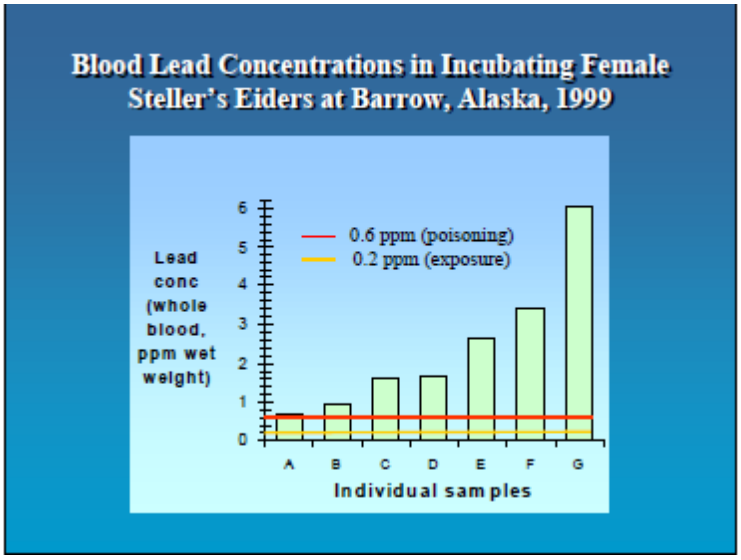

Figure 15. Blood lead concentrations in incubating female Steller's eiders at Barrow, 1999 (Service data).

Increased Predator Populations

Predator and scavenger populations may be increasing on the North Slope near sites of human habitation such as villages and industrial infrastructure (Eberhardt et al. 1983, Day 1998, Powell and Bakensto 2009). Reduced fox trapping, anthropogenic food sources in villages and oil fields, and nesting/denning sites on human-built structures may have resulted in increased fox, gull, and raven numbers (Day 1998, USFWS 2003). These anthropogenic influences on predator populations and predation rates may have affected eider populations, but this has not been substantiated. However, increasing predator populations are a concern, and Steller's eider studies at Barrow attributed poor breeding success to high predation rates (Obritschkewitsch et al. 2001). In years when arctic fox removal was conducted at Barrow prior to and during Steller's eider nesting, nest success appears to have increased substantially (Safine 2012), reinforcing that nest depredation may be a significant population-level influence.

Subsistence Harvest
Prior to the listing of Steller's and spectacled eiders under the ESA, some level of subsistence harvest of these species occurred across the North Slope (Braund et al. 1993). Hunting for spectacled and Steller's eiders was closed in 1991 by Alaska State regulations and Service policy, and outreach efforts have been conducted by the North Slope Borough, BLM, and Service to encourage compliance. Harvest surveys indicate that listed eiders are taken during subsistence hunting on the North Slope, although estimates of the number taken are imprecise, and numerous unquantifiable biases compromise the reliability of estimates. Continued efforts to eliminate shooting are being implemented in North Slope villages, particularly at Barrow, where Steller's eiders regularly nest near important subsistence hunting areas. Intra-service consultations for the Migratory Bird Subsistence Hunting Regulations are conducted annually.

Impacts from Development and Disturbance
With the exception of contamination by lead shot, destruction or modification of North Slope nesting habitat of listed eiders has been limited to date, and is not thought to have played a major role in population declines of spectacled or Steller's eiders. While development activities may adversely affect listed eiders, these species were not listed as a result of the impacts of development. The majority of eider breeding habitat on the ACP remains unaltered by humans, although limited portions of each species' breeding habitat have been impacted by fill of wetlands, the presence of infrastructure that presents collision risk, and other human activities that may cause disturbance of birds or increase populations of nest predators. These impacts have resulted from the gradual expansion of communities, limited military facilities such as the Distant Early Warning (DEW) Line sites at Cape Lonely and Cape Simpson, and, more recently, oil development since construction of the Prudhoe Bay field and TAPS in the 1970s.

Oil development is gradually spreading from the original hub at Prudhoe Bay. Given the expansion of the Alpine field, development is likely to continue to spread west.

Previously Consulted on Federal Projects
Development and other activities that may adversely affect listed eiders require consultation under section 7of the ESA, where their potential effects are estimated and evaluated. Table 2 summarizes activities in the Action Area that required formal section 7 consultations and the estimated incidental take of listed eiders. These actions are included in the environmental baseline for this consultation and were all considered in the analysis of this BO. For some actions estimated take is likely to occur over the life of the project (often 30–50 years) rather than annually or during single years. Note the incidental take in Table 2 is not cumulative, as aspects of some actions have been repeatedly consulted upon, resulting in some duplicative estimates of take.

Potential adverse effects on spectacled and Steller's eiders can range from human disturbance that may cause nest abandonment or death of ducklings to the death of breeding adults. Because only a small proportion of spectacled or Steller's eider eggs or ducklings survive and are recruited into the breeding population, loss of eggs or ducklings is less significant to the population than the loss of breeding adults. Therefore, while the Service aims to minimize loss of all individuals in the population, losing an adult, especially a breeding female, negatively affects the population more than the loss of individuals that have not reached adult or breeding

status. Further, take of eggs/ducklings is an estimate of take that may occur; actual take is likely much lower because we base take estimates on conservative assumptions. Thus, take in Table 2 are estimates, and we expect the actual or realized take is most likely substantially lower. Additionally, in all cases reasonable and prudent measures and their implementing terms and conditions for each BO likely minimizes the estimated take.

Table 2. Previously consulted on federal projects. Incidental take issued to federal agencies for spectacled and Alaska-breeding Steller's eiders. Con = contaminants, Col = collisions, Dis = disturbance, LOP = loss of production, C/H = capture/handling, C/H/S = capture/handling/surgery, HL = habitat loss, Res = research activities, EC = egg collection. With the exception of collisions, egg collection, and some surgery all of these forms of take are non-lethal.

Project Name	Impact Type	Estimated Incidental Take
Intra-Service, Issuance of Section 10 permits for spectacled eider (2000)	Dis Collection	10 spectacled eiders 10 spectacled eider eggs 25 spectacled eiders
Intra-Service, Section 10 permit for USFWS Barrow Steller's eider project (2003)	Res; EC for artificial incubation	24 Steller's eiders or Steller's eider eggs
Alpine Development Project (2004)	HL Col	4 spectacled eider eggs/ducklings 3 adult spectacled eiders
Barrow Hospital (2004 & 2007)	HL	2 spectacled eider eggs/ducklings 17 Steller's eider eggs/ducklings
Barrow Landfill (2003)	HL	1 spectacled eider nest/ year 1 Steller's eider nest/year
Barrow Tundra Manipulation Experiment (2005)	HL Col	2 spectacled eider eggs/ducklings 1 Steller's eider eggs/ducklings 2 adult spectacled eiders 2 adult Steller's eiders
Barrow Global Climate Change Research Facility, Phase I & II (2005 & 2007)	HL Col	6 spectacled eider eggs/ducklings 25 Steller's eider eggs/ducklings 1 adult spectacled eider 1 adult Steller's eider
Barrow Wastewater Treatment Facility (2005)	HL	3 Steller's eider eggs/ducklings 3 spectacled eider eggs/ducklings
ABR Avian Research/USFWS Intra-Service Consultation (2005)	Dis	5 spectacled eider eggs/ducklings
Pioneer's Oooguruk Project (2006)	HL, Col	3 spectacled eider eggs/ducklings 3 adult spectacled eiders
Barrow Artificial Egg Incubation (2006)	Removal of eggs for captive breeding program	Maximum of 24 Steller's eider eggs
Barrow Airport Expansion (2006)	HL	14 spectacled eider eggs/ducklings 29 Steller's eider eggs/ducklings
Intra-Service Consultation on MBM Avian Influenza Sampling in NPR-A (2006)	Dis	7 spectacled eider eggs/ducklings
Intra-service on Subsistence Hunting Regulations (2007)	No estimate of incidental take provided	
BLM Programmatic on Summer Activities in NPR-A (2007)	Dis	21 spectacled eider eggs/ducklings
Intra-Service Consultation on MBM Avian Influenza Sampling in NPR-A (2007)	Dis	6 spectacled eider eggs/ducklings
Intra-service on Subsistence Hunting	No estimate of incidental take provided	

Regulations (2008)		
BLM Programmatic on Summer Activities in NPR-A (2008)	Dis	56 spectacled eider eggs/ducklings
BLM Northern Planning Areas of NPR-A (2008)	Dis, Col	87 spectacled eider eggs/ducklings/year 12 Steller's eider eggs/ducklings/year < 7 adult spectacled eiders < 1 adult Steller's eider
MBM/USFWS Intra-Service, Shorebird studies and white-fronted goose banding in NPR-A (2008)	Dis	21 spectacled eider eggs/ducklings
NOAA National Weather Service Office in Barrow (2008)	HL Dis Col	< 4 spectacled eider eggs/ducklings < 10 Steller's eider eggs/ducklings 1 adult Steller's eider
Intra-Service, Section 10 permit for USGS telemetry research on spectacled eider use of the Bering, Chukchi, and Beaufort Seas (2009; North Slope field sites)	LOP C/H	130 spectacled eider eggs/ducklings 4 adult spectacled eiders
Intra-service on Subsistence Hunting Regulations (2009)	No estimate of incidental take provided	
BLM Programmatic on Summer Activities in NPR-A (2009)	Dis	49 spectacled eider eggs/ducklings
Intra-Service, Migratory Bird Subsistence Hunting Regulations (2010)	No estimate of incidental take provided	
Intra-Service, Section 10 permit for USGS telemetry research on spectacled eider use of the Bering, Chukchi, and Beaufort Seas (2010; North Slope field sites)	LOP C/H/S	130 spectacled eider eggs/ducklings 7 adult/juvenile spectacled eiders (lethal take) 108 adult/juvenile spectacled eiders (non-lethal take)
BLM Programmatic on Summer Activities in NPR-A (2010)	Dis	32 Spectacled eider eggs
Intra-Service, USFWS Migratory Bird Management goose banding on the North Slope of Alaska (2010)	Dis	4 spectacled eider eggs/ducklings
Intra-Service, Section 10 permit for USFWS eider survey work at Barrow (2009)	Dis C/H	3 Steller's eider or spectacled eider clutches 90 Steller's and 60 spectacled eider pairs (nonlethal take; pre-nesting) 60 Steller's and 60 spectacled eider hens (nonlethal take; nesting) 1 Steller's eider or spectacled eider adult (lethal take) 7 ducklings Steller's eider or spectacled eider (lethal take) 30 Steller's eider or spectacled eider hens (nonlethal take) 40 Steller's eider or spectacled eider ducklings (nonlethal take)
Intra-Service, Section 10 permit for ABR Inc.'s eider survey work on the North Slope and at Cook Inlet (2010)	Dis	35 spectacled eider eggs/ducklings
Intra-Service, Migratory Bird Subsistence Hunting Regulations (2011)	Shooting	400 adult spectacled eiders (lethal take) 4 adult Steller's eiders (lethal take)
Olgoonik gravel pad and access road, Wainwright, Alaska (2011)	LOP	23 spectacled eider eggs/ducklings
Barrow Gas Fields Well Drilling Program, (2011)	LOP	20 spectacled eider eggs/ducklings 22 Steller's eider eggs/ducklings

Intra-Service, Migratory Bird Management Greater White-fronted Goose Banding, North Slope of Alaska (2011)	Dis	8 spectacled eider eggs/ducklings
Intra-Service, Section 10 permit for ABR Inc.'s eider survey work on the North Slope and at Cook Inlet (2011)	Dis	20 spectacled eider eggs/ducklings
Intra-Service, Section 10 permit for USFWS eider survey work at Barrow (2011)	Dis C/H	4 Steller's and 4 spectacled eider clutches 20 additional Steller's or spectacled eider eggs 90 Steller's and 60 spectacled eider pairs (nonlethal take; pre-nesting) 60 Steller's and 60 spectacled eider hens (nonlethal take; nesting) 20 Steller's and 20 spectacled eider hens (nonlethal take) 40 Steller's or spectacled eider ducklings (nonlethal take) 1 Steller's eider or spectacled eider adult (lethal take) 7 ducklings Steller's eider or spectacled eider (lethal take)
Intra-Service, Section 10 permit for USGS telemetry research on spectacled eider use of the Bering, Chukchi, and Beaufort Seas (2011; Colville River Delta field site)	C/H/S	65 juvenile + 13 adult spectacled eiders (non-lethal take) 7 adult/juvenile spectacled eiders (lethal take)
ConocoPhillips Alaska, Inc's CD-5 Project (Alpine reinitiation; 2011)	HL	59 spectacled eider eggs/ducklings
Revised Biological Opinion and Conference Opinion for Oil and Gas Activities in the Beaufort and Chukchi Sea Planning Areas (issued to BOEM and BSEE, May 2012)	C	13 spectacled eiders, 1 Steller's eider (lethal take)

Research Impacts

While many research activities have no impacts on listed eiders because they occur when eiders are absent from the area or use remote sensing tools, on-tundra activities and aircraft landings in spring and summer potentially disturb a small number of listed eiders annually. Birds flushed from nests during on-the-ground activities may be more susceptible to nest predation than undisturbed birds (Grand and Flint 1997, Bowman and Stehn 2003). Field-based research is also increasing in arctic Alaska as interest in climate change and its effects on high latitude habitats grow. Some studies may involve direct impacts to eggs or birds. Collecting eggs removes a small number of spectacled eiders from the population. Implantation of satellite transmitters has provided the best information available on spectacled eider movements and locations of molting and winter areas, but the invasive nature of the surgery may affect the ultimate survival or reproductive ability of a small number of birds.

Climate Change

High latitude regions such as Alaska's North Slope are thought to be especially sensitive to the effects of climate change (Quinlan et al. 2005, Schindler and Smol 2006, Smol et al. 2005). While climate change will likely affect individual organisms and communities, it is difficult to predict with specificity or reliability how these effects will manifest. Biological, climatological, and hydrologic components of the ecosystem are interlinked and operate on multiple spatial,

temporal, and organizational scales with feedback between the components (Hinzmann et al. 2005).

Arctic landscapes are dominated by lakes and ponds (Quinlan et al. 2005), such as those used by listed eiders for feeding and brood rearing. In many areas these arctic water bodies are draining and drying out during summer as the underlying permafrost thaws (Smith et al. 2005, Oechel et al. 1995), while others are losing water through increased evaporation and evapotranspiration resulting from longer ice-free periods, warmer temperatures, and longer growing seasons (Schindler and Smol 2006, Smol and Douglas 2007). Productivity of lakes and ponds appears to be increasing as a result of nutrient inputs from thawing soil and increasing temperatures (Quinlan et al. 2005, Smol et al. 2005; Hinzmann et al. 2005, Chapin et al. 1995). Changes in water chemistry and temperature are also resulting in changes in algal and invertebrate communities that form the basis of the food web (Smol et al. 2005, Quinlan et al. 2005).

Historically, sea ice has served to protect shorelines from erosion; however, this protection has decreased as sea ice decreases in extent and duration. With the reduction in summer sea ice, the frequency and magnitude of coastal storm surges has increased. These can cause breaching of lakes and inundation of low-lying coastal wetland areas, killing salt-intolerant plants and altering soil and water chemistry, and hence, the fauna and flora of the area (USGS 2006). Coupled with thawing permafrost, the inundation of the shoreline due to lack of sea ice has significantly increased coastal erosion rates (USGS 2006), potentially reducing the quality or quantity of coastal tundra nesting habitat.

Changes in precipitation patterns, air and soil temperature, and water chemistry are also affecting tundra vegetation communities (Hinzmann et al. 2005, Prowse et al. 2006, Chapin et al. 1995), and boreal species are expanding their ranges into tundra areas (Callaghan et al. 2004). Changes in the distribution of predators, parasites, and disease-causing agents resulting from climate change may have significant effects on listed species and other arctic fauna and flora. Climate change may also result in mismatched timing of migration and development of food in arctic ponds (Callaghan et al. 2004), and changes in the population cycles of small mammals such as lemmings to which many other species, including nesting Steller's eiders (Quakenbush and Suydam 1999), are linked (Callaghan et al. 2004).

Regional-scale environmental shifts may be underway in the Chukchi and the Bering seas that may affect spectacled and Steller's eider populations. Ice thickness generally increases from the Siberian Arctic to the Canadian Archipelago, due mostly to convergence of drifting sea ice (Walsh 2005). Rothrock et al. (1999; cited in Walsh 2005) found a decrease of about 40% (1.3 m) in the sea-ice draft (proportional to thickness) in the central Arctic Ocean by comparing sonar data obtained from submarines during two periods: 1958–1976 and 1993–1997. Wadhams and Davis (2000; cited in Walsh 2005) provide further submarine-measured evidence of reductions in sea ice thickness in the Arctic Ocean. Satellite imagery has documented a downward trend in September sea ice extent (historically when sea ice extent is at its minimum; Figure 16, NSIDC 2012). From 1979 through 2009, satellite data from 10 Arctic regions indicated that nine of 10 regions experienced trends towards earlier spring melt and later autumn freeze onset (Markus et al. 2009). For the entire Arctic, the melt season length has increased by about 20 days during this period (Markus et al. 2009). The Chukchi/Beaufort seas region, which is within the range of listed eiders, has experienced a strong trend toward later autumn freeze-up date and longer ice-

free seasons (Markus et al. 2009). Such changes in sea ice extent and duration would likely affect Steller's and spectacled eider populations. While listed eider populations would likely be affected by climate change-induced ecological shifts in their terrestrial and marine environments, we are unable to predict with reasonable reliability the direction or magnitude of these impacts.

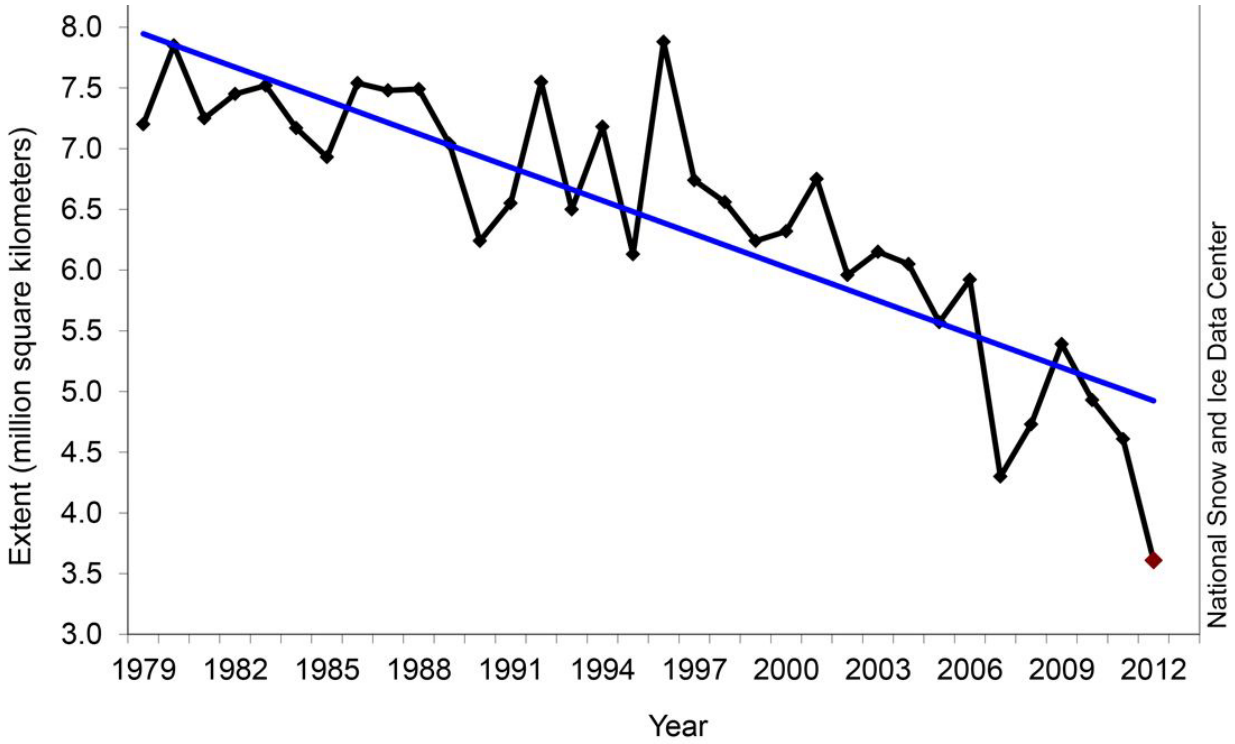

Figure 16. Average September arctic sea ice extent from 1979 through 2012 showing a 13.0% decline per decade. From NSIDC (2012). [http://nsidc.org/arcticseaicenews/asina/2011/100411.html, accessed 10/03/2012]

Polar Bears

Typically, most polar bears occur in the active ice zone, far offshore, hunting throughout the year. Bears also spend a limited time on land to feed or move to other areas, although melting sea ice may result in increased numbers of polar bears moving from the offshore ice onto land. The highest number of polar bears in the Action Area occurs during fall and winter when some polar bears use the terrestrial environment to search for suitable den sites (pregnant females), and/or food (e.g., whale carcasses). Polar bears may also abandon melting sea ice and/or use the terrestrial environment to transit to other areas. Bears are known to occasionally den in the Action Area (Durner et al. 2006; Durner et al. 2010), but few dens have been reported within the Action Area in the last 10 years. Polar bears rarely den along the Alaskan coast of the Chukchi Sea but more frequently den along the Beaufort Sea coast in Alaska. Potential polar bear denning areas are generally definable by the physical features that facilitate the capture of sufficient snow to allow den excavation (Durner et al. 2003). In terrestrial habitats, these conditions are typically found along the shores of rivers, lakes and the coast. Orientation of these landforms, wind speed and direction, and snow amount and timing also influence the suitability of denning habitat (Liston 2012). The two dominant wind directions associated with storm events that deposit the most snow (storms with wind speds above approximately 5 m/s,

assuming snow is available to be transported) on the North Slope of the Arctic coast are northeast to east (45.0 to 90.0 degrees) and west southwest to southwest (247.5 to 270.0 degrees; Liston 2012). If fall storms and ocean currents result in bears coming to land, they may remain along the coast or on barrier islands for several weeks until the ice returns.

Polar bears in the Action Area are managed as part of the Alaska-Chukotka (A-C) or southern Beaufort Sea (SBS) stocks/populations (Figure 17). Therefore, we briefly discuss the status of these two stocks.

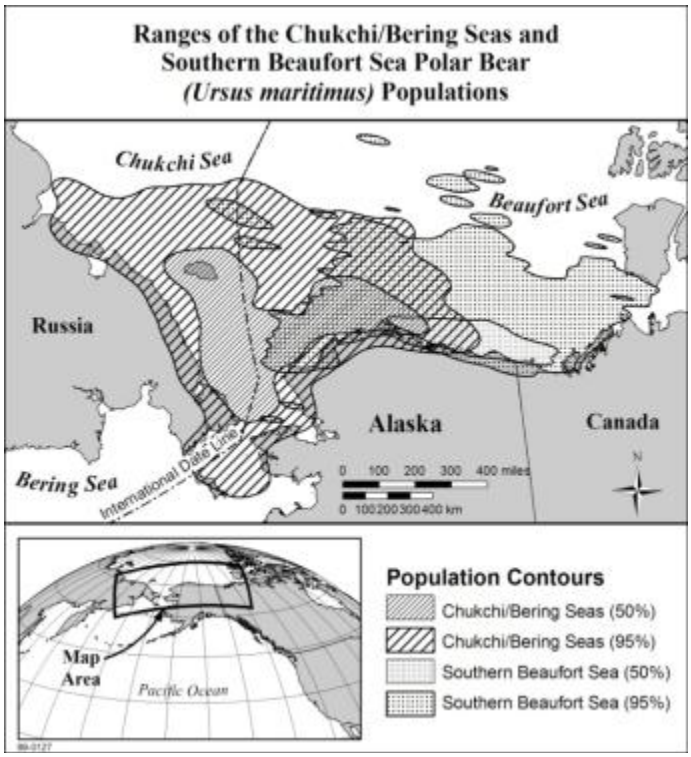

Figure 17. Ranges of Alaska polar bear stocks (73 FR 28212).

Alaska-Chukotka Stock

The A-C stock is widely distributed on the pack ice of the northern Bering, Chukchi, and eastern Siberian seas (Figure 17; Garner et al. 1990, Garner et al. 1994, Garner et al. 1995). The constant movement of pack ice influences the movement of polar bears, and this makes obtaining a reliable population size estimate from mark and recapture studies challenging. For example, polar bears of this stock move south with advancing ice during fall and winter and north in advance of receding ice in late spring and early summer (Garner et al. 1990). Experts estimate the subpopulation to number approximately 2,000 polar bears (Aars et al. 2006). Currently, the Polar Bear Specialist Group (PBSG) classifies the A-C stock as declining based on reported high levels of illegal killing in Russia, continued legal harvest in the United States, and observed and projected losses in sea ice habitat (Table 3, Obbard et al. 2010).

Southern Beaufort Sea Stock

The SBS is distributed across the northern coasts of Alaska, and the Yukon and Northwest territories of Canada (Figure 17). Estimates of the population size of the SBS were 1,778 from 1972 to 1983 (Amstrup et al. 1986), 1,480 in 1992 (Amstrup 1995), and 2,272 in 2001 (Amstrup, USGS unpublished data). Declining survival, recruitment, and body size (Regehr et al. 2006, Regehr et al. 2009, Rode et al. 2010), low population growth rates during years of reduced sea ice (2004 and 2005), and an overall declining population growth rate of 3% per year from 2001 to 2005 (Hunter et al. 2007) suggest that the SBS is now declining, and Regehr et al. (2006) most recently estimated the SBS to be 1,526 (95% CI 1,211-1,841). The status of this stock is listed as 'reduced' by the IUCN (Obbard et al. 2010) and 'depleted' under the MMPA. Based on oil and gas industry observations and Service survey data, up to 125 SBS individuals have been observed in fall in the Action Area on barrier islands or the coastline between Barrow and the Alaska-Canada border.

Table 3. IUCN and MMPA statuses of the two polar bear stocks in the Action Area.

	#IUCN Polar Bear Specialist Group			
Subpopulation/stock	**Population status**	**Population trend**	**Population size**	***MMPA Status**
Chukchi Sea	Reduced	Declining	Unknown	Depleted
Southern Beaufort Sea	Reduced	Declining	1,526 (95% CI: 1,211 – 1,841)	Depleted

The Polar Bear Specialist Group (PBSG) is a research scientist group under the auspices of the International Union for the Conservation of Nature (IUCN); Obbard et al. (2010)
* Marine mammals listed under the Endangered Species Act are given a "depleted" status under the Marine Mammal Protection Act (MMPA).

Threats and Possible Stressors in the Action Area

As stated in the section, *Threats to the Polar Bear,* the primary threat to polar bears throughout their range is the projected future loss of sea ice resulting from climate change. Although significant changes in summer sea ice have already occurred in the Action Area in the past few years, the prognosis for continued change and how those changes will affect polar bear populations is not yet known. Other factors that may affect polar bears in the Action Area are also discussed.

Subsistence Harvest

The U.S. manages subsistence hunting through international, bi-lateral, and user-to-user agreements. The signing of the *Multilateral Agreement on the Conservation of Polar Bears* in 1973 provides authority for the maintenance of a subsistence harvest of polar bears and for habitat conservation. Sustainable harvest levels are set by the Inuvialuit-Inupiat (I-I) Council (Canada-Alaska) and the U.S.-Russia Polar Bear Commission (Commission) for the Southern Beaufort Sea and Alaska-Chukotka polar bear populations, respectively.

Southern Beaufort Sea population – In 1988 the I-I Council established a sustainable harvest quota for the SBS population of 80 polar bears. In 2010 the Council adjusted the quota downward to 70 polar bears (email T. DeBruyn, August 13, 2010) based on a revised population

estimate of 1,526 (Regehr et al. 2006; email T. DeBruyn, August 13, 2010). The reported annual average combined (Alaska-Canada) harvest for the SBS population from 2004 to 2009 was 44, and the 2008/2009 reported harvest for Alaskan North Slope villages was 25 polar bears (DeBruyn et al. 2010).

Alaska-Chukotka population – Russia and the U.S. signed the *Agreement between the United States of America and the Russian Federation on the Conservation and Management of the Alaska-Chukotka Polar Bear Population* (Bilateral Agreement) in 2000 which established the U.S.-Russia Polar Bear Commission (Commission) and provides a common legal, scientific, and administrative framework to manage the shared A-C polar bear population; implementing legislation for the Bilateral Agreement was signed in the U.S. on January 12, 2007. Based upon reliable science and Traditional Ecological Knowledge, in June 2010 the Commission adopted an annual take limit of the A-C polar bear population of 19 females and 39 males (DeBruyn et al. 2010). Harvest will be split evenly between Native peoples of Alaska and Chukotka. The Alaskan share of the harvest is 29 polar bears per year, which is below the average of 37 polar bears harvested each year between 2004 and 2008 (USFWS, unpublished data). From 2008 through 2011, reported annual harvest in the Barrow area ranged from 10 to 14 bears (email T. DeBruyn, November 2, 2012).

Polar Bear Research

Currently, several ongoing polar bear research programs take place in the Action Area. The goal of these programs is to gain information on the ecology and population dynamics of polar bears to help inform management decisions, especially in light of climate change. These activities may cause short-term adverse effects to individual polar bears targeted in survey and capture efforts and may incidentally disturb those nearby. In rare cases, research efforts may lead to injury or death of polar bears. Polar bear research is authorized through permits issued under the MMPA. These permits include estimates of the maximum number of bears likely to be harassed, subjected to biopsy darting, captured, etc., and include a condition that halts a study if a specified number of deaths, usually four to five, occurs during the life of the permit; permits are typically for five years.

Incidental Take Regulations

Incidental Take Regulations (ITRs) for the Beaufort and Chukchi seas have been issued under the MMPA for oil and gas activities in and adjacent to the Beaufort and Chukchi seas since the early 1990s. Oil and gas companies can obtain Letters of Authorization (LOAs) under the ITRs, and these LOAs have reporting requirements. Under the Beaufort Sea ITRs, the oil and gas industry observed on average 306 polar bears annually (from 2006-2009; actual numbers ranged from 170 to 420 annually). About 81% of observed bears showed no change in behavior, 4% altered their behavior by fleeing, and the remaining 15% were subject to intentional hazing or other deterrence actions (described below). Because few oil and gas activities have occurred in the Chukchi Sea and adjacent area, few polar bear sightings have been reported. The current Chukchi Sea ITRs expire in 2013, and the Service will likely re-issue these regulations.

Deterrence Activities and Intentional Take Authorization

Polar bear deterrence associated with oil and gas and other activities takes place in the Action Area. The Service previously consulted on a Final Rule regarding passive and preventative

deterrence measures that any person can use (e.g., acoustical and vehicular deterrence) when working in polar bear habitat (75 FR 61631). The Service concluded that these methods are not likely to adversely affect polar bears and are likely to cause, at most, only short-term changes in behavior, such as bears running away from the disturbance (75 FR 61631). These methods would not require authorization via LOAs. However, the Service issues LOAs regarding intentional taking of polar bears for both human and bear safety pursuant to 101(a)(4)(A), 109(h), and 112(c) to appropriately-trained individuals.

Intentional-take LOAs allow trained individuals to use other mechanisms (e.g., use of projectiles) to deter polar bears away from human structures and activities. These deterrence activities are necessary tools to prevent the lethal take of polar bears or potential for injury to personnel. Intentional take LOAs would allow trained individuals to use other mechanisms (e.g., chemical repellants, electric fences, and projectiles such as bean bags projected from a shotgun) to deter polar bears away from infrastructure and personnel, and would allow the Service to require mitigation measures and ensure minimum standardized training in the use of deterrence methods.

From August 2006 through July 2010, the oil and gas industry working in the Beaufort Sea or its adjacent coast reported the sightings of 1,414 polar bears, of which 209 (15%) were intentionally harassed, or deterred (C. Perham, *pers. comm*., email, July 12, 2011). Annually, the percent of total bears sighted that were deterred ranged from 9% in 2010 to 43% in 2006, with an average of 15%. In the majority of cases deterrence was accomplished using acoustical or vehicular deterrence methods. However, chemical repellants and projectiles were also used, although infrequently. For example, from August 2006 through July 2011 up to five polar bears were deterred using bean bags and at most one was deterred with rubber bullets annually. Two bears were accidentally killed in 2011-2012 due to misuse of deterrent rounds (one in oil and gas operations).

Climate Change

For a more complete discussion of effect of climate change in the arctic, see the section, *Climate Change* discussed above for listed eiders. In addition to the loss of sea ice, climate change may affect polar bears and their habitat in a variety of other ways. For example, increasing temperatures in the arctic are likely to result in increased frequency of rain-on-snow events, which will affect the insulation and structure of dens, potentially reducing the production of cubs (and ice seals, which are the primary prey of polar bears). However, uncertainty regarding the frequency of these events and their effects on productivity makes predicting their impact impossible.

Other Activities and Threats

Polar bear viewing at sites such as whale bone piles may result in disturbance of feeding polar bears. These disturbances are temporary, however, and within the Action Area are limited to the bone pile at Barrow, which limits the extent and severity of any possible impact.

Summary

The primary factor affecting the status of polar bears in the Action Area is the loss of sea ice. In addition, tens of polar bears are taken by subsistence hunters in the Action Area annually, but

this harvest is managed through international agreements to ensure sustainability. Other stressors are not thought to significantly affect polar bear populations; however, all stressors could become more significant in combination with expected loss of sea ice.

Polar Bear Critical Habitat

The Action Area includes small proportions of each of the three critical habitat units (< 1% of the sea ice unit, about 7% of Barrier Island Unit, and about 26% of the terrestrial denning unit; Table 4 and Figure 18). When evaluating the baseline condition of PCEs in the Action Area, we considered actions that are ongoing or were consulted on previously. They include research on polar bears by USGS and the Service, summer activities and research in NPR-A, contaminated site remediation and restoration, and development projects in and adjacent to North Slope villages. We have previously evaluated the effects of some oil and gas activities in the Action Area in consultations on other actions, such as the Beaufort and Chukchi Sea ITRs and LOAs issued pursuant to these ITRs. All of these previously consulted upon activities had only short-term, localized effects to critical habitat, and none rose close to the level of adverse modification.

Table 4. Estimated size and percent of critical habitat units in the NPR-A.* From Table 3.2 in BLM (2012: 42).

Critical Habitat Unit	Number of acres and percent of critical habitat in NPR-A
Sea-Ice	434,500 (<1%)
Terrestrial Denning	945,265 (26%)
Barrier Islands**	15,650 (7%)
Total***	1,395,415 (1%)

*Acres and percentages rounded to the nearest whole number. All acres were obtained from GIS analysis of the Service's critical habitat spatial data and BLM's NPR-A spatial data.
**Figures for the Barrier Islands unit do not include the one-mile no disturbance zone around the unit.
***The total areas reported include overlap between the critical habitat units.

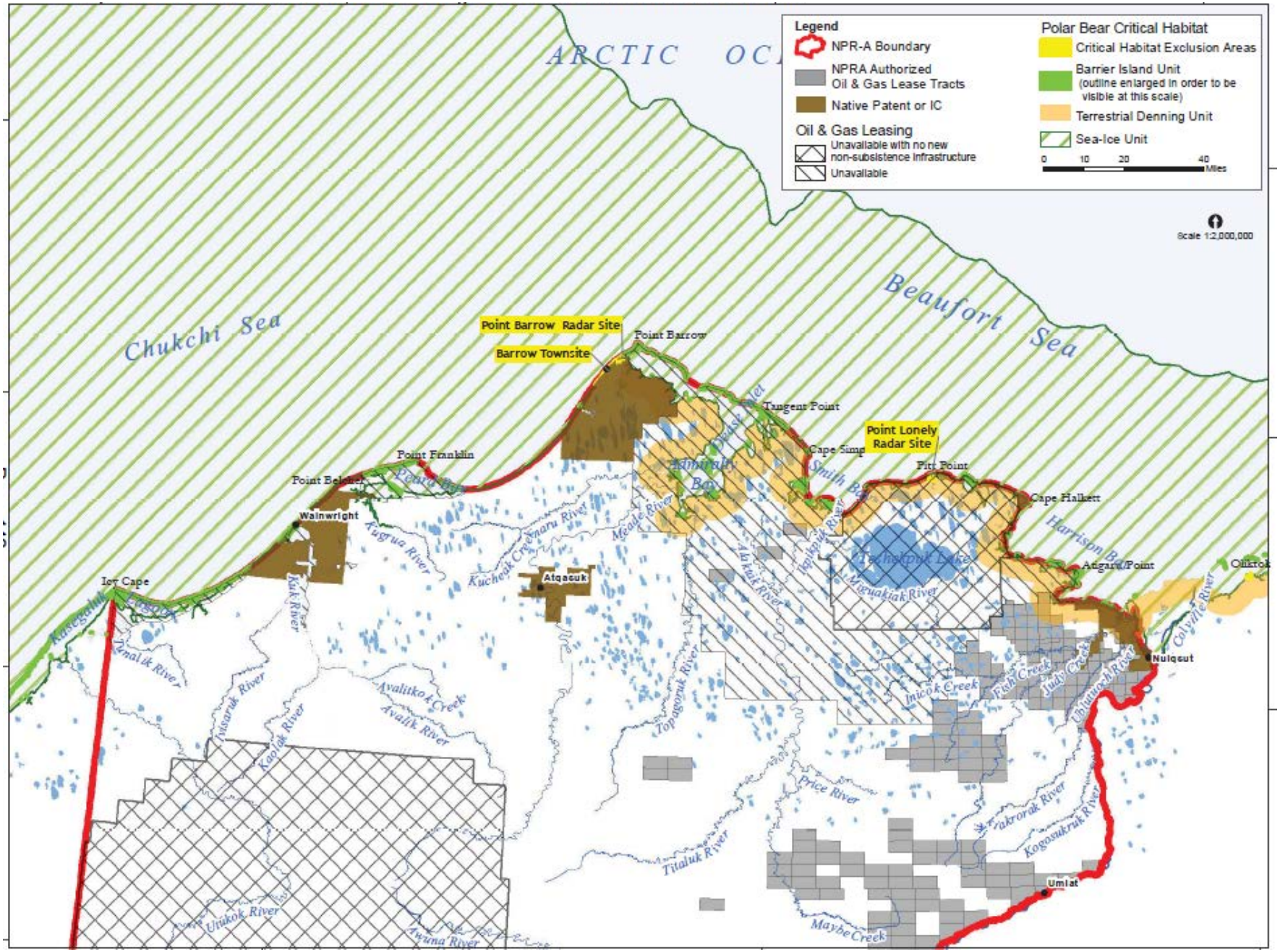

Figure 18. Overlap between NPR-A and polar bear critical habitat. From Map 7 in BLM (2011: 142).

Because the Action Area contains a very small portion of the Sea Ice Unit, effects to other critical habitat units are more important in influencing the condition of critical habitat in the Action Area. As mentioned in the section, *Threats to the Polar Bear*, climate change is likely affecting the Barrier Island Unit through increased erosion, and affecting denning critical habitat through increase rain-on-snow events. The extent of these effects is unknown. While some federal actions may have adverse effects to critical habitat, these effects are small-scale and short-term when considered individually and cumulatively. Additionally, most of the critical habitat in the NPR-A is undeveloped, and the management of the NPR-A entails a number of BMPs and lease stipulations that serve to directly or indirectly conserve the value of polar bear critical habitat. Therefore, other than the uncertain effects of climate change, the components of polar bear critical habitat in the Action Area are currently intact.

Effects of the Proposed Action

This section of the BO analyzes direct effects, indirect effects, and interdependent and interrelated effects of the proposed Action on listed species and critical habitat. Because of the uncertainty regarding how much and where development would occur, the U.S. Fish and Wildlife Service (Service) has made conservative assumptions about the locations of development activities to ensure that impacts to listed species are not underestimated. These assumptions include: 1) all development estimated by the BLM in their development scenario would occur; and 2) effects of habitat loss via disturbance of eiders near development is permanent. The effects analysis also considers the protections provided to listed species through lease stipulations and BMPs. As discussed previously in *The Proposed Action*, section, the BLM would make 48% (11 million acres) of federally-owned subsurface in the NPR-A unavailable for leasing (UL). A proportion of the remaining BLM-managed land is subject to various lease stipulations and BMPs that further restrict surface activities (e.g., timing and flight elevation restrictions). We also discuss implications of the proposed lease stipulations, BMPs, and areas UL designation for each species and critical habitat designation in the appropriate sections below.

Crude and Refined Oil Spills

While spills of crude and refined oil products are not part of the Proposed Action, they may occur as a result of activities authorized and described in the Proposed Action. Therefore, to ensure we have considered all the potential effects to listed species and critical habitat that may result from the proposed action we describe the types of spills that may occur here, and then evaluate their potential effects to each species and critical habitat below.

Because a range of spill types and sizes could occur, the BLM conducted oil spill analyses for three spill size categories: (1) small spills (less than 500 barrels); (2) large spills (from 500 and less than 120,000 barrels); and (3) very large spills (120,000 barrels or more). We briefly discuss the size categories of spills, the chance of a spill in each size class occurring, and the typical products that could be spilled in each size class. While the majority of spills would be contained on gravel pads, approximately 20−35 percent of past North Slope crude oil spills have reached areas beyond pads (BLM 2012b). Please see BLM (2012b) for a more thorough discussion of spill assumptions and modeling results.

Over the lifetime of exploration, development, and production of the NPR-A (i.e., through 2057), small spills are extremely likely to occur (>99.9 % chance). BLM estimated that 94 crude and 273 refined oil spills could occur, with an average small spill volume of 1.4 barrels (BLM 2012b). Onshore or offshore refined-oil spills could occur along ice roads, or from barges, helicopters, airplanes, gravel pad facilities, or trucks along the road system. Typical refined-oil products that may be spilled include aviation fuel, diesel fuel, engine lubricant, fuel oil, gasoline, grease, hydraulic oil, transformer oil, and transmission oil.

The two sources of potential large crude oil spills are from pipelines and long duration blowout resulting from a well-control incident. The loss of the entire volume in an onshore pipeline between two valves would also result in a large spill of crude oil. The BLM estimated a 28% chance that one or more large crude oil spills would occur during the life of the IAP. Based on information on past spills, large spills volumes would likely be on the lower end of the range for this spill volume category. BLM used spill sizes of 900 and 5,100 barrels for a facility or pipeline spill, respectively, in analyses; these spill volumes reflect the largest North Slope spill volumes recorded, rounded to the nearest 100 barrels (BLM 2012, Appendix G).

The BLM determined the only potential source of a very large oil spill (> 120,000 barrels) is a well-control incident that escalates into long duration blowout when all primary and secondary safeguards fail and the well does not collapse in on itself and stop flowing. The approximate occurrence rate worldwide for onshore very large oil spills is about one for every 270 billion barrels produced (BLM 2012b, Appendix G). More locally (at Northstar), the statistical frequency of a blowout well leading to a very large oil spill was estimated at 9.4×10^{-7} per well drilled (for volumes > 130,000 barrels; BLM 2012b, Appendix G). Thus, very large oil spills are extremely unlikely to occur, and none have occurred in over 16.4 billion barrels of oil produced on Alaska's North Slope.

Steller's and Spectacled Eiders

The following types of adverse effects to listed eiders may result from the Proposed Action:

- Habitat Loss
- Disturbance and Displacement
- Aircraft and On-tundra Activities
- Collisions
- Increased Predation
- Crude and Refined Oil Spills
- Gas Leaks
- Freshwater Withdrawal from Lakes and Ponds
- Non-oil and Gas Activities

We discuss each of these effects below, and then discuss the BMPs and lease stipulations that help to mitigate these effects.

Habitat Loss

The impact of habitat loss depends upon the location of gravel pads and material sites because spectacled and Steller's eider density varies across the Action Area (Figure 1). Assuming the gradient in observed density of eiders reflects a gradient in habitat quality, and that displacing birds from preferred habitat reduces their reproductive potential, placing fill in areas used by breeding and brood-rearing eiders would compromise their reproductive potential. The BLM estimated that the proposed action would result in the long-term loss of 8,402 acres throughout NPR-A (BLM 2012a, Appendix B). Because much of NPR-A contains wetland habitat, a large proportion of this estimated loss may be eider habitat.

Temporary habitat loss for eiders could result from implementation of the Proposed Action. Accumulated snow from ice roads, plowing activities, or unnatural snow drifts could be delayed in melting, and could preclude eiders from nesting in those areas in those years. Ice roads, pads, and airstrips could also compact vegetation, which could reduce cover for nesting eiders. Rolligons and track vehicles used during seismic exploration could leave tracks on tundra habitats that would affect vegetation and soil thaw characteristics, and cause small-scale hydrologic changes (Jorgenson et al. 2010). The most noticeably-affected areas would include terrain with considerable micro topographic relief caused by mounds, tussocks, hummocks, and high-centered polygons. These areas are used by eiders for nesting and loafing. Wet areas would be less likely to be affected than drier sites (Walker 1996). However, vegetation generally recovers from this temporary impact within a few years (Yokel et al. 2007). For about the next 50 years, the BLM estimated about 150 acres could be affected annually from the above-mentioned activities (BLM 2012a). Taking into consideration recovery time for vegetation in affected areas, at any given time a few hundred acres might have reduced quality for eiders.

Short and long-term loss of eider habitat from the Proposed Action will likely be minimized through BMPs and lease stipulations. While the Proposed Action includes one BMP specific to threatened eiders (E-11), most stipulations and BMPs that benefit eiders were designed for more general purposes or to benefit other specific resources. For a list of BLM's stipulations and BMPs and their content, see *Appendix A. BLM's Lease Stipulations and Best Management Practices*.

Disturbance and Displacement

Oil and gas development activities that may result from the proposed Action could disturb Steller's and spectacled eiders, and potentially prevent them from initiating nests or displace them from preferred nesting habitat. The severity of disturbance and displacement will likely depend upon the duration, frequency, and timing of the disturbing activity. Seismic surveys, exploratory drilling, gravel mining, material hauling, pad, road, and pipeline construction, and pipeline maintenance are all expected to occur in winter and therefore will not disturb listed eiders. However, once pads, staging areas, and roads are constructed these areas will be subject to year-round human activities, including machinery and facility noise, pedestrian and vehicle traffic during the breeding, nesting, and brood-rearing periods. Frequent fixed-wing and helicopter flights into and out of CPF airstrips will likely occur, particularly during the construction and development phase. Disturbance occurring during the nesting period (approximately June 5 - August 15) could adversely affect individuals by: 1) displacing adults and or broods from preferred habitats during pre-nesting, nesting, and brood rearing, leading to reduced foraging efficiency and higher energetic costs; and 2) flushing females from nests or

shelter in brood-rearing habitats, exposing eggs or ducklings to inclement weather and predators. Hens may also damage eggs as they are flushed from a nest (Major 1989), and may abandon nests entirely, particularly if disturbance occurs early in the incubation period (Livezy 1980, Götmark and Ählund 1984). Individual tolerance and behavioral response of Steller's and spectacled eiders to disturbance will likely vary, and their response to oil development activities has not been studied or quantified.

Human disturbance may also displace hens and broods from preferred brood-rearing habitat, which could negatively impact duckling growth and survival (Flint et al. 2006). For example, pre-nesting spectacled eiders (observed in groups or pairs) were located an average of 239 m from structures, whereas nests were found an average of 442 m from structures near the Alpine development (Anderson et al. 2007), and the distance between pre-nesting spectacled eiders and the location of Alpine oilfield structures before and after construction did not differ (Johnson et al. 2006). We can infer from these examples that nesting birds may be more sensitive to activities occurring at infrastructure than pre-nesting birds, and habitat near facilities may have a lower nesting value compared to distant areas. Thus, human activity at facilities, gravel mines, staging areas, and on roads may reduce use of available nesting habitat adjacent to the areas of human activity. However, estimating loss of nesting habitat from disturbance is difficult. Additionally, the effect of disturbance would vary with facility type; for example, staging areas may have less activity than CPFs and may have less impact. Based on best judgment and conservative estimates to benefit the species, we estimate nesting behavior may be disrupted and/or displaced by human activities within 200 m of active facilities.

Spectacled eiders:
BLM used spatial analyses to estimate the total area of habitat potentially affected by development and associated disturbance surrounding facilities using the technique presented in TWS et al. (2012). This analysis combined spectacled eider density contours (top portion of Figure 13) from aerial survey results for the ACP study area (TWS et al. 2012) with projected development scenarios described under the Proposed Action. The habitat map consisted of five classes of eider density ranging from the lowest (1) to highest (5) density. The footprints (Table 5) of simulated roads, pads (i.e., oil and gas), and gravel pits, but not pipelines were overlaid onto the eider habitat map with a 200 m buffer around each using an iterative process (100 iterations) within areas where development could occur (e.g., areas available for leasing). Through this iterative process, a range of potential effects of development were generated for spectacled eider habitat, accounts for the uncertainty regarding where development may occur. Pipelines were not included because we do not expect the presence of pipeline to significantly affect the presence of or distribution of eider nests. Roads were not assumed to have an actual "footprint" except for the 200 m buffer on either side of the line segment; the raster size used in these models was not of a small enough scale to capture the area occupied by the road and would not have changed model results regarding the proportion of habitat falling in a given eider density category.

Table 5. Simulated sizes of footprints for oil and gas facilities potentially resulting from the Proposed Action. Gravel pits had variable sizes based on BLM (2012b). Roads were assumed to have a zero width but had a buffer of 200 m on either side of the line segment (2012b).

Type of Facility	Footprint Size (acres)

Oil Central Processing Facility	51
Oil Production Pad	10
Gas Central Processing Facility	21
Gas Production Pad	6
Gravel Pit	10-63

The BLM then quantified the area of each eider density category that fell within the development model (Table 6).

Using the information estimated in Table 6, the Service estimated the potential loss of spectacled eider eggs and subsequent productivity resulting from this habitat loss. We used median spectacled eider density from each category to calculate the estimated mean and 95% CIs: 1) number of eggs lost during 25 years, the estimated life of oil production infrastructure; and 2) potential adult recruitment from decreased egg production. All development is not likely to occur at once within the NPR-A; thus, the effects of habitat loss would likely vary and possibly increase over time.

Table 6. Estimated spectacled eider habitat loss by eider density category to new development in the NPR-A. Habitat loss includes a 200 m disturbance buffer around each development (including gravel roads).

Spectacled eider density category	Spectacled eider density range (eider/km^2)	Median density (eider/km^2)	Mean habitat lost (km^2)	95% CI
1	0.000-0.034	0.017	41.91	30.21, 54.66
2	0.035-0.146	0.0555	21.53	14.46, 32.74
3	0.147-0.225	0.039	4.31	0, 12.40
4	0.226-0.409	0.0915	2.22	0, 7.248
5	0.410-1.409	0.4995	0.478	0, 3.646
Total	**--**	**--**	**70.45**	**44.66, 110.70**

First, we calculated the number of birds (mean, and upper and lower 95% CIs) expected to occur within the area lost to development from the information in Table 6 by multiplying the median eider density of each range category by the area lost. For example, the calculation of the mean *number of birds lost to development in the first density range category* is as follows:

0.017 eiders/km^2 x 41.91 km = 0.71 eiders present in development footprint.

Table 7. Spectacled eiders lost to development within each density category.

Median spectacled eider density category	Mean eiders lost to development	95% CI
1	0.71	0.51, 0.93
2	1.19	0.80, 1.82
3	0.17	0, 0.48
4	0.20	0, 0.66
5	0.24	0, 1.82

We next calculated the number of nests potentially affected by development. We estimated that 50% of the spectacled eiders calculated in Table 7 are females; thus, *we multiplied number of eiders potentially affected by development in each density category (and the upper and lower 95% CIs) by 0.50*. Results are in Table 8. The number estimated in Table 8 indicates the number of nests (based on one female per nest) potentially affected by development in the first year of development.

Table 8. Estimated number of spectacled eider nests (females) potentially affected by development in the first year; all estimated development is assumed to occur in one year.

Median spectacled eider density category	Mean number of nests (females)	95% CIs
1	0.36	0.26, 0.46
2	0.60	0.40, 0.91
3	0.08	0, 0.24
4	0.10	0, 0.33
5	0.12	0, 0.91

To calculate the number of nests potentially affected by development over the 25-year lifespan of each development facility, we multiplied the number of nests in each density category (and the 95% CIs) in Table 8 by 25:

Table 9. Estimated number of spectacled eider nests potentially affected by development for the 25-year lifespan of most development structures in the development scenario.

Median spectacled eider density category	Mean number of nests (females)	95% CIs
1	8.91	6.42, 11.62
2	14.93	10.03, 22.72
3	2.10	0, 6.05
4	2.54	0, 8.29
5	2.98	0, 22.77
Total nests:	**31.46**	**16.45, 71.43**

To calculate the number of eggs lost from nests in Table 9, we multiplied these values by 4.9, a maximum estimate of average (range: about 3-7 eggs) clutch size near Barrow (Safine 2011 and 2012, USFWS unpublished data) clutch size for spectacled eiders at hatch.

Table 10. Number of spectacled eider eggs lost for the 25-year lifespan of the most development structures during the life of the development scenario.

Median spectacled eider density category	Mean number of lost eggs	95% CIs
1	43.64	31.45, 56.92
2	73.17	49.14, 111.31
3	10.30	0.00, 29.63
4	12.45	0.00, 40.62
5	14.61	0.00, 111.55
Total eggs:	**154.17**	**80.59, 350.02**

Thus, between about **81 and 350 spectacled eider eggs** could be lost due to habitat loss over life of the development scenario.

Loss of nests would result in loss of eggs. Loss of eggs is of much lower significance for survival and recovery of the species than the death of an adult bird. Using survival estimates for nests and several age classes near Barrow (unless specified elsewhere), we can estimate the number of adult birds that could be produced in the Action Area, and thus the potential loss of adult recruitment into the breeding population. Spectacled eider nest success recorded near Barrow ranged from 32-72% (data from 2010-2012; Safine 2011 and 2012, USFWS unpublished data). From the nests that survived to hatch, spectacled eider brood survival to 50 days (fledging) near Barrow ranged from 54-86% (data from 2011-2012; Safine 2012, USFWS unpublished data). Average spectacled eider brood size near fledging (≥ 38 days old) ranged from about 3 to 3.5 birds (data from 2011-2012; Safine 2012, USFWS unpublished data). Because no estimate is available for first-year survival of spectacled eiders, we use king eiders from the North Slope (Kuparuk Oilfield and near Teshekpuk Lake) as a surrogate (Oppel and Powell 2010). Juvenile survival (from fledging to one year of age) of king eiders was estimate at 0.67 (Oppel and Powell 2010). Annual survival of adults (females captured on nests from the Y-K Delta) was estimated at 78% (Grand et al. 1998). Adult survival is generally thought to remain constant after two years of age. Spectacled eider females generally become part of the breeding population at three years of age (Petersen et al. 2000). Given the information presented above we expect that only a small proportion of spectacled eider eggs or ducklings on the North Slope would eventually survive to maturity. Using the information above, we generated a constant to convert nests to an estimated maximum number of adult birds (at three years of age) produced:

> 0.72 nest survival x 0.86 brood survival x 3.5 fledglings per brood x 0.67 juvenile survival x 0.78 adult annual survival (two years) x 0.78 adult annual survival (three years) = 0.88, a constant

To calculate the lost productivity resulting from the loss of eggs calculated in Table 11, we multiplied the number of nests lost in Table 9 by the constant 0.88, likely a significant over estimate of the number of eggs reaching adult breeding status (i.e., the proportion of eggs that survive to adulthood is likely much lower).

Table 11. Estimated spectacled eider lost productivity from new development during the lifespan of the Proposed Action.

Median spectacled eider density category	Mean number of breeding adults	95% CIs
1	7.87	5.67, 10.26
2	13.19	8.86, 20.07
3	1.86	0.00, 5.34
4	2.24	0.00, 7.32
5	2.63	0.00, 20.11
Total breeding adults:	**27.80**	**14.53, 63.11**

Thus, the above methods predict development could result in lost production of 15 to 63 adult breeding spectacled eiders over the lifespan of development.

Steller's eiders:
We cannot use density categories to estimate habitat loss of Steller's eiders across the landscape as we did for spectacled eiders because there are so few observations of Steller's eiders that density contours cannot be developed. Additionally, most areas where Steller's eiders are known to occur in higher densities are designated as UL. Thus, we used the mean density estimate of 0.0047 eiders/km^2 (calculated using in Figure 22 of Larned et al. 2012a) to calculate potential losses in nesting effort. Thus,

Estimated number of Steller's eider's nests/km^2:

(0.0047 eiders/km^2) x 0.5 [proportion of females] = 0.00235 nests/km^2

Estimated number of lost nests:

0.00235 females/km^2 x 111 km^2 habitat lost (from Table 6) = **0.262 Steller's eider nests**

Using the above methods, the density of Steller's eiders in the majority of the Action Area is so low that we predict that no Steller's eider egg would be affected by development.

Possible overestimate of effects:
Due to uncertainty regarding where development would occur, we made several assumptions regarding the effects of habitat loss and associated disturbance and predation. Our assumptions used to estimate the number of eiders affected by habitat loss for spectacled and Steller's eiders are very conservative and likely result in a significant overestimate of impacts. First, we assumed eiders that may have nested within the development footprint or associated 200 m

buffer do not successfully nest within the buffer or elsewhere. We expect this assumption likely underestimates the ability of eiders to move elsewhere on the landscape or adjust to nearby development. Second, we assumed development would occur randomly across the landscape; however, due to engineering and financial constraints, development is more likely to occur in drier habitats rather than lower, wetter habitats favored by waterfowl. Third, we used the best case scenarios regarding survival estimates instead of average survival. Fourth, the BLM would require BMPs to minimize effects of actual development (discussed later in this section). Therefore, our analysis likely overestimates impacts, potentially to a significant extent.

Effects from abandonment and rehabilitation of facilities would generally be similar to effects during construction. Dismantling equipment for transport would likely take place during summer. Transport of large equipment would likely take place in winter using ice roads. Re-contouring or removal of gravel likely would occur in winter, with some summer activity possible. Re-vegetation and vegetation monitoring would occur in summer.

Aircraft and On-tundra Activities

Eider response to aircraft and other on-tundra activities may vary with location. Steller's eiders have been observed nesting and raising broods near the airport at Barrow, and spectacled eiders are known to nest near the airport at Deadhorse (Service data). Studies of spectacled eider responses to aircraft and construction activities at the Alpine oilfield suggest broods can be raised successfully near significant levels of disturbance (Johnson et al. 2006). In these areas aircraft disturbance occurs frequently, allowing sensitive individuals to move or become habituated. The potential displacement of sensitive individuals from habitat adjacent to runways at the CPFs is included within the assessment of habitat loss presented above.

Activities that occur infrequently or in undeveloped areas, such as helicopter landings and field research in remote areas, other tundra foot traffic, communication tower repairs, pipeline maintenance, and spill response exercises do not allow birds to become habituated to disturbance. While these occasional activities may not displace eiders from preferred habitat, they could flush hens from nests or disrupt and separate hens from their ducklings. The effect of such disturbance would, in part, depend on the frequency and duration of disturbance. For example, a hen flushed once from her nest may not affect nest success, but repeated or prolonged disturbance could result in nest failure.

We have previously calculated disturbance estimates for the level of aircraft landings and on-tundra activities anticipated to occur during the implementation of permitted summer activities in the NPR-A. Winter activities (i.e., drilling) were not included in estimates of habitat loss because eiders are not present during winter and thus would not be affected by these activities. In USFWS (2012a), we estimated the loss of 60 spectacled eider eggs, which could lead to the loss of five breeding spectacled eiders as a result of aircraft landings and on-tundra activities occurring at 1,044 locations from June 5 through August 15 (the nesting season). In USFWS (2012b; BO for activities in undeveloped areas of NPR-A in summer 2012), we estimated the loss of 20 spectacled eider eggs, which could lead to the loss of two breeding adults from similar activities also occurring during the nesting season. We estimated the loss of < 1 Steller's eider nest, and expected that no loss of recruitment of Steller's eider adults would result from these activities.

Given that the level of aircraft landings and on-tundra activities would be similar in the foreseeable future as they were in 2012, we anticipate the following:

Spectacled eiders:

annual loss of up to 80 eggs

We predict disturbance might result in the annual loss of up to 7 breeding adults through lost recruitment from the above estimate of eggs.

Steller's eiders:

< 1 nest lost annually and no loss of eggs (see "clutch size" in the section, *Status of the Species and Critical Habitat* for Steller's eiders)

We predict no annual loss of breeding adults through lost recruitment.

As with our estimates of lost recruitment from disturbance and displacement, we likely overestimated on-tundra activities. In addition, we also likely underestimate the ability of eiders to move elsewhere on the landscape or adjust to disturbance. Additionally, the BLM would require BMPs to minimize effects of actual development (discussed later in this section). Therefore, our analysis likely overestimates impacts.

In the marine environment, vessels supporting activities in NPR-A may disturb listed eiders that are foraging or resting. In the Beaufort Sea and along most of the barge route in the Chukchi Sea, only small numbers of listed eiders would be encountered and temporarily displaced to adjacent, comparable habitat. Thus, so long as vessels do not repeatedly disturb flocks of eiders, vessel activities would have only a minor and temporary effect on listed eiders.

Collisions

Structures that may result from the Proposed Action could pose a collision risk for listed eiders. The flight behavior of eiders puts them at risk of colliding with structures. Eiders in coastal areas along the Beaufort Sea often fly at low altitudes (10 m or lower) and at relatively high speed (~ 45 mph; Johnson and Richardson 1982, Day et al. 2005). Structures associated with oil and gas development may pose risks to migrating eiders, and visibility may be limited by weather conditions and darkness. Thus, listed eiders could collide with structures during spring or fall migration or possibly during local flights within nesting territories. Structure location and design will influence the magnitude of risk.

Migrating birds frequently collide with man-made structures (Manville 2004). Spectacled eiders have been documented colliding with vessels (Lovvorn et al. 2003), overhead powerlines (Anderson and Murphy 1988), and guywires (Anderson and Murphy 1988). Birds with similar flight behaviors have also collided with structures at Northstar Island (Day et al. 2004). Birds generally have an increased risk of colliding with objects during darkness or inclement weather (i.e., rain, drizzle, or fog; Weir 1976), and certain types of lights (such as steady-state red; Reed et al. 1985, Russell 2005, numerous authors cited by Manville 2000). Birds have been observed circling structures, presumably attracted to the "cone of light" resulting from some lighting

systems (Russell 2005, Gauthreaux and Belser 2002, Federal Communications Commission 2004).

Collision Risk and Development Stage

The phases of oil and gas development pose different collision risks. Seismic and exploration activities take place in winter when listed eiders are absent from the Action Area, and hence pose no risk. Although rigs are stored with their derricks laying down, parallel to the ground, the over-summer storage of equipment could present a collision hazard, particularly if equipment is stored in areas with higher densities of listed eiders. Production drilling would occur year-round.

Listed eiders could collide with vehicles while crossing in-field roads. Birds, particularly grouse and passerines, are regularly killed by vehicle collisions along the Dalton Highway (BLM 2008), and a female spectacled eider was killed in a collision with a vehicle along the Barrow road system (summer 2012, Service report). Traffic on in-field road systems is anticipated to be highest in winter, when listed eiders are not present in the Action Area, reducing collision risk. While vehicle collisions could occur, we expect them to occur rarely and affect at most very few individuals.

Despite BLM's stipulations and BMPs (discussed in the section, *Stipulations and BMPs that Minimize Impacts*), collisions during oil and gas activities in NPR-A may occur, with collisions involving spectacled eiders more likely than Steller's eiders given the former's greater abundance. Collisions could lead to injury (e.g., concussions, wounds, broken bones, internal bleeding) or death. Because most spectacled eiders nest and rear broods in the western portion of NPR-A, collisions would likely decrease on a west to east gradient. Similarly, structures located in areas of relatively high listed eider density would be encountered by more eiders during local flights, presumably posing a risk to more individuals than a similar structure located in a low density area. Because most of the current interest in oil and gas development is in the eastern portion of NPR-A and spectacled eiders are more numerous in the west, the collision risk to this species is lower than if development occurred throughout all of available lands. Because much of the land where Steller's eiders are known to nest is UL, we expect very few collisions between structures and this species.

Some estimate of vulnerability is required to estimate collision risk, but no specific data on spectacled or Steller's eider collision rates are available. We therefore used known numbers of common eider (*Somateria mollissima*) collisions at the human built Northstar Island in the Beaufort Sea as a surrogate. In the years from 2000 through 2004, 6, 8, 0, 4, and 3 common eiders struck structures on the island, for an average of 4.3/year (2000 data reported by BP Alaska to the Service; 2001-2004 data from Day et al. 2005). Potential structures resulting from the Proposed Action would occur in the terrestrial environment, and would likely have lower strike rates than Northstar, which is on the coast and thus along the main marine route used by migrating eiders. However, in the absence of data from facilities situated inland, the Northstar strike rate is the best available data.

An annual strike rate (proportion of population killed per year) was then calculated as the number of collisions divided by the number of common eiders potentially at risk using 176,109 (Quakenbush and Suydam 2004):

$$\frac{4.3 \text{ collisions}}{176{,}109 \text{ migrating common eiders}} = 0.00002441$$ (proportion of common eiders colliding with Northstar Island)

We then estimated the number of spectacled and Steller's eiders likely to migrate through the NPR-A. The western boundary of the NPR-A is approximately 162°W, and approximately 98.45% (7,829) of North Slope spectacled eiders (Larned et al. 2012a) occur east of this longitude. Comparable longitudinal data is not available for Steller's eiders. For the purposes of estimating number of collisions, we assume a population of 576 (Stehn and Platte 2009).

We assumed spectacled and Steller's eider collision rate would be similar to that of common eiders at Northstar (0.00002441), and this strike rate was applied to the number of spectacled and Steller's eiders migrating through the Action Area.

We then calculated the "structure years" for new developments by multiplying the number of structures by the number of years (Table 12):

Table 12. Estimated structure years for new development used in bird collision calculations.

No.	Structure Type	Estimated Years	Structure Years
2	pump station	25	50
8	CPFs	25	200
14	satellite oil	25	350
21	CPGCFs	22	462
47	satellite gas	22	1034
	Total structure years		**2096**

Then, we calculated the estimated number of collisions for the life of the development scenario (50 years):

Spectacled eiders:
2096 structure years x 0.00002441 [strike rate] x 7828.74 birds = **400.65 collisions for the 50-year life of the development scenario**

Thus, we estimate **8.01 spectacled eider** collisions annually (400.65 collisions/50 years).

Steller's eiders:
2096 structure years x 0.00002441 [strike rate] x 576 birds = **29.47 collisions for the 50-year life of the development scenario**

Thus, we anticipate **< 1 Steller's eider** collisions annually (29.47 collisions/50 years).

We likely significantly overestimated the number of collisions that may occur. As described in the section, *Status of the Species and Critical Habitat*, during molt migration females and young, and many males, migrate over marine waters and therefore would have a reduced risk of colliding with structures in the terrestrial environment. Additionally, the limited data on spring migration of listed eiders suggests they may migrate over land over a broad front. Given the small profile of potential oilfield structures relative to the size of the eider breeding area (approximately 15 km to 135 km wide in NPR-A), we anticipate that a small proportion of migrating eiders would encounter structures and thereby be at risk of collisions. Further, 24 hour daylight during spring migration would increase structure visibility and would further reduce the likelihood of collisions.

Increased Predation

Predator and scavenger populations have likely increased near villages and industrial infrastructure on the ACP (Eberhardt et al. 1983, Day 1998, Powell and Bakensto 2009). Reduced fox trapping, anthropogenic food sources in villages and oil fields, and an increase in availability of nesting/denning sites on human-built structures may have resulted in increased numbers of arctic foxes (*Vulpes lagopus*), common ravens (*Corvus corax*), and glaucous gulls in developed areas of the ACP (e.g., Day 1998). Foxes are a primary predator of ground-nesting birds in the Prudhoe Bay Oilfield (Liebezeit and Zack 2008, 2010) and appear to occur at higher densities in the Prudhoe Bay region than adjacent areas (see review in Burgess 2000). Ravens may be highly efficient egg predators (Day 1998), and have been observed depredating Steller's eider nests near Barrow (Quakenbush et al. 2004). Ravens appear to have expanded their breeding range on the ACP by using manmade structures for nest sites (Day 1998). Therefore, as the number of structures and anthropogenic attractants associated with development increase, predator populations may increase, leading to a decrease in the reproductive success of listed eiders.

The effects of predators on spectacled eider recruitment in the action area are extremely uncertain and we are unable to estimate them with any reliability. We expect structures associated with the Proposed Action to increase the number of potential nesting and perching sites for ravens and increase availability of anthropogenic food and nesting/denning resources for predators. We assume that the 200 meter buffer (for disturbance) included in that calculation of habitat loss for structures also incorporates most potential losses from predators. Thus, we conclude there will be no additional egg or subsequent recruitment losses from predation for listed eiders.

Oil Spills and Contaminants

Small crude and refined oil spills will likely occur as a result of the Proposed Action. BLM estimated a 28% chance of one or more large ($\geq$ 500 barrels) crude oil spill and 399 small crude and refined oil spills would likely occur over the life of the proposed IAP, with an average small

spill volume of 1.4 barrels (BLM 2012). Very large oil spills (≥ 120,000 barrels), a subset of large oil spills, are extremely unlikely to occur. The majority of spills would be contained on gravel pads, as only approximately 20−35 percent of past North Slope crude oil spills have reached areas beyond pads (BLM 2012). Thus, while spills are likely to occur, most likely their volume would be very small, and the spills would be contained on non-tundra habitats so will not impact listed species.

Exposure to oil can cause bird mortality. External oiling disrupts feather structure, causing matting, and permits wetting of the bird. Death typically results from hypothermia and drowning (Jenssen 1994). Ingestion of petroleum products through preening, or consumption of contaminated food or water, and inhalation of fumes from evaporating oil, may be immediately lethal, or in lower doses cause debilitating effects including gastrointestinal irritation, pneumonia, dehydration, red blood cell damage, impaired osmoregulation, immune system suppression, hormonal imbalance, inhibited reproduction, retarded growth, and abnormal parental behavior (Jenssen 1994, Hartung and Hunt 1966, Miller et al. 1978, Szaro et al. 1981, Leighton 1991, Fry 1986, Eppley 1992, Fowler et al. 1995, Walton 1997, and Briggs et al. 1997). These effects can cause death from starvation, disease, or predation, especially in the harsh arctic environment. Oil that contacts bird eggs, from the plumage of an incubating adult, can cause toxic effects or death to embryos (Aibers 1978, Hoffman 1978, and White et al. 1979). Because listed eiders occur in in the action area, they may suffer injury or death if they contact spilled oil.

Potential impacts from a spill are dependent on numerous factors including: effectiveness of spill response, weather, time of year, and location/habitat type (i.e., tundra, gravel pad, ponds and lakes, or marine waters). Spills in water spread to a much larger area than spills of equal volume on tundra. The timing of a spill, particularly the presence of ice or broken ice, and the stage of ice development (i.e., freeze up, mid-winter, or breakup), greatly affects the fate of spilled oil in this environment. Tundra spills can typically be contained more easily than those reaching water. Oil flowing over land can infiltrate vegetation and soil which can act as absorbents slowing the spread of oil during summer; but, snow, when present, may prevent oil from reaching the tundra surface. The flat topography of the North Slope also limits oil flow.

The impacts of a spill on listed eiders would vary depending on the circumstances of the spill. The impacts of a terrestrial spill will also be determined by: 1) the density of nesting eiders (i.e., oil could adversely impact a greater number of individuals in a high density area compared to a low density area); and 2) timing (whether oil and/or cleanup efforts occur during the period when eiders are present). In the marine environment the most significant factor in determining the severity of effects would be the location of oil, and in particular if it reaches areas where listed eiders congregate, such as open water offshore from river deltas.

Spills on drier tundra areas could impact nesting habitat of listed eiders, while spills that reach lakes and ponds could affect foraging hens engaged in incubation of eggs or hens with broods. If actively nesting and incubating hens come into contact with oil, and if they do not die, they could transfer oil to their eggs potentially causing the death of the embryo. Spills into lakes and ponds could also impact hens and their broods; these birds could subsequently get sick or die. If a large spill occurred on the tundra and reached lakes or ponds during brood-rearing, perhaps low tens of listed eiders could be impacted. However, based on BLM's spill analysis, we do not expect large

spills to occur or to reach areas used by listed eiders. While small spills may occur, they would likely occur on a pad or cover such a small area that listed eiders are not likely to come into contact with the oil. Thus, we expect few, if any, listed eiders to come into contact with oil in terrestrial or freshwater habitats.

Spills that reach streams or rivers that flow into marine waters could also impact listed eiders. While few eiders use flowing streams and rivers, they use nearshore marine waters in the Action Area. If a large volume of oil reached the marine environment during migration, many listed eiders, perhaps hundreds, could be impacted. However, we do not expect oil to reach rivers and marine environments. Because the Proposed Action includes development buffers from the streams, rivers, and the coast, spills are unlikely to reach marine areas. Thus, even if a large spill occurred on land, it is unlikely to reach large congregations of eiders in coastal areas.

If a very large spill occurred (from an uncontrolled flow event from a well), effects would likely be similar to those described above, although many more, perhaps hundreds, of birds could potentially come into contact with oil. Based on BLM's spill analysis, very large oil spills are extremely unlikely to occur. Thus, we do not expect listed eiders to be exposed to oil originating from an uncontrolled flow event from a well.

Gas Leaks

The main hazard associated with a natural gas leak is its flammability. If an ignition source exists, a fire or explosion could occur. Thermal effects could extend to 500 meters from the ignition source. Due to the localized nature and short duration of a gas release, it is highly unlikely that they would affect eiders, and effects would be much less severe than those from an oil spill.

Toxic Substance Spills and Solid and Hazardous Waste Remediation

In addition to crude and refined oil, spills of other substances, such as seawater, sewage, and hazardous materials are possible. A spill of seawater on freshwater or tundra could kill vegetation and render it unsuitable for nesting and brood-rearing for years. Drilling mud and cuttings contain heavy metals and hydrocarbons that are toxic to biota. As with an oil spill, the size, location, timing, and characteristics of a toxic substance spill would determine the severity of impacts to listed species, and a range of potential outcomes from no effect to mortality of an unknown number of individuals could occur.

The effects of solid and hazardous waste removal and remediation on listed eiders would be localized and temporary, and confined to activities occurring during the summer breeding season. Effects would be disturbance-related, similar to disturbance events arising from the construction, abandonment, and rehabilitation of oil and gas facilities. Cleanup and remediation activities are not expected to create or restore eider habitat.

Freshwater Withdrawal from Lakes and Ponds

Construction of ice roads and pads involves water withdrawal from deep lakes near road and pad locations. Water withdrawals may alter shoreline used by eiders for nesting if water levels are affected. However, studies indicate lakes fully recharged the spring following winter water removal (Rovansek et al. 1996, Baker 2002, Hinzman 2006). Water withdrawal levels under the

Proposed Action are expected to be similar to those monitored during these studies. Further, BMPs B-1 and B-2 provide protections to avoid over pumping of waterbodies. Because water levels are projected to be minimally affected by withdrawals, we expect effects, if any, on listed eiders to be minimal.

Stipulations and BMPs that Minimize Impacts

The BLM will implement a number of measures that are expected to mitigate the potential effects of disturbance to listed eiders described above and are part of the Proposed Action (Table 13). We briefly discuss these measures below. For more information regarding these measures, See *Appendix A. BLM's Lease Stipulations and Best Management Practices*).

Table 13. Stipulations and BMPs that minimize potential impacts on listed eiders. From BLM (2012; Table 4.3).

Impact Category	**BMP/Stipulation**
Predator Attraction	A-1, A-2, E-9
Disturbance	E-11, E-18, F-1e,h, I1, K-1, K-2, K-3, K-4, K-5, K-6, K-10
Habitat Alteration	B-1, B-2, C-2, E-1, E-3, E-5, E-6, E-11, E-12, K-1, K-2, K-3, K-4, K-6, K-10
Contaminants	A-2, A-3, A-4, A-5, A-6, A-7, E-4, K-3, K-6
Collisions	E-10, E-11

Habitat Loss

Many of the stipulations and BMPs do not have an easily measurable benefit; however, the effects of land allocations (UL-Infrastructure prohibited (IP), UL-Infrastructure allowed (IA)) and restrictions on surface occupancy (RSOs; on lands available for leasing and on lands UL-IA) in areas known to be occupied by spectacled eiders can be estimated based by overlapping eider density distributions with land allocations.

Approximately 13,277 km^2 (3.28 million acres; 58%) of spectacled eider habitat within the Action Area are included in UL-IP, UL-IA, or RSO limitations (BLM 2012a; Table 14) including 27% of the highest spectacled eider density category. This is expected to minimize effects on approximately 48% of the spectacled eider breeding population within the NPR-A. The remaining 42% of the spectacled eider habitat (containing 11% of the highest density habitat category) and 52% of the breeding population within the Action Area would be provided protections through post-lease surveys and mapping efforts (BMP E-11), and application of general stipulations and BMPs. The surveys would result in understanding of local use by listed eiders, and used during site layout and design planning as directed through BMP E-11.

Table 14. Area of each spectacled eider density class and associated estimated number of birds and population index for ACP Waterfowl Breeding Population Survey data, constrained to the NPR-A boundary that falls within the area designated as UL-IP, UL-IA and RSO. From BLM (2012a), Table 4.7.

Density Range per km^2 (midpoint)	Area (km^2) covered by UL-IP, UL-IA and RSO stipulations	Percent of each density class from the ACP Waterfowl Breeding Population Survey coinciding with the areas of UL-IP, UL-IA and RSO stipulations	Estimated number of spectacled eiders[1]	ACP Waterfowl Breeding Population Survey Area Population Index[2]
0.00-0.034 (0.017)	4236	32	72	0.011
0.035-0.146 (0.091)	4737.84	36	431	0.066
0.147-0.225 (0.186)	2331.24	17	434	0.066
0.226-0.409 (0.318)	1208.91	9	384	0.059
0.410-1.109 (0.910)	777.42	6	707	0.108
Total	13262.09	100	2028	0.310

[1]Area (km^2) multiplied by mid-point of spectacled eider density range
[2]Estimated number of birds/ ACP Waterfowl Breeding Population survey long- term pop index at year 2010

On lands not included in UL-IP, UL-IA or RSO limitations, several BMPs and lease stipulations would apply. Displacement and resulting reduction in reproductive potential could be particularly significant for Steller's eiders because they nest at very low densities across the ACP, with highest density in the vicinity of Barrow. These tracts total an area of 689,987 acres and support significant numbers of Steller's eiders.

BMP C-2 implements measures to protect stream banks, and minimize soil compaction, and the breakage, abrasion, compaction or displacement of vegetation during winter operations and governs the construction and operation of ice roads in both planning areas. Although minor impacts to tundra vegetation may occur, significant impacts that would adversely affect listed eiders are not anticipated.

BMP E-11 requires three years of pre-construction surveys to determine listed eider use proximal to a proposed development project. Survey results will be used to exploit flexibility in facility placement to reduce potential disturbance to nesting and brood-rearing eiders. Thus, the low density of listed eiders, combined with measures to inform project design decisions, will serve to reduce potential for placement of facilities in habitats used by listed eiders.

Disturbance

BMP E-11 requires 3 years of pre-construction aerial surveys prior to authorization of development; results from these studies may lead to additional ground nest surveys. Surveys would provide information to maximize the distance between development and nesting eiders. To reduce the possibility of eiders colliding with above-ground utility lines (e.g., power and communication lines), these lines will either be buried in access roads or suspended on

vertical support members except in rare cases. To reduce the likelihood of eiders colliding with communication towers, towers will be located, to the extent practicable, on existing pads and as close as possible to buildings or other structures, and on the east or west side of buildings or other structures. Support wires associated with communication towers, radio antennas, and other similar facilities should be avoided. If support wires are necessary, they should be clearly marked along their entire length to improve visibility to low-flying birds. Such markings shall be developed through consultation with the Service.

BMP E-18 is expected to minimizes potential disturbance to Steller's and/or spectacled eider nests by restricting activities within 200 meters of nests. For example, ground-level activity (by vehicle or on foot) would be restricted to existing thoroughfares such as pads and roads from June 1 to August 15. Construction of permanent facilities, placement of fill, alteration of habitat, and introduction of high noise levels would be prohibited during this period. In instances where summer support/construction activity must occur off existing thoroughfares, Service-approved nest surveys must be conducted prior to the approval of the activity, and the resulting data used to inform acceptable mitigation.

While intended to benefit caribou and molting geese, aircraft restrictions from May 20 through August 20 described in BMP F-1e would also benefit nesting and brood-rearing spectacled eiders. Aircraft would be required to maintain a minimum altitude of 2,000 feet above ground level (except for takeoffs and landings) over the Teshekpuk Lake Caribou Habitat Area, and aircraft use should be minimized by oil and gas lessees in the Goose Molting Area (Figure 1) , unless doing so would endanger human life or violate safe flying practices.

While intended to benefit Pacific walrus and ice seals, aircraft restrictions described in BMP F-1h and F-1i, respectively, would also minimize disturbance of spectacled and Steller's eiders using nearshore habitat during migration. This BMP requires fixed-wing aircraft to maintain a minimum altitude of 2,000 feet when within 0.5 mile of walrus haulouts. A minimum altitude of 3,000 feet and a 1-mile buffer would also be required of helicopters near walrus haulouts and of all aircraft near seal aggregations.

BMP I-1 requires all personnel to attend an orientation program at least annually for information on how to reduce disturbance to wildlife and threatened species in particular. There is no formal assessment of the efficacy of this educational approach; however, anecdotal reports suggest that at least in some areas workers are aware of eiders, take a possessory interest in them and make efforts to reduce potential disturbance (Backensto 2010).

Stipulation/BMP K-1 places various width buffers on major rivers within the NPR-A. The buffers range in width (measured from the ordinary high water mark) from 0.5 miles to 3 miles on both sides of the river (Figure 1). On a case-by case basis, essential pipeline and road crossings to the main channel may be permitted through setback areas. In delta areas where setbacks are not practical, permanent facilities shall be designed to withstand a 200-year flood event. The buffers enclose a relatively large amount of potential eider habitat and would prevent the types of disturbance associated with day-to-day operations. GIS model results provided by BLM (2012a) predict that 3213 km^2 (793,946 acres) of habitat, which is estimated to contain 440 spectacled eiders, would be protected by this stipulation/BMP (BLM 2012a, Table

4.4). Of particular importance to the protection of spectacled eiders are the 1-mile setbacks along the Inaru, Meade, and Topagoruk rivers (Figure 1).

Collisions
BMPs E-10 and E-11c intend to limit the likelihood that collisions would occur as a result of development infrastructure. BMP E-10 would limit the use of outward-directed facility lighting that could attract or confuse migrating birds. BMP E-11c requires that above-ground power and communication lines be buried in access roads or suspended on pipeline vertical support members except in very limited situations.

Predators
BMPs A1, A2a, and A2b are intended to prevent garbage (food) from becoming available to wildlife by requiring management of garbage and proper disposal of putrescible waste. BMP E-9 prohibits intentional feeding of wildlife and requires permittees to use best available technology to prevent facilities from providing nesting, denning, or shelter sites for predators. Effectiveness of these BMPs will be dependent on the education and behavior of workers and visitors, coupled with inspection and enforcement.

To date, no development has occurred in the NPR-A; thus, these BMPs have not been tested. However, BMPs are modeled after practices and requirements from oil development in the Prudhoe Bay, Kuparuk, and Alpine oil fields. Based on results at the existing Alpine development, we do not expect that BMP-9 will deter ravens from nesting on infrastructure; thus, proper monitoring, and compliance enforcement of this BMP will guide the development of more effective methods for preventing human-caused increases in these predation populations.

Spills of Oil and other Contaminants
BMP A-2 requires preparation and implementation of a comprehensive waste management plan for all phases of exploration and development, including seismic activities and the injection of pumpable waste products (drilling muds, waste water) into approved injection wells. No reserve pits will be approved, and only limited on-pad storage of muds/drill cuttings will be allowed as necessary to facilitate reinjection.

BMPs A-3 and A-4 require permittees to have spill contingency plans that ensure rapid and effective reporting and response to spills, while also ensuring that safe handling practices are followed. In recent history, the number of reported spills in the Prudhoe Bay complex has increased while the overall volume spilled has declined, indicating that similar measures imposed by the State of Alaska have resulted in increased reporting and rapid response (NRC 2003). The BP 2006 spill is an exception and was due to an outdated leak detection system that failed to detect a minor leak that occurred during winter. As a result, the leak detection system was updated. BMP E-4 requires the latest leak detection technologies to be employed in the Action Area.

BMP A-5 minimizes impacts of contaminants by prohibiting refueling within 500 feet of the active floodplain of any water body, and requires that fuel storage stations shall be located at least 500 feet from any water body.

BMPs A-6 and A-7 prohibits surface discharge of reserve-pit fluids (A-6) and produced water (A-7).

Stipulation/BMP K-3 requires spill prevention measures and response capabilities within the major coastal waterbodies and coastal islands **(**Kogru River, Dease Inlet, Admiralty Bay, Elson Lagoon, Peard Bay, Wainwright Inlet/Kuk River, and Kasegaluk Lagoon, and their associated Islands). This stipulation/BMP encompasses 1,736 km^2 (429,000 acres), much of which is used by spectacled eiders. These requirements will reduce risk of hazardous material spills to threatened eiders using coastal waterbodies during molting, staging, and migration.

Stipulation K-6 prohibits exploratory well drill pads, production well drill pads, or a central processing facility for oil or gas in coastal waters, on islands, or on land within one mile of the coast. While this protection is redundant with protections afforded through UL designation, it would also serve to reduce the potential for a crude oil spill into coastal and marine environments. This stipulation would not preclude infrastructure (e.g., pipelines) associated with offshore oil and gas activities.

Interdependent and Interrelated Effects

We have not identified any interdependent or interrelated effects to listed eiders that may result from the Proposed Action.

Polar Bears

Polar bears den in and transit the Action Area, and they may engage in various activities while transiting the NPR-A (e.g., hunting, resting). Female polar bears typically den from mid-November until mid-April, and transient polar bears could be present in the Action Area at any time. Proposed activities could affect polar bears by (1) causing direct mortality from defense of human life, accidental oil spills, or lethal effects during research activities; (2) altering polar bear behavior, physiology, or movements; or (3) disturbing or destroying dens, potentially affecting cubs at critical life stages and resulting in mortality. We describe effects to denning and non-denning polar bears in this area within the Action Area below. We also describe how BMPs and lease stipulations are likely to mitigate these effects.

Disturbance

Several activities resulting from the Proposed Action could disturb polar bears. Possible sources of disturbance could include vessels, aircraft, seismic and exploratory drilling activities, activity at future facilities, and gravel and ice road construction and associated vehicle traffic.

Denning polar bears are believed to be more sensitive than other bears to human activities. For example, noise could disturb bears at den sites and could have varying effects on the female bear and family group, depending on timing in the denning cycle. Denning polar bears can be tolerant to acute disturbance (Amstrup 1993), although their response to chronic disturbance is not well understood. Disturbance during early stages of denning, when a female bear has little investment in a den site, could cause her to abandon the site in search of another one and thus could affect reproductive success. Premature site abandonment could also occur after the bears have emerged from the den but before the cubs are developmentally ready to move from the site, which could

result in death of the cubs (Amstrup 1993). Response will likely vary among individual bears, whether the den was active or abandoned, and the age of the cubs when the disturbance occurred.

Vessels

Very few denning bears are likely to experience disturbance from vessels in the Action Area. Most bears that den in the Action Area do so in the terrestrial environment. Thus, denning polar bears are unlikely to hear the noise of vessels. Additionally, the temporal overlap between open water conditions (when vessels would be active) and the denning period would be very low. Thus, we expect vessels to have a very small impact on denning polar bears.

A swimming bear may be able to hear engine noise (although encountering a swimming bear occurs only rarely), and bears on the ice may be able to hear activities near or on the ice. If an encounter between a vessel and a swimming bear occurs, it would most likely result in only a minor disturbance (e.g., the bear may change its direction or temporarily swim faster) as the vessel passes the bear. Transient or hunting bears on the ice (e.g., during in-ice and hardwater surveys) may run away.

Tundra Travel

Tundra travel during fall and winter, (e.g., rolligons, snow machines, seismic activity, exploratory drilling) could disturb denning polar bears by introducing noise and vibrations (e.g., from vehicles) into the environment. Effects may range from minor disturbance of bears in dens to den abandonment. Typically, disturbance events are occasional and short in duration because those traveling across the tundra do not usually stay in any one place for an extended time. MacGillivray et al. (2003) found noise from various vehicles attenuated to background levels about 40 to more than 2,000 meters, but all sounds reached background levels by about 400 – 500 meters. A Hägglunds tracked vehicle and a fuel truck produced the loudest sounds inside the dens, while the least amount of sound was detected from a pickup truck and Tucker Sno-Cat tracked vehicle (MacGillivray et al. 2003). Ground and snow vibrations varied considerably for different vehicles (MacGillivray et al. 2003). A Hägglunds tracked vehicle produced the maximum vibration in the snow, and a Tucker Sno-Cat tracked vehicle and pickup truck produced the least (MacGillivray et al. 2003). Vibrations in the snow were similar for all vehicles other than the Hägglunds at 50 m from the source, and vibrations were undetectable for all vehicles except the Hägglunds at 100 m (MacGillivray et al. 2003). Snow vibrations from the Hägglunds were detectable to 200 m (MacGillivray et al. 2003). Thus, variability likely affects the ability of denning polar bears to detect noise and vibrations from vehicular tundra travel. The chance of a bear detecting sound is likely low because dens have a low density across the landscape and winter tundra travel would be infrequent.

Aircraft

As with tundra travel, aircraft overflights have the potential to disturb denning polar bears, but typically these events are occasional and short in duration. Amstrup (1993) studied the response of denning bears to research aircraft flying 50 to 500 meters above the ground and recorded 40 cases of potential disruption of denning by research aircraft (44 dens were located in this study). Two bears left their dens temporarily, but disturbance did not appear to affect cub survival (Amstrup 1993). Thus, flights over dens are not expected to cause disturbance to the degree that reproductive performance is likely to be affected. Additionally, the chance of aircraft flying

directly over a polar bear den is low because dens have a low density across the landscape. Further, aircraft associated with NPR-A activities will likely fly higher than elevations than the Amstrup (1993) study, as minimum flight elevations over polar bears or areas of concern and flight restrictions around known polar bear dens will be required in LOAs/minimization measures (e.g., BMP F), as appropriate, to reduce the likelihood that bears are disturbed by aircraft. Aircraft overflights during the denning season are rare, and the chance of encountering denning bears is extremely low, but if this does occur we expect the effect of aerial disturbance on denning bears to be minimal.

Extensive or repeated low altitude overflights of fixed-wing aircraft for monitoring purposes or helicopters used for re-supply of operations travelling to and from remote facilities could disturb polar bears. Such disturbance is most likely to occur in the fall if overflights occur over barrier island and coastal habitat as larger numbers of polar bears are present in these areas waiting for ice to return or using the coast for movements and beginning searching for den sites. Service polar bear researchers reported that 14.2% to 28.9% of polar bears were observed to change their behavior during aerial surveys conducted at an altitude of 300 feet (Rode 2008, 2009, 2010). As with other sources of disturbance, polar bears may respond to aircraft by moving from their original positions (by running, trotting, or walking), or jumping into the water if on land or ice. Given the low density of polar bears where activities would likely take place, and implementation of minimum altitude requirements in BMP F-1, the number of potential helicopter overflights an individual polar bear may experience is extremely low. We expect these occasional overflights would likely cause only minor, short-term behavioral changes similar to other types of disturbance already described.

Seismic Activities and Exploratory Drilling

Most coastal areas would be UL, and the BLM expects no seismic surveys would be conducted in UL areas. Exploratory drilling would not occur in any coastal areas due to UL designations and the K-6 lease stipulation, which, in areas available for leasing, precludes wellpads from being placed within 1 mile of the coast. Short-term effects of disturbance would be similar to those previously described. Additionally, stationary exploratory drilling activities could preclude the use of a localized area for denning purposes, or could cause den abandonment if drilling activities occur near a den. However, mitigation measures are expected to minimize the risk of den abandonment. Given the low density of polar bears the Action Area, the small number of seismic and exploratory drilling activities expected within five miles of the coast during winter, and implementation of minimization measures, we expect adverse effects from disturbance to occur infrequently and affect few individuals.

Transient polar bears could also encounter seismic and exploratory drilling activities that could lead to human-polar bear interactions. Polar bear would respond similarly to other disturbances previously described. Polar bear deterrence could become necessary.

Development and Production Activities

Development and production activities could introduce noise into areas used by denning polar bears. During development of facilities, noise effects on denning polar bears likely would be very similar to those for other types of disturbance described above. Once construction is complete and facilities are operational with year-round activity, bears may avoid denning near

active facilities, resulting in a functional loss of denning habitat. Historically, measures taken to reduce effects on bears from development have been successful, and injury or death to bears from development occurs rarely (Schliebe et al. 2006). However, because dens occur at a very low density in the NPR-A (Durner et al. 2010) and suitable denning habitat is readily available (Durner et al., unpubl. manuscript) it is unlikely that this functional habitat loss would cause population-level effects.

Some polar bears could be attracted to oil field camps by food odors or curiosity. Attraction to the area would increase the potential for human-bear interactions previously described. Additionally, some interactions could result in intentional harassment or potentially death of the bear.

Habitat Loss

Direct loss of denning habitat could occur in the Action Area. Creation of gravel pits, pads, roads, and other infrastructure could reduce available denning habitat for polar bears by removing it. However, once activities cease at these sites, the slopes created by gravel pads, roads, etc., could catch snow drifts and thus create denning habitat. Ice road and other cross-tundra activities could reduce vegetation structure on slopes that catches snow that creates drifts used by denning bears. We anticipate vegetation would eventually recover sufficient to hold snow. The above activities would largely occur at a distance > five miles from the coast, the most active area for denning polar bears. The BLM will also require adherence to mitigation measures minimizing impacts of development. These developments would occupy a very small portion of habitat where polar bears are likely to den and their effects are not likely to be permanent.

Non-Oil or Gas Activities

Disturbance effects of non-oil and gas activities would have similar effects to those for oil and gas activities. The only potential for habitat loss for denning bears would be minor changes to vegetation from overland travel in winter described above in the section, *Habitat Loss*. Winter overland travel, including vehicle and sled trains used to bring supplies to villages, is the non-oil and gas activity likely to have the greatest effect on polar bears in the NPR-A. It has the potential, if passing close enough, to disturb denning bears and possibly result in den abandonment causing cub mortality. If a vehicle were to travel directly over a den, it could crush and kill the adult female in addition to cubs. However, winter overland travel not in support of oil and gas activity occurs infrequently in the NPR-A, and likely would not result in numerous disturbances to the widely-distributed denning bears.

Effects of non-oil and gas activities on transient polar bears would have similar effects as those described previously for oil and gas activities. Thus, we expect these activities to usually cause only short-term behavioral changes, although some interactions could result in intentional harassment (i.e., deterrence).

Oil Spills and Contaminants

To date no spill on the North Slope has been reported to have injured or killed a polar bear. However, spills do occur, are predicted by the development scenario, and have the potential to negatively affect polar bears.

Oil can be highly toxic to polar bears (Øritsland et al. 1981). Polar bears may be affected directly through contact with oil or ingestion of contaminated prey (Øritsland et al. 1981, Stirling 1990), or indirectly through loss of habitat or prey species. However, polar bears are unlikely to encounter a small spill because polar bears are absent or sparsely distributed in the NPR-A, and a small spill would not cover an extensive area. Moreover, if a spill occurs and a polar bear is nearby, the bear would likely be intentionally hazed to keep it away from the spill area, further reducing the likelihood of effects other than disturbance of the hazed individual. In addition, because small spills would likely be contained or weather quickly, the likelihood of a polar bear coming into contact with a small spill at any given time is further reduced.

A spill that reached a river during late fall when polar bears are constructing dens, occurred in winter under ice or in spring during broken ice periods could affect traveling polar bears or denning polar bears and their young if the spill was large enough to reach the den area in sufficient quantity. Female polar bears select "bluffs" including river banks for denning habitat, and thus are more likely to be present in river drainages than in lands between rivers. Polar bears are known to travel and den along the Colville River.

A spill to marine waters could contact, and potentially kill, a larger number of polar bears or their prey than a spill in terrestrial or riverine areas. Aars et al. (2006) modeled the potential impacts to polar bears of large oil spills from development projects in the Beaufort Sea (Northstar and Liberty) based on spill trajectory models and radio telemetry data on bear movements. Their model showed that a 5,912 barrel marine spill (thought to the largest spill possible from a pipeline connecting specific existing or planned offshore developments with onshore facilities) could contact up to 74 polar bears depending on the spill's trajectory, as well as location and timing of the spill. The most likely number of bears to be contacted was far lower, however, with median estimates ranging from 1-3 or 3-11 bears, depending upon the location and month of the spill (75% of likely trajectories contacted less than 9 or 20 bears, depending on spill location). The specific scenarios evaluated in this model are not directly applicable to the Proposed Action, (oil trajectory estimates and bear movement data pertain to areas to the east of the Action Area), but results support the contention that a spill of low thousands of barrels reaching the marine environment could encounter low tens or possibly high tens of polar bears, depending on season, location, and trajectory.

Under the Proposed Action, the most likely scenario for a spill reaching the marine environment would be a leak in a pipeline crossing a river. Aars et al.'s (2006) model predicted a large spill (5,912 barrels) in the eastern Beaufort Sea could kill tens of polar bears. The mortality levels that may occur as a result of a spill from the Proposed Area are likely to be lower than those predicted by Amstrup et al. (2003) as there are no high density polar bears areas, such as Barter Island. The probability of a marine spill is greatly reduced by UL areas along the coast and lease stipulation K-6's one-mile coastal buffer. Additionally, downstream movement of spills on open rivers could be arrested with booms and then removed. Thus, while a large spill to marine waters in summer/fall could kill polar bears, such an event is unlikely given the coastal and river buffers preventing all but the largest terrestrial spills from reaching the marine environment.

The effects of solid and hazardous waste removal and remediation on individual polar bears would be localized and temporary, and the same as those presented for other types of

disturbances. As with oilfield construction, abandonment and rehabilitation operations, some portions of site clean-up or remediation could occur in summer when some polar bears are onshore. Activities may cause disturbance or displacement of one or a few bears at this time. As with other activities, the BLM would require those conducting these activities to adhere to mitigation measures.

Abandonment and Rehabilitation

Effects from abandonment and rehabilitation would generally be the same as those associated with construction. Dismantling of equipment and modules and readying it for transport would most likely take place during summer. Transport of large or heavy material would presumably take place in winter on ice roads. Re-contouring or removal of gravel would presumably occur in winter, although summer activity such as planting or monitoring may take place. A combination of ground vehicles and aircraft would presumably be used transportation. Effects of these activities on bears would be similar to those described for construction and production. No population level effects would be expected.

Stipulations and BMPs that Minimize Impacts

As described previously, much of the coast is UL and other BMPs provide setbacks from rivers and streams; and because most polar bears are more likely to den along the coast, many would not experience disturbance from oil and gas development. We describe other mitigation measures below.

The BLM will require lessees and permittees to adhere to lease stipulations and/or BMPs designed to minimize effects from the Proposed Action on polar bears (Table 15). Upon receipt of project proposals, the BLM will look for overlap with potential denning habitat and decide if further, site specific, mitigation measures are necessary. In addition, each exploration or development project proposal will undergo subsequent Section 7 consultation. Additionally, LOAs, pursuant to the Beaufort and Chukchi Sea ITRs, would likely be provided to those conducting oil and gas activities; LOAs would include additional species-specific conditions intended to minimize effects on polar bears. We describe the BLM's stipulations and BMPs below.

Table 15. Stipulations and BMPs by potential impact type for polar bears. From BLM (2012a), Table 4.8.

Potential effect	Protective BMP/Stipulation
Human Interaction	A1; A2a, b; A8; I1b, c, i
Disturbance to Individual Bears	C1b; F1b, c, e, g
Habitat Modifications	E1; E5; E-7; J; K1; K2; K3; K6; K9; K10
Contaminants	A2b, c, d; A3; A4; A5; A6; A7; E4

Human Interaction

Polar bears can be attracted to food wastes as well as other forms of garbage. BMPs A-1 and A-2 would help to reduce the potential for attraction to development areas. BMP A-8 requires facility designs include building layout and lighting that limits the likelihood of bear-human interactions. The "I" BMP includes requirements for education of workers on wildlife awareness, interaction avoidance, and protocols for minimizing bear-human interactions.

Disturbance to Individual Bears
BMP C-1 would prohibit use of heavy equipment and seismic activities within one mile of known or observed polar bear dens. This BMP would also require operators in coastal areas to conduct surveys for potential polar bear dens and seal birthing lairs and consult with the Service before initiating activities between October 30 and April 15. It is possible that some dens would not be detected during surveys, and disturbances could result; but, this is expected to occur infrequently. Several provisions of BMP I require workers to participate in bear-awareness training programs to minimize human-polar bear interaction with humans. LOAs may include project-specific restrictions to further reduce the likelihood adverse effects.

Habitat Modification
Lease stipulations K-1, -2, -6, -9, and -10 incorporate buffers and other spatial restrictions on development. These stipulations would help protect polar bear resting and denning habitat, particularly those that limit or prohibit development along the rivers (K-1), lakes (K-2), and the coast (K-6). Pipelines could cross these areas, so the likelihood of spills from transport pipelines would not be eliminated; but, spills on pads or at compressor stations would be less likely to reach rivers, lakes, and marine waters. Lease Stipulation K-6 would prohibit the placement of well pads and central processing facilities in coastal waters or on islands between the northern boundary of NPR-A and the mainland, or on the mainland within one mile of the coast. If other facilities are needed in the area (e.g., barge landings, seawater treatment plant, or spill response staging and storage areas), the use of a previously occupied site (Cape Simpson, Peard Bay, Camp Lonely, Husky/USGS drill sites, and DEW-Line sites) would be considered. Stipulations K-9 and -10, although designed for caribou, would limit development that contain potential denning habitat for polar bears. Thus, K-9 and K-10 further reduce the potential for disturbing polar bear dens.

BMPs E-1, E-5, and E-7 requires best management practices for design and construction of roads and water-crossings be incorporated, including measures to minimize footprints (E-5). E-7 establishes minimum pipeline height (for caribou), and would reduce potential impediment to polar bear movements.

BMP A-2b covers the disposal of putrescible waste or ash resulting from incineration. BMPs A-2c and -2d require the injection of fluid waste products (drilling muds, waste water) into approved injection wells. No reserve pits will be approved and only limited on-pad storage of muds/drill cuttings will be allowed as necessary to facilitate reinjection.

Contaminants
BMPs A-3 and A-4 require permittees to have spill contingency plans, to including material handling plans and spill prevention and response plans, which require training, onsite material location, and storage/containment considerations. This is intended to ensure rapid and effective reporting and response to any spill and that safe handling practices are followed. Since the number of reported spills in the Prudhoe Bay Oil complex has gone up, while the volume of produced oil has declined, indicating that similar State regulatory measures resulted in increased reporting and rapid response (the BP 2006 spill is an exception; NRC 2003).

BMPs A-5, -6 and -7 reduce the probability that polar bears and their habitat would be affected by refueling operations, reserve-pit fluids or produced water. BMP E-4 is intended to reduce spills from pipelines by requiring that pipeline design, construction, and operation meet Federal standards including inspection protocols.

Interrelated and Interdependent Effects

Interdependent actions are defined as actions having no independent utility apart from the proposed Action, while interrelated actions are defined as actions that are part of a larger action and depend upon the larger action for their justification (50 CFR §402.02). MMPA authorization issued to oil and gas companies has required, and likely will require the development of polar bear interaction plans, which include procedures for polar bear deterrence. Please see the section, *Incidental Take Regulations* for further details. Deterrence actions are used to prevent the lethal take of polar bears or potential for injury to personnel.

Based on human-polar bear interactions in recent years, we expect that some bears will likely need to be deterred on occasion in connection with the Proposed Action, particularly at facilities and field camps near the coast. However, most actions are not likely to require use of projectiles and thus would likely cause only minor, temporary behavioral changes (e.g., forcing a bear to leave the area). Polar bears could experience temporary disturbance and stress from some deterrence activities (e.g., from acoustical devices, moving vehicles, spotlights) and could walk, run or swim away. The potential effects of deterrence actions to individual bears likely varies with a bear's physiological and reproductive condition, and the number, type, and duration of deterrence actions used. In the unlikely event that bears are deterred using more aggressive methods (e.g., projectiles such as bean bags and rubber bullets), those bears may become injured (e.g., pain and bruising).

As stated previously, from 2006 through 2010, the proportion of bears seen that were deterred ranged from 9% to 43% and averaged 15%. If polar bears increasingly occupy nearshore/coastal environment due to melting sea ice from climate change, the number of deterrence events could increase. Based on information collected from LOA reports (unpublished Service data), we estimate under the full development scenario provided (through 2062), about 150 polar bear sightings during BLM-authorized activities would occur annually. Of these, about 15% (about 23) would result in deterrence actions. In most cases, the actions would cause only minor, temporary behavioral changes (e.g., causing the bear to flee). However, occasionally use of projectiles for deterrence would be required, which would result in varying degrees of injury to the bear. In recent years, projectiles have been used by the oil and gas industry zero to five times per year. Given an expected increase in the use of onshore habitat by polar bears, combined with increased activities in the NPR-A, we anticipate that the oil and gas industry will likely deter polar bears using projectiles. Very rarely, these deterrence events may cause fatalities if the projectiles are used incorrectly, but the frequency of this is difficult to predict. One deterrence event in 2011 resulted in an unintended fatality of a polar bear, the first in the last several decades. Using current information for deterrence events during oil and gas industry, we estimate that up to five deterrence actions using projectiles may occur annually as a result of the Proposed Action, with no more than five fatalities to polar bears will occur during the 50-year life of the full development scenario (about one per decade)

Polar Bear Critical Habitat

The vast majority (96%; 1,387,540 acres; including 180,540 acres of Native patent lands) of polar bear critical habitat within NPR-A would be designated UL under the Proposed Action (Table 16). The NPR-A lands designated UL include the Kasegaluk Lagoon Special Area, Peard Bay Special Area, and most of the Teshekpuk Lake Special Area (Table 16). UL designation does not preclude seismic exploration, but the BLM predicts that none is likely to occur in areas designated UL. UL designation does not preclude the construction of infrastructure (staging areas, pipelines, etc.) to support oil development in adjacent leases; however, the portion of the Teshekpuk Lake Special Area from Smith Bay to Garry Creek on Harrison Bay has an additional restriction that prohibits non-subsistence infrastructure (UL-IP). In this UL-IP area, there could be no support pads, pipelines, roads or any other permanent infrastructure related to oil or gas activities.

Three units of critical habitat occur in NPR-A: Terrestrial Denning, Sea Ice, and Barrier Island. We describe how activities resulting from the Proposed Action may affect these units below. We recently (USFWS 2012d) estimated potential effects of marine oil spills on polar bear critical habitat; for a full discussion of effects, please refer to that analysis. We briefly describe effects of spills below. We also describe how lease stipulations and BMPs would minimize potential effects on critical habitat.

Effects on Terrestrial Denning Unit

Activities resulting from the Proposed Action would likely occur within or adjacent to the Terrestrial Denning Unit. Potential effects, however, are greatly reduced because 81% of this unit located in the NPR-A would be designated UL (Table 16). We describe how potential activities affect characteristics of the Terrestrial Denning Unit below.

Effects on Denning Habitat Features

The NPR-A contains denning habitat along the coast, rivers and lakes, with bears using coastal bluffs used most often by polar bears (Durner et al. 2003). The existing coastal staging areas are not considered part of critical habitat, though additional activities such as pad enlargement and vegetation clearing may occur. These developments could affect habitat characteristics and usability. However, constructed features may aid in drift formation, and provide suitable denning sites after human activity has ceased. Total anticipated new development would occupy only a small proportion of critical habitat and would not preclude use of other areas of critical habitat within the Action Area.

Temporary winter routes, gravel roads, and pipelines could hypothetically alter slopes, altering their effectiveness for catching snow. Vegetation may take years to recover in these localized areas. Thus, temporary loss of denning habitat could occur in localized areas. The slopes of gravel roads could be used as denning habitat once abandoned. Placement of road and pipeline corridors is guided by BMPs that would minimize alteration of habitat features that contribute to formation of drifts used for denning. Vegetation would likely recover on winter routes with time, and the footprint of road and pipeline development would occupy only a small proportion of critical habitat and would likely not affect the value of other areas of critical habitat elsewhere within the Action Area.

Oil and gas activities would be subject to lease stipulations and BMPs, including spatial restrictions of oil and gas activities (Table 16). In all, 82% of the NPR-A's Terrestrial Denning Unit (excluding Native patent lands not under BLM management) has restricted development potential (i.e., are designated as UL, or protected by stipulations K-6, K-1, or K-2). General stipulations and BMPs would apply to the remaining 18%. Effects of stipulations and BMPs on the terrestrial denning unit are provided below.

Table 16. Spatially-explicit Leasing Restrictions within the Terrestrial Denning Unit*

Spatially-Explicit Leasing Restrictions	Area (acres) in restricted area	Percent affected by restriction
Unavailable for Leasing (UL):	769,700	80.7%
K-6 Coastal Areas: No exploratory or production well drill pads, or central processing facilities for oil or gas within one mile of coast.	4,400	0.5%
K-1 Rivers: No permanent oil and gas facilities within ½ - 3 mi.	3,500	0.4%
K-2 Deep Water Lakes: No Permanent oil and gas facilities within ¼ mi.	300	<0.1%
General Stipulations and BMPs	175,500	18.4%
Total	953,400	100%

*Areas calculated from GIS analyses of BLM's spatial data for NPR-A, and Service's spatial data for critical habitat.

Effects on Unobstructed, Undisturbed Access between Den Sites and the Coast
Industrial facilities could act as obstructions between den sites and the coast. Polar bears may have to walk around facilities; thus, a localized area of critical habitat would not be available for its intended function and conservation role. Ice roads would be temporary and would not constitute a physical barrier, but the traffic on them may have a behavioral influence. Bears may avoid active coastal staging areas; but, given their small footprint (a maximum of three at 50 acres each), we do not expect them to be an obstruction such that they significantly impair the ability of polar bears to use critical habitat for its intended conservation role.

Human activities could create disturbance that impedes bear movements. Disturbance-creating activities include construction of infrastructure, use of roads and heavy equipment, and use of aircraft. Such activities would occur in localized areas; thus disturbance and effects on bear movements would be localized. While some activities would produce only temporary effects (e.g., occasional travel down an ice road), activities creating persistent disturbance could occur at some facilities that would preclude use of denning habitat.

Remediation of solid and hazardous waste sites could occur within the Terrestrial Denning Unit. Effects of disturbance would be similar to other types of activities, and adherence to BMPs would limit disturbance effects. While some disturbance that would temporarily preclude the use of small areas of critical habitat may occur, the removal of wastes would likely improve the quality of critical habitat

Effects to the Sea Ice Unit

The Sea Ice Unit could be affected by watercraft traffic and to a very limited extent removal or remediation of solid and hazardous wastes. Watercraft traffic delivering construction materials would occur during summer months only, when sea ice is either not present or not extensive; therefore, minimal effects would occur to this unit (i.e., actual sea ice). Barges could create disturbance or obstacles that temporarily discourage or reroute bears from accessing nearby islands or the mainland coast. Very little vessel traffic is likely to take place when sea ice is present, and we do not expect direct effects on sea ice to occur (e.g., no ice management would occur). However, some vessel traffic could disturb ice seals, the main prey of polar bears. Thus, this food resource may be temporarily unavailable in small portions of the sea ice unit. However, effects on prey would be minimal and would not preclude polar bears from using other area to hunt. Removal or remediation of solid and hazardous wastes might occur to a very limited extent in the Sea Ice Unit via the removal of solid waste from lagoons between barrier islands and the mainland. Effects of disturbance from would be similar to other types of activities, and limited by adherence to BMPs. While some disturbance would temporarily preclude the use of small areas of the Sea Ice Unit, removal of wastes would likely improve the quality of critical habitat. These effects would likely occur on a localized, small scale and would not preclude access to other portions of this unit.

Effects to the Barrier Islands Unit

While UL designations and stipulation K-6 would preclude drilling and infrastructure related to production within the NPR-A in the Barrier Island Unit, some activities resulting from the Proposed Action could take place within this unit. Activities that support development in tracts outside of the Barrier Island Unit (e.g., vessel and aircraft traffic) could create temporary disturbance within Barrier Island Unit. Additionally, construction of pipelines or staging areas serving offshore production could take place. Support activities could temporarily make portions of Barrier Island Unit unavailable to polar bears by creating disturbance within it. Most solid and hazardous waste removal and remediation activities within the Barrier Island Unit would occur on the mainland within the one-mile island "no disturbance zone," although limited solid waste removal could occur on barrier islands. Such disturbances are similar to those described for other units, and adherence to BMPs would likely limit disturbance effects. However, critical habitat would regain its conservation value to polar bears once the activity ceases (e.g., the vessel leaves the area).

Oil Spills and Contaminants

To date no spill on the North Slope has been reported to have significantly affected polar bear critical habitat. However, spills do occur, are predicted by the development scenario, and have the potential to adversely affect polar bear critical habitat. See BLM (2012b) for a complete discussion on the probability, behavior, assumptions, and potential effects of oil spills. To summarize, the fate and behavior of contaminant spills would vary by location; marine spills would have more severe environmental consequences than terrestrial spills. The severity of marine spills would depend on several factors, including the amount of open water, the direction and velocity of ocean currents, how long the oil persists, and the effectiveness of response. Spills in open water during summer would spread more than spills on or under ice. Spills in the Arctic Ocean may be more difficult to respond to than spills in other environments.

Most spills would occur in the Terrestrial Denning Unit, although the chance of oil or other chemicals contaminating Terrestrial Denning Unit is small. Most of this unit in NPR-A is designated UL, thus reducing changes of spills occurring from exploration and development drilling sites. Where exploration and develop could occur within The Terrestrial Denning Unit, most oil spills would be small in volume and contained on development pads. If an off-pad oil spill did occur, it most likely would originate from a pipeline. Even if a spill did occur off pad, it would not cover an extensive area because vegetation during the summer and low temperatures in the winter would slow the flow of oil. Additionally, and cleanup would occur. Therefore, even if an oil or other contaminant spill did affect the Terrestrial Denning unit, we anticipate adverse effects on a very localized scale.

Potential sources of oil spills that could affect the Sea Ice and Barrier Island units include terrestrial spills that flow down rivers and streams into the marine environment, and spills from vessels due to damage from collisions, lack of maintenance, or other reasons. As previously mentioned, terrestrial spills would likely be of small in volume, contained at the drilling site, and therefore are unlikely to reach the marine environment. Spills from vessels would likely be small spills of refined oils, which have lower overall effects on the environment than spills of crude oil. The chance of crude oil contaminating the Barrier Island and Sea Ice Critical units is extremely small. Crude oil spills directly into marine waters are unlikely to result from the Proposed Action because exploratory and development drilling operations would be set back at least one mile from the coast, and no development would occur on barrier islands (see discussion of stipulations and BMPs below). Additionally, oil produced in the NPR-A would be piped over land to the TAPS, not to the Arctic coast for shipment in tankers, thus minimizing crude oil spills from pipelines and tankers.

However, if oil reached marine waters, it could remain in water, on ice, or on barrier islands within the Sea Ice and Barrier Island units, and along the coastline of the Terrestrial Denning Unit. Additionally, spills of oil or other contaminants could concentrate and accumulate in leads and openings during spring break-up and autumn freeze-up. Oil concentrated in leads in the ice would increase the chance that seals, the main food source of polar bears, would be oiled and killed. Thus, oil spills could cause a localized reduction in ringed seal numbers and temporarily decrease the conservation role of the Sea Ice Unit for polar bears (i.e., for hunting). All three units have, in part, a conservation role to provide habitat for movements and/or travel; oil on ice, the coastline, and on barrier islands could decrease the ability of the units to provide this conservation role. The Terrestrial Denning and Barrier Island units also provide, in part, habitat free of human disturbance. Response activities, including deterrence activities to keep polar bears away from contaminated areas, could make portions of these units unavailable.

Physical impacts to Barrier Island and Terrestrial Denning units could occur from removal of soil, vegetation, and snow. These impacts, however, would likely occur over a small portion of critical habitat and would not preclude the use of other areas of these units. We do not anticipate physical modification to the Sea Ice Unit will occur.

Stipulations and BMPs that Minimize Impacts

In addition to those lands designated UL, several stipulations would limit where activities creating persistent disturbance could preclude denning. K-1, K-2, K-6, K-9, and K-10 reduce

potential for disturbance and obstructions by incorporating buffers and other restrictions along rivers, lakes, and coastline. In all of the coastal NPR-A, BMPs C-1, E-1, E-5, and F-1b minimize disturbance by regulating the use of heavy equipment and aircraft, and by requiring best management practices for road and water crossings. BMP C-1 requires operators to survey for polar bear dens, prohibits cross-country use of heavy equipment within one mile of known dens, and directs operators to consult with Service before initiating activities during the denning period. Spill prevention and response measures are provided in BMPs A-4 through A-7, and E-4. These BMPs would minimize the chance of oil or contaminant releases into waters, their contact with wildlife, and would require cleanup response. Collectively, lease stipulations and BMPs would reduce potential effects from activities that reduce the conservation role of critical habitat. Thus, while some adverse effects could occur, we expect these effects would not prevent polar bears from using this unit for its intended function and conservation role.

The extent of the critical habitat in the Action Area, the low density of polar bears using it, coupled with the limited area that would be impacted by oil or other spills serves to reduce the severity of this type of impact on critical habitat. Additionally, several lease stipulations and BMPs would minimize the chance a spill would occur and potential impacts of spills should they occur. Pipelines could be approved within river buffers on a case-by-case basis, but only to cross the river, which would minimize the amount of pipeline potentially exposed to flowing water. These measures, the lack of marine transport of oil from the NPR-A, and placement of drilling operations inland significantly reduce the chance that a spill would reach marine waters as a result of the Proposed Action. Thus, we anticipate minimal effects on the three units of polar bear critical habitat from spills of or other contaminants.

Interrelated and Interdependent Effects

We have not identified any interrelated or interdependent effects to polar bear critical habitat resulting from the Proposed Action.

Cumulative Effects

Under the ESA, cumulative effects are the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the Action Area. Future Federal actions are not considered in this section because they will require separate consultation under the ESA. In addition to the federally controlled NPR-A, the Action Area is comprised of State waters, and Native-owned lands. To assess potential cumulative impacts the Service considered the following types of activities:

Future Oil and Gas Development

Future oil and gas development, whether in State waters or in the terrestrial environment on State, private, Native-owned, or Federal lands, would require Federal permits (such as section 404 of the Clean Water Act authorization from the U.S. Army Corps of Engineers (COE), and National Pollution Discharge Elimination System permits from the Environmental Protection Agency) and, therefore, are not considered cumulative impacts under the ESA.

Natural Gas Pipeline

The BLM considers the development and export of North Slope natural gas via pipeline to be reasonably foreseeable. While much of this pipeline is likely to be on State, not BLM lands, a project of this magnitude would require Federal permits and section 7 consultation. It is therefore, not a cumulative effect under the ESA.

Community Growth

Community growth is anticipated to continue across the North Slope. The footprints of villages within the boundaries of NPR-A will likely increase, along with associated infrastructure such as roads, powerlines, communication towers, landfills, and gravel pits and these activities may adversely affect listed species. The scale of impacts will depend not only on the amount of growth, but the location as it relates to habitat. For example, community development projects at Barrow may potentially impact Steller's eiders to a much higher degree than developments at Wainwright.

Because most of the Action Area is wetlands or open water (USGS National Land Cover Database), a section 404 permit from the COE would likely be necessary for all large-scale community development projects that may impact eiders. The issuance of these permits would also trigger consultation under the ESA. Smaller projects may not require a Federal permit, but are likely to have a small, if any, impact to listed species.

Commercial Fishing

Reduction in the extent and duration of sea ice may increase the potential for commercial fishing; however, under the Arctic Fisheries Management Plan, NMFS has prohibited any and all commercial fishing in the Arctic. Future commercial fisheries in the Action Area would likely be managed by the National Marine Fisheries Service (NMFS), and the issuance of regulations would require section 7 consultations, and therefore are not considered cumulative effects.

Increased Marine Traffic

As the spatial and temporal extent of arctic sea ice in the summer has declined, and the duration of ice free periods has increased, interest in shipping in arctic waters has increased (Brigham and Ellis 2004). Ships operating, or that could operate in the area include military vessels, pleasure craft, cruise ships, barges re-supplying communities, scientific research vessels, and vessels related to resource development such as oil and gas. The potential increase in the number of vessels operating in arctic waters has been matched by an increase in United States Coast Guard (USCG) activities. The USCG has conducted a number of major exercises in Arctic waters for which section 7 consultations were conducted.

Increased marine traffic could impact listed species through disturbance, and more significantly from an accidental fuel spill. However, changes in traffic and associated risk are highly speculative. As more information about future marine traffic becomes available, the environmental baseline may change. The effects of future increments of the proposed Action will be considered in the environmental baseline in future section 7 consultations.

Increased Scientific Research

Scientific research across the Arctic is increasing, as concern about effects of climate change in the arctic grows. While research is often conducted by universities and private institutions, many activities take place in NPR-A. These activities would require permits from the BLM. In addition, large-scale projects in the marine environment are generally funded by NSF or operate off U.S. Coast Guard ice breaking vessels. Because these activities have a federal nexus, they will be considered in future section 7 consultations.

Conclusion

We anticipate oil and gas development, community growth, subsistence hunting, scientific activities, and other activities will continue to occur in the Action Area in coming decades. Most activities with potential to affect significant numbers of individuals of listed species (such as oil and gas development and community growth) will require consultation, whereas those that may not require consultation (e.g., small projects in developed areas such as home renovation, and non-commercial shipping) will likely have minor impacts to only a few individuals.

If additional oil and gas development resulted from the Proposed Action, the development could facilitate additional oil and gas development in adjacent areas such Native-owned lands, State waters, and other Federal lands on the North Slope. The nature and extent of any such additional development that may occur, however, currently is unknown. Offshore and terrestrial oil and gas development in these areas would require federal permits. Therefore, if development is proposed, issuance of federal permits would require consultation under section 7 of the ESA to ensure the proposed activity would not jeopardize the continued existence of listed or proposed species or destroy or adversely modify critical habitat.

Conclusion

Introduction

This BO evaluates the potential impacts of the proposed Action on Steller's eiders, spectacled eiders, polar bears, and polar bear critical habitat in the Action Area. To reach a conclusion, impacts of the proposed Action are not considered in isolation, but are placed in the context of the current status of the species and critical habitat, the environmental baseline, and cumulative effects (as defined by the ESA). After considering these aggregate effects on the species, the Service's biological opinion is that the proposed Action is not likely to jeopardize the continued existence of any of these species, nor is likely to destroy or adversely modify critical habitat.

Section 7(a)(2) of the ESA requires Federal agencies ensure their activities are not likely to: (1) jeopardize the continued existence of any listed species, or (2) result in the destruction or adverse modification of designated critical habitat. Regulations that implement section 7(a)(2) of the ESA define "jeopardize the continued existence of" as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, number, or distribution of that species" (50 CFR 402.02).

In evaluating the impacts of the Action to listed species, the Service identified a number of adverse effects that may occur. These are discussed more fully in the section, *Effects of the*

Proposed Action, and are summarized below. Incidental take has been authorized for activities that may adversely affect listed eiders. Impacts to polar bears were assessed to ensure the Action is in compliance with section 7(a)(2). However, while we estimate the take that may occur, no incidental take for polar bears has been authorized in this BO as the take of marine mammals may only authorized under the ESA after it is authorized under the MMPA.

The analysis set forth in this BO is based on our assessment of the likely effects of the activities in the BLM's development scenario, as set forth in the Proposed Action. Additional section 7 consultation may be required in the future, however, as specific exploration and development projects are proposed. Additional consultation would be required in accordance with 50 CFR § 402.16; for example, if proposed projects so differ from the activities in the Proposed Action that the likely effects of the proposed projects to listed species or critical habitat exceed those considered in this BO. Any additional consultations would require careful consideration of all information available at that time, including up-to-date evaluations of the status of listed species and critical habitat, the environmental baseline and project-specific considerations such as the specific location, nature, and extent of proposed activities. We wish to provide clear notification that additional consultations could result in different conclusions than the ones set forth in this BO, depending on these project-specific considerations.

Listed Eiders

Steller's and spectacled eiders' life histories are sufficiently similar such that we considered effects on their survival and recovery together in the sections below.

Habitat Loss and Disturbance/Displacement, and Predation

Some habitat could be completely and permanently lost when structures or fill render the habitat unusable. Additionally, the capability of immediately adjacent habitat to support eiders may be completely or partially compromised by nearby structures and the associated human activity, including anthropogenic influences on predator population size or distribution. The size of the habitat affected by the disturbance remains unknown, and it is also unknown whether eiders are simply displaced from this habitat (possibly with reduced productivity) or continue to use it but possibly at reduced fitness. Due to the temporary nature of such effects, activities in the nearshore marine environment are not expected to cause significant levels of disturbance. We have determined habitat loss from fill and gravel mining and of immediately adjacent habitat from disturbance may adversely affect listed eiders, causing an estimated loss of between 14 and 64 adult breeding spectacled eiders that would have been recruited into the breeding population during the life of the project (see Table 11); this estimated range is likely an overestimate and represents a tiny fraction of the listed population of about 369,122 birds. We estimated that no Steller's eiders eggs would be lost; thus, production of Steller's eiders would not be affected. Because the loss of breeding adults resulting from the development scenario is low, and lease stipulations and BMPs will further minimize this loss, we do not expect that habitat loss and disturbance will cause population-level impact on spectacled or Steller's eiders.

Disturbance from Helicopter Landings and On-tundra Activities

We anticipate helicopter landings in undeveloped areas may adversely affect listed eiders by flushing females from nests, possibly resulting in nest abandonment, or partial or complete depredation. The magnitude of these effects will vary with the density of listed eiders and the

number of landings. For spectacled eiders, we estimated a loss of up to 80 eggs and 7 breeding adults annually; this estimation is likely an overestimate and is low when compared to the listed population of about 369,122 birds. We estimated that no Steller's eiders eggs would be lost; thus, production of Steller's eiders would not be affected. Given the low numbers of potential eggs lost from lack of nesting effort and minimal loss of recruitment into the breeding population, we do not expect that adverse effects from this type of disturbance will cause population-level effects on spectacled or Steller's eiders.

Collisions

We determined that collisions with structures may adversely affect listed eiders at the individual level. However, because we anticipate low numbers of birds (8 spectacled and less than one Steller's eiders annually) would collide with structures when compared to the overall populations (369,122 spectacled eiders and 576 Steller's eiders), we conclude that these potential effects are very unlikely to cause population-level impacts.

Oil and Toxic Substance Spills

Some impacts could occur from spills of oil and other toxic substances. The BLM anticipates small spills are likely to occur. However, listed eiders are unlikely to contact small spills, and no take is anticipated. BLM's spill analysis indicated that large spills are unlikely to occur. In the worst-case scenario (a large volume of oil entering marine waters in summer in an area where listed eiders congregate) oil could contact and kill small numbers of Steller's eiders and/or spectacled eiders. However, BLM's estimated the probability of a very large spill occurring to be very low. Additionally, lease stipulations, BMPs, development setbacks from the coast and rivers, and limited spatial extent and temporal duration of listed eiders in the marine environment reduces the likelihood of a significant quantity of oil spilled in NPR-A reaching concentrations of listed eiders in marine waters. Therefore, population-level effects of listed eiders from oil and toxic spills are unlikely.

Conclusion Summary for Listed Eiders

The Service determined that while some impacts of the Proposed Action will likely cause adverse effects on individuals, these effects, when taken together, are not likely to cause population-level impact in spectacled or Steller's eiders. We anticipate that BLM's 29 stipulations and BMPs would minimize potential effects of exploration and development, including predator attraction, disturbance, habitat loss/alteration, exposure to oil spills or other contaminants, and collisions. Therefore, the Service concludes that the effects of all the Proposed Action, considered together with, cumulative effects and in the context of the status of the species, environmental baseline, and cumulative effects, *are <u>not</u> reasonably likely to jeopardize the continued existence of listed Steller's and spectacled eiders by reducing appreciably the likelihood of survival and recovery of these species in the wild by reducing their reproduction, numbers, or distribution.*

Polar Bears

Polar bears could be adversely affected by the Proposed Action through disturbance, accessing spills, and human-polar bear interactions. These effects are summarized below.

We anticipate most polar bears would not experience more than short-term disturbance resulting from the Proposed Action. Non-denning (mobile) bears may be affected by human presence and activities such that they change their behavior and move away from the source of disturbance, or in rare cases may be attracted to the area where activity is occurring. The majority of polar bear disturbances would only result in short-term behavior changes that have a minimal effect on polar bears.

Small spills of oil and other chemicals are expected to occur. However, it is highly unlikely that polar bears will be significantly affected because the vast majority of spills will likely be of a very low volume and would occur on development pads. Moreover, the density of polar bears is low in most of the Action Area so that only very small numbers of individuals are likely to encounter spilled substances. Further, oil spill response activities would cause a significant local disturbance which would likely displace individuals away from the spill site before they come into contact with the spill. Very rarely an oil or chemical spill may be unattended, and a few polar bears may access these chemicals and suffer injury or death. Even under the worse-case scenario, where a large spill from a pipeline crossing a river in summer/fall or an uncontrolled well blowout where oil reaches the marine environment few polar bears would be affected or killed because of their low density in the Action Area. Therefore, given the low probability of a large oil spill combined with the low density of bears in the Action Area population-level effects are not likely to occur. We expect only a very small number of polar bears, fewer than one annually, to contact spills.

Some human-polar bear interactions may lead to polar bear deterrence events. We expect that very few polar bears would suffer injury from deterrence events (up to 10 annually) annually, and while unlikely it is possible that 5 polar bears could be killed from such events over the 50-year lifespan of the full development scenario.

Four BMPs directly benefit polar bears by reducing access to anthropogenic sources of food (e.g. trash), requiring designs to reduce surprise encounters with bears, and requiring workers to be educated on bear avoidance strategies. Nineteen stipulations and BMPs indirectly benefit polar bears by preventing environmental contamination and protecting potential denning habitat from impacts and disturbance. These BMPs complement protective measures included in MMPA LOAs issued by the USFWS.

Conclusion Summary for Polar Bears

In summary, we expect few, if any, polar bears would die as a result of disturbance, human-polar bear interactions, or small oil spills. The anticipated level of impact is not likely to cause population-level declines. All anticipated effects of the Proposed Action would likely impact only a small proportion of the worldwide population. Therefore, the Service concludes the effects of the Proposed Action, considered together with cumulative effects and in the context of the status of the species, environmental baseline, and cumulative effects, *are <u>not</u> reasonably likely to jeopardize the continued existence of polar bears by reducing appreciably the likelihood of survival and recovery of these species in the wild by reducing their reproduction, numbers, or distribution*.

Polar Bear Critical Habitat

On October 29, 2009, the Service proposed critical habitat for polar bears (74 FR56058). A final rule designating critical habitat for polar bears, comprised of three critical habitat units, was issued on December 7, 2010 (75 FR 76086). On January 11, 2013, the final rule was vacated and remanded to the Service by the US District Court for the District of Alaska in *Alaska Oil and Gas Association et al. v. Salazar et al* (D. Alaska)(3:11-cv-00025-RRB). Service decisions regarding the District Court's order are currently pending, and the scope and description of a final critical habitat designation for polar bears are unresolved at this time. Nevertheless, prior to the District Court's decision, the Service conducted an analysis of the potential effects of the Proposed Action on the three critical habitat units set forth in the vacated final rule. For advisory purposes, we are providing that analysis in this biological opinion.

All three units of polar bear critical habitat occur in the Action Area and some adverse effects are expected. Although UL designations and lease stipulations would preclude development within a large portion of the terrestrial denning unit within the Action Area, new development related to production in NPR-A could occur on a predicted 8,402 acres within the terrestrial denning unit. Development is not likely within the Sea Ice or Barrier Island units.

Activities related to the Proposed Action could cause temporary and localized disturbance to all three critical habitat units. While some development and activities that create disturbances could adversely affect critical habitat, these effects would be minimized by lease stipulations and BMPs. Thus, only a small proportion of critical habitat would be directly affected by the Proposed Action.

While spills of oil or other contaminants are likely to occur the vast majority are likely to be small and only result in minor and temporary effects on critical habitat. Large spills are unlikely; but, if they occur, they are likely to affect only a small portion of polar bear critical habitat. Therefore, while adverse effects could result from the Proposed Action in localized areas, we expect these effects would not prevent polar bears from using the rest of critical habitat for its intended function and conservation role.

Conclusion Summary for Polar Bear Critical Habitat

This biological opinion does not rely on the regulatory definition of 'destruction or adverse modification' of critical habitat at 50 C.F.R. §402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

While adverse effects to polar bear critical habitat may occur, we anticipate the majority would result in only small-scale and temporary disruptions in the use of critical habitat. Construction of structures or facilities that could more permanently displace bears would also be small scale, and thus affect only a very small proportion of critical habitat. The only potential exception would be a very large marine oil spill; however, one or more spills of size great enough to affect the role and function of critical habitat, are very unlikely to occur. Therefore, after considering the indirect and direct effects of the entire Proposed Action, together with the cumulative effects, as well as the effects of interrelated and interdependent actions, when considered in conjunction with the environmental baseline, and given the size of the critical habitat unit, it is the Service's biological opinion that the effects of the Proposed Action *are <u>not</u> reasonably likely to destroy or*

adversely modify polar bear critical habitat, and the critical habitat would retain the intended function and conservation role for which it was designated.

Given the uncertainty regarding what final designation of polar bear critical habitat may include, we also compared the vacated final rule to the 2009 proposed rule, for the purpose of conducting an analysis of the potential effects of the Proposed Action on the 2009 proposed critical habitat area. Specifically, in the now vacated final rule, the town sites of Barrow and Kaktovik were excluded; existing manmade structures were not included (because they lack the habitat features essential to the bear); five coastal radar sites were excluded because existing resource management plans were deemed to provide comparable conservation benefit to polar bears; and the description of marine waters included to protect sea ice was modified slightly to correct identification of U.S. territorial waters. The differences between the proposed and vacated final rule are minor in regard to total areal extent [200,541 mi^2 (519,403 km^2) proposed; 187,157 mi^2 (484,734 km^2) in final rule] and composition of the three units, with the majority of the differences lying outside the Action Area. We find that the minor differences between the proposed and final rules for polar bear critical habitat have no effect upon the outcome of our analyses and conclusions regarding the potential effects of the proposed Action upon critical habitat, regardless of whether we are evaluating the effects of the proposed Action upon the critical habitat, as set forth in the vacated final rule, or as originally proposed. Thus, as with the final vacated rule, we concluded that the effects of the Proposed Action on critical habitat as defined by the proposed rule would not be likely to destroy or adversely modify critical habitat. Therefore, after considering the indirect and direct effects of the entire Proposed Action, together with the cumulative effects, as well as the effects of interrelated and interdependent actions, when considered in conjunction with the environmental baseline, and given the size of the critical habitat unit, it is the Service's biological opinion that the effects of the Proposed Action *are <u>not</u> reasonably likely to destroy or adversely modify proposed polar bear critical habitat, and the proposed critical habitat would retain the intended function and conservation role for which it was initially proposed.*

Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, but not the purpose of, carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS). Please be aware that all known

instances of incidental takings of listed species must be reported to the Service using the contact information below.

Spectacled and Steller's Eiders

Habitat Loss and Disturbance/Displacement, and Predation

To ensure potential impacts to listed eiders were not underestimated, we assumed random placement of developments and that all development would occur in the eider breeding area, although it comprises roughly a quarter of the Action Area. There is considerable variation in eider density, and hence potential impacts, even within the eider breeding area. Our estimates of incidental take are based on the acreage of gravel fill and the 200-m buffer surrounding facilities, the lifetime of structures, and the density of listed eiders in areas within which development can occur. Using the methodology described in the Effects section for *Steller's and Spectacled Eiders*, we anticipate the following incidental take:

Spectacled eiders:

- Up to **350 eggs** during the 50-year development lifespan

Steller's eiders:

- **No take from habitat loss is anticipated**

We did not estimate annual loss of eggs from habitat loss because development would occur on a project-by-project basis until about 2057, not on an annual basis. As explained in Effects section for *Steller's and Spectacled Eiders*, the take estimates for habitat loss are predicated upon several conservative assumptions, which lead us to expect that we have likely over estimated incidental take.

Disturbance from Aircraft Landings and On-tundra Activities

Using the methodology explained in the Effects section for *Steller's and Spectacled Eiders*, we estimate an incidental take from aircraft landings and on-tundra activities of **80 spectacled eider eggs annually**. Because we estimated less than one Steller's eider nest would be taken from aircraft landings and on-tundra activities, **no take from aircraft landings and on-tundra activities is anticipated or authorized for Steller's eiders**.

Collisions

Our methods for estimating incidental take are described the Effects section for *Steller's and Spectacled Eiders*. We predicted incidental take caused by collisions of **up to 8 spectacled eiders and less than 1 Steller's eiders each year during the 50-year development lifespan, for a total of up to 401 spectacled and 29 Steller's eiders**. Our estimate likely overstates the likely impact. Given the terrestrial location of structures that may result from this Action compared to the principally marine fall migration route of eiders, and the comparatively small profile of structures within the path of migrating eiders, we likely overestimated take, likely significantly. Additionally, BLM's BMPs will also likely reduce collision risk but to an unknown degree; thus, we have not adjusted our take estimates to reflect this likelihood.

Polar Bears

Based on records reported from previous human-polar bear operations, we estimate that:

- a few (six or fewer) polar bears may suffer injury or death due to contact with oil or other toxic chemicals during the 50-year life of development
- 10 deterrence events that lead to injury (e.g., pain and bruising) during the 50-year life of development
- 5 polar bears may die during deterrence events during the 50-year lifespan of development, most likely from misuse of deterrence firearms

Given BLM's assessment of the very low probability of a very large spill occurring, lease stipulations, BMPs, setbacks of most oil and gas structures from the coast and large rivers, minimization measures included in the Service's LOAs that authorize MMPA take, and limited spatial extent and temporal duration of concentrations of polar bears in the marine environment, the likelihood of a significant quantity of oil spilled in NPR-A reaching large numbers of polar bears is extremely unlikely.

Although we have enumerated the extent of take of marine mammals anticipated, the Service is not authorizing take of marine mammals under the ESA at this time because such take has not yet been authorized under the Marine Mammal Protection Act and/or its 2007 Amendments. After take has been authorized under the MMPA, take under the ESA that results from actions conducted in compliance with all requirements and stipulations set forth in the MMPA authorization will be considered by the Service to also be authorized under the ESA.

Reasonable and Prudent Measures & Terms and Conditions

Reasonable and prudent measures (RPMs) and their implementing terms and conditions (T&Cs) aim to minimize the incidental take anticipated to result from the Proposed Action. As described above, activities resulting from the Proposed Action may lead to the incidental take of spectacled and Steller's eiders through habitat loss, disturbance, and collisions. The 2008 IAP BO (USFWS 2008) required adherence to five RPMs with several T&Cs. The Service is not including RPMs and T&Cs for reasons stated below.

Steller's and Spectacled Eiders

The 2008 IAP BO (USFWS 2008) included five RPM/T&Cs intended to minimize impacts to listed species. The proposed IAP, through its land allocations, lease stipulations, and BMPs, would adopt RPM/T&Cs 1, 2, and 3. Also, RPM/T&C 4 would be adopted on a portion of the land originally referenced in the 2008 BO. RPM/T&C 4 prohibited the BLM from allowing most permanent oil and gas facilities in the Barrow Triangle, an area north of 70º50' north latitude and west of Dease Inlet. The proposed IAP would allocate as UL the portion of the Barrow Triangle demonstrating the most consistent and recent use by Steller's eiders. Because we did not anticipate or authorize take of Steller's eiders due to habitat loss, the Service has concluded that lands made UL, lease stipulations and BMPs that provide habitat protection for listed eiders are sufficient. The Service no longer thought that RPM/T&C 5 was necessary to minimize take; therefore, this measure was not included as a lease stipulation or BMP in the proposed IAP. Specifically, the BMPs/stipulations B-1, B-2, C-2, E-1, E-3, E-5, E-6, E-11, E-12, K-1, K-2, K-3, K-4, K-5, K-6, and K-10 aim to minimize habitat loss. BMPs/stipulations E-

11, E-18, F-1e, F-1h, I-1, K-1, K-3, K-4, K-5, K-6, and K-10 are designed to minimize impacts from disturbance. Finally, E-10 and E-11 will minimize take from collisions. Additionally, the BLM has included lease stipulations/BMPs designed to minimize effects of predators and contaminants. The Service has no new information suggesting new or different RPMs/T&Cs would further minimize take caused by habitat loss, disturbance, and collisions; therefore, no new RPM/T&Cs are included in the ITS.

The Service expects that adherence to the lease stipulations and BMPs included in the Proposed Action will serve to minimize take of Steller's eiders and spectacled eiders. We have therefore not included RPMs/T&Cs to further minimize take. The BLM will be exempt from the prohibitions of Section 9 of the ESA so long as their lessees, permittees, or agents of their lessees and permittees adhere to these lease stipulations and BMPs.

Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. BLM is encouraged to:

1. continue to monitor threatened eiders and BLM special status species in NE and NW NPR-A. Results will allow the Service and BLM to better evaluate abundance, distribution, and population trends of listed eiders and other special status species. These efforts will enhance the likelihood that future oil and gas development within NE and NW NPR-A will not jeopardize listed eiders or lead to listing additional species.
2. work with the Service and other Federal and State agencies in implementing recovery actions identified in the Steller's and spectacled eider recovery plans. Research to determine important habitats, migration routes, and wintering areas of spectacled and Steller's eiders is an important step toward minimizing conflicts with current and future North Slope oil/gas activities.
3. continue to conduct studies that further our knowledge of yellow-billed loon breeding ecology, especially relation to the effect of climate change on lakes that support nesting and brood-rearing habitat.

Service requests notification of the implementation of any conservation recommendations by the BLM to keep the Service informed of actions minimizing or avoiding adverse effects or benefiting candidate or listed species or their habitats.

Re-initiation Notice

This concludes formal consultation on the Action described. As provided in 50 CFR 402.16, re-initiation of formal consultation is required where discretionary BLM involvement or control over the action has been retained (or is authorized by law) and:

1) If the amount or extent of incidental take is exceeded;

a. Habitat loss, associated disturbance/displacement, and predation:
   - Up to 350 spectacled eider eggs during the 50-year development lifespan
b. Aircraft landings and on-tundra activities:
   - 80 spectacled eider eggs annually
c. Collisions:
   - < 8 spectacled eiders annually, and 401 during the 50-year development lifespan
   - <1 Steller's eiders annually and 29 during the 50-year development lifespan

2) If new information reveals effects of the action agency that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion;
   a. Including but not limited to the following:
      - six polar bear injuries or deaths due to contact with oil or other toxic chemicals during the 50-year life of development
      - 10 polar bear deterrence events that lead to injury (i.e., bruising, significant exhaustion) during the 50-year life of development
      - five polar bear deaths from deterrence events during the 50-year life of development
3) If the agency action is subsequently modified in a manner that causes an effect to listed or critical habitat not considered in this opinion;
4) If a new species is listed or critical habitat designated that may be affected by the action.

Thank you for your cooperation in the development of this BO. If you have any comments or require additional information, please contact Ted Swem, Endangered Species Branch Chief, Fairbanks Fish and Wildlife Field Office, 101 12th Ave., Fairbanks, Alaska, 99701.

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Appendix A. BLM's Lease Stipulations and Best Management Practices

A. WASTE PREVENTION, HANDLING, DISPOSAL, SPILLS, AND PUBLIC SAFETY

A-1 Best Management Practice

Objective: Protect the health and safety of oil and gas field workers and the general public by disposing of solid waste and garbage in accordance with applicable federal, State, and local law and regulations.
Requirement/Standard: Areas of operation shall be left clean of all debris.

A-2 Best Management Practice

Objective: Minimize impacts on the environment from non-hazardous and hazardous waste generation. Encourage continuous environmental improvement. Protect the health and safety of oil and gas field workers and the general public. Avoid human-caused changes in predator populations.
Requirement/Standard: Lessees/permittees shall prepare and implement a comprehensive waste management plan for all phases of exploration and development, including seismic activities. The plan shall be submitted to the authorized officer for approval, in consultation with federal, State, and North Slope Borough regulatory and resource agencies, as appropriate (based on agency legal authority and jurisdictional responsibility), as part of a plan of operations or other similar permit application. Management decisions affecting waste generation shall be addressed in the following order of priority: (1) prevention and reduction, (2) recycling, (3) treatment, and (4) disposal. The plan shall consider and take into account the following requirements:

a. Methods to avoid attracting wildlife to food and garbage. The plan shall identify precautions that are to be taken to avoid attracting wildlife to food and garbage.
b. Disposal of putrescible waste. Requirements prohibit the burial of garbage. Lessees and permitted users shall have a written procedure to ensure that the handling and disposal of putrescible waste will be accomplished in a manner that prevents the attraction of wildlife. All putrescible waste shall be incinerated, backhauled, or composted in a manner approved by the authorized officer. All solid waste, including incinerator ash, shall be disposed of in an approved waste-disposal facility in accordance with EPA and Alaska Department of Environmental Conservation regulations and procedures. The burial of human waste is prohibited except as authorized by the authorized officer.
c. Disposal of pumpable waste products. Except as specifically provided, the BLM requires that all pumpable solid, liquid, and sludge waste be disposed of by injection in accordance with EPA, Alaska Department of Environmental Conservation, and the Alaska Oil and Gas Conservation Commission regulations and procedures. On-pad temporary muds and cuttings storage, as approved by Alaska Department of Environmental Conservation, will be allowed as necessary to facilitate annular injection and/or backhaul operations.
d. Disposal of wastewater and domestic wastewater. The BLM prohibits wastewater discharges or disposal of domestic wastewater into bodies of fresh, estuarine, and marine water, including wetlands, unless authorized by a National Pollutant Discharge Elimination System or State permit.

A-3 Best Management Practice

Objective: Minimize pollution through effective hazardous-materials contingency planning.
Requirement/Standard: For oil- and gas-related activities, a hazardous materials emergency contingency plan shall be prepared and implemented before transportation, storage, or use of fuel or hazardous substances. The plan shall include a set of procedures to ensure prompt response, notification, and cleanup in the event of a hazardous substance spill or threat of a release. Procedures in the plan applicable to fuel and hazardous substances handling (associated with transportation vehicles) shall consist of best management practices if approved by the authorized officer. The plan shall include a list of resources available for response (e.g., heavy-equipment operators, spill-cleanup materials or companies), and names and phone numbers of federal, State, and North Slope Borough contacts. Other federal and State regulations may apply and require additional planning requirements. All appropriate staff shall be instructed regarding these procedures.

In addition contingency plans related to facilities developed for oil production shall include requirements to:

a. Provide refresher spill-response training to North Slope Borough and local community spill-response teams on a yearly basis.
b. Plan and conduct a major spill-response field-deployment drill annually.
c. Prior to production and as required by law, develop spill prevention and response contingency plans and participate in development and maintenance of the North Slope Subarea Contingency Plan for Oil and Hazardous Substances Discharges/Releases for the National Petroleum Reserve-Alaska operating area. Planning shall include development and funding of detailed (e.g., 1:26,000 scale) environmental sensitivity index maps for the lessee's/permittee's operating area and areas outside the lessee's/permittee's operating area that could be affected by their activities. (The specific area to be mapped shall be defined in the lease agreement and approved by the authorized officer in consultation with appropriate resource agencies.) Maps shall be completed in paper copy and geographic information system format in conformance with

the latest version of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration's Environmental Sensitivity Index Guidelines. Draft and final products shall be peer reviewed and approved by the authorized officer in consultation with appropriate federal, State, and North Slope Borough resource and regulatory agencies.

A-4 Best Management Practice

Objective: Minimize the impact of contaminants on fish, wildlife, and the environment; including wetlands, marshes and marine waters; as a result of fuel, crude oil, and other liquid chemical spills. Protect subsistence resources and subsistence activities. Protect public health and safety.

Requirement/Standard: Before initiating any oil and gas or related activity or operation, including field research/surveys and/or seismic operations, lessees/permittees shall develop a comprehensive spill prevention and response contingency plan per 40 CFR § 112 (Oil Pollution Act). The plan shall consider and take into account the following requirements:

a. On-site Clean-up Materials. Sufficient oil-spill-cleanup materials (absorbents, containment devices, etc.) shall be stored at all fueling points and vehicle-maintenance areas and shall be carried by field crews on all overland moves, seismic work trains, and similar overland moves by heavy equipment.

b. Storage Containers. Fuel and other petroleum products and other liquid chemicals shall be stored in proper containers at approved locations. Except during overland moves and seismic operations, fuel, other petroleum products, and other liquid chemicals designated by the authorized officer that in total exceed 1,320 gallons shall be stored within an impermeable lined and diked area or within approved alternate storage containers, such as over packs, capable of containing 110% of the stored volume. In areas within 500 feet of waterbodies, fuel containers are to be stored within appropriate containment.

c. Liner Materials. Liner material shall be compatible with the stored product and capable of remaining impermeable during typical weather extremes expected throughout the storage period.

d. Permanent Fueling Stations. Permanent fueling stations shall be lined or have impermeable protection to prevent fuel migration to the environment from overfills and spills.

e. Proper Identification of Containers. All fuel containers, including barrels and propane tanks, shall be marked with the responsible party's name, product type, and year filled or purchased.

f. Notice of Reportable Spills. Notice of any reportable spill (as required by 40 CFR § 300.125 and 18 AAC § 75.300) shall be given to the authorized officer as soon as possible, but no later than 24 hours after occurrence.

g. Identification of Oil Pans *("duck ponds")*. All oil pans shall be marked with the responsible party's name.

A-5 Best Management Practice

Objective: Minimize the impact of contaminants from refueling operations on fish, wildlife, and the environment.

Requirement/Standard: Refueling of equipment within 500 feet of the active floodplain of any water body is prohibited. Fuel storage stations shall be located at least 500 feet from any water body with the exception of small caches (up to 210 gallons) for motor boats, float planes, ski planes, and small equipment, e.g., portable generators and water pumps, will be permitted. The authorized officer may allow storage and operations at areas closer than the stated distances if properly designed to account for local hydrologic conditions.

A-6 Best Management Practice

Objective: Minimize the impact on fish, wildlife, and the environment from contaminants associated with the exploratory drilling process.

Requirement/Standard: Surface discharge of reserve-pit fluids is prohibited.

A-7 Best Management Practice

Objective: Minimize the impacts to the environment of disposal of produced fluids recovered during the development phase on fish, wildlife, and the environment.

Requirement/Standard: Discharge of produced water in upland areas and marine waters is prohibited.

A-8 Best Management Practice

Objective: Minimize conflicts resulting from interaction between humans and bears during oil and gas activities.

Requirement/Standard: Oil and gas lessees and their contractors and subcontractors will, as a part of preparation of lease operation planning, prepare and implement bear-interaction plans to minimize conflicts between bears and humans. These plans shall include measures to:

a. Minimize attraction of bears to the work sites.
b. Organize layout of buildings and work sites to minimize human/bear interactions.
c. Warn personnel of bears near or on work sites and identify proper procedures to be followed.
d. Establish procedures, if authorized, to discourage bears from approaching the work site.
e. Provide contingencies in the event bears do not leave the work site or cannot be discouraged by authorized personnel.
f. Discuss proper storage and disposal of materials that may be toxic to bears.
g. Provide a systematic record of bears on the work site and in the immediate area.

A-9 Best Management Practice

Objective: Reduce air quality impacts.

Requirement/Standard: All oil and gas operations (vehicles and equipment) that burn diesel fuels must use "ultra-low sulfur" diesel as defined by the Alaska Department of Environmental Conservation-Division of Air Quality.

A-10 Best Management Practice

Objective: Prevent unnecessary or undue degradation of the lands and protect health.

Requirement/Standard: This measure includes the following elements:

a. Prior to initiation of a NEPA analysis for an application to develop a central production facility, production pad/well, airstrip, road, gas compressor station, or other potential substantial air pollutant emission source (hereafter project), the authorizing officer (BLM) may require the project proponent to provide a minimum of one year of baseline ambient air monitoring data for any pollutant(s) of concern as determined by BLM if no representative air monitoring data are available for the project area, or existing representative ambient air monitoring data are insufficient, incomplete, or do not meet minimum air monitoring standards set by the Alaska DEC or the EPA. If BLM determines that baseline monitoring is required, this pre-analysis data must meet Alaska DEC and EPA air monitoring standards, and cover the year immediately prior to the submittal. Pre-project monitoring may not be appropriate where the life of the project is less than one year.

b. The BLM may require monitoring for the life of the project depending on the magnitude of potential air emissions from the project, proximity to a federally mandated Class I area, sensitive Class II area (as identified on a case-by-case basis by Alaska DEC or a federal land management agency), or population center, location within or proximity to a non-attainment or maintenance area, meteorological or geographic conditions, existing air quality conditions, magnitude of existing development in the area, or issues identified during NEPA undertaken for the project.

c. For an application to develop a central production facility, production pad/well, airstrip, road, gas compressor station, or other potential substantial air pollutant emission source, the project proponent shall prepare (and submit for BLM approval) an emissions inventory that includes quantified emissions of regulated air pollutants from all direct and indirect sources related to the proposed project, including reasonably foreseeable air pollutant emissions of criteria air pollutants, volatile organic compounds, hazardous air pollutants, and greenhouse gases estimated for each year for the life of the project. The BLM will use this estimated emissions inventory to identify pollutants of concern and to determine the appropriate level of air analysis to be conducted for the proposed project.

d. For an application to develop a central production facility, production pad/well, airstrip, road, gas compressor station, or other potential substantial air pollutant emission source, the BLM may require the proponent to provide an emissions reduction plan that includes a detailed description of operator committed measures to reduce project related air pollutant emissions including, but not limited to greenhouse gases and fugitive dust.

e. For an application to develop a central production facility, production pad/well, airstrip, road, gas compressor station, or other potential substantial air pollutant emission source, the authorized officer may require air quality modeling for purposes of analyzing project direct, indirect or cumulative impacts to air quality. The BLM may require air quality modeling depending on the magnitude of potential air emissions from the project or activity, duration of the proposed action, proximity to a federally mandated Class I area, sensitive Class II area (as identified on a case-by-case basis by Alaska DEC or a federal land management agency), or population center, location within a non-attainment or maintenance area, meteorological or geographic conditions, existing air quality conditions, magnitude of existing development in the area, or issues identified during NEPA undertaken for the project. The BLM will determine the information required for a project specific modeling analysis through the development of a modeling protocol for each analysis. The authorized officer will consult with appropriate federal, State, and/or local agencies regarding modeling to inform his/her modeling decision and avoid duplication of effort. The modeling shall compare predicted impacts to all applicable local, State, and federal air quality standards and increments, as well as other scientifically defensible significance thresholds (such as impacts to air quality related values, incremental cancer risks, etc.).

f. The BLM may require air quality mitigation measures and strategies within its authority (and in consultation with local, state, federal, and tribal agencies with responsibility for managing air resources) in addition to regulatory requirements and proponent committed emission reduction measures, and for emission sources not otherwise regulated by Alaska DEC or EPA, if the air quality analysis shows potential future impacts to NAAQS or AAAQS or impacts above specific levels of concern for air quality related values (AQRVs).

g. If ambient air monitoring indicates that project-related emissions are causing or contributing to impacts that would cause unnecessary or undue degradation of the lands, cause exceedances of NAAQS, or fail to protect health (either directly or through use of subsistence resources), the authorized officer may require changes in activities at any time to reduce these emissions to comply with the NAAQS and/or minimize impacts to AQRVs. Within the scope of BLM's authority, the BLM may require additional emission control strategies to minimize or reduce impacts to air quality.

h. Publicly available reports on air quality baseline monitoring, emissions inventory, and modeling results developed in conformance with this best management procedure shall be provided by the project proponent to the North Slope Borough and to local communities and tribes in a timely manner.

A-11 Best Management Practice

Objective: Ensure that permitted activities do not create human health risks through contamination of subsistence foods.

Requirement/Standard: A lessee proposing a permanent oil and gas development shall design and implement a monitoring study of contaminants in locally-used subsistence foods. The monitoring study shall examine subsistence foods for all contaminants that could be associated with the proposed development. The study shall identify the level of contaminants in subsistence foods

prior to the proposed permanent oil and gas development and monitor the level of these contaminants throughout the operation and abandonment phases of the development. If ongoing monitoring detects a measurable and persistent increase in a contaminant in subsistence foods, the lessee shall design and implement a study to determine how much, if any, of the increase in the contaminant in subsistence foods originates from the lessee's activities. If the study determines that a portion of the increase in contamination in subsistence foods is caused by the lessee's activities, the authorized officer may require changes in the lessee's processes to reduce or eliminate emissions of the contaminant. The design of the study/studies must meet the approval of the authorized officer. The authorized officer may consult with appropriate federal, State, and North Slope Borough agencies prior to approving the study/studies design. The authorized officer may require/authorize changes in the design of the studies throughout the operations and abandonment period, or terminate or suspend studies if results warrant.

A-12 Best Management Practice
Objective: To minimize negative health impacts associated with oil spills.
Requirement/Standard: If an oil spill with potential impacts to public health occurs, the BLM, in undertaking its oil spill responsibilities, will consider:
a. Immediate health impacts and responses for affected communities and individuals.
b. Long-term monitoring for contamination of subsistence food sources.
c. Long-term monitoring of potential human health impacts.
d. Perceptions of contamination and subsequent changes in consumption patterns.
e. Health promotion activities and communication strategies to maintain the consumption of traditional food.

B. WATER USE FOR PERMITTED ACTIVITIES
B-1 Best Management Practice
Objective: Maintain populations of, and adequate habitat for, fish and invertebrates.
Requirement/Standard: Withdrawal of unfrozen water from rivers and streams during winter is prohibited. The removal of ice aggregate from grounded areas ≤4-feet deep may be authorized from rivers on a site-specific basis.

B-2 Best Management Practice
Objective: Maintain natural hydrologic regimes in soils surrounding lakes and ponds, and maintain populations of, and adequate habitat for, fish, invertebrates, and waterfowl.
Requirement/Standard: Withdrawal of unfrozen water from lakes and the removal of ice aggregate from grounded areas ≤4-feet deep may be authorized on a site-specific basis depending on water volume and depth and the waterbody's fish community. Current water use requirements are:
a. Lakes with sensitive fish (i.e., any fish except ninespine stickleback or Alaska blackfish): unfrozen water available for withdrawal is limited to 15% of calculated volume deeper than 7 feet; only ice aggregate may be removed from lakes that are ≤7-feet deep.
b. Lakes with only non-sensitive fish (i.e., ninespine stickleback or Alaska blackfish): unfrozen water available for withdrawal is limited to 30% of calculated volume deeper than 5 feet; only ice aggregate may be removed from lakes that are ≤5.
c. Lakes with no fish present, regardless of depth: water available for use is limited to 35% of total lake volume.
d. In lakes where unfrozen water and ice aggregate are both removed, the total use shall not exceed the respective 15%, 30%, or 35% volume calculations.
e. Additional modeling or monitoring may be required to assess water level and water quality conditions before, during, and after water use from any fish-bearing lake or lake of special concern.
f. Any water intake structures in fish bearing or non-fish bearing waters shall be designed, operated, and maintained to prevent fish entrapment, entrainment, or injury. **Note**: All water withdrawal equipment must be equipped and must utilize fish screening devices approved by the Alaska Department of Fish and Game, Division of Habitat.
g. Compaction of snow cover or snow removal from fish-bearing waterbodies shall be prohibited except at approved ice road crossings, water pumping stations on lakes, or areas of grounded ice.

C. WINTER OVERLAND MOVES AND SEISMIC WORK
C-1 Best Management Practice
Objective: Protect grizzly bear, polar bear, and marine mammal denning and/or birthing locations.
Requirement/Standard:
a. Cross-country use of heavy equipment and seismic activity is prohibited within 0.5 mile of occupied grizzly bear dens identified by the Alaska Department of Fish and Game unless alternative protective measures are approved by the authorized officer in consultation with the Alaska Department of Fish and Game.
b. Cross-country use of heavy equipment and seismic activity is prohibited within 1 mile of known or observed polar bear dens or seal birthing lairs. Operators near coastal areas shall conduct a survey for potential polar bear dens and seal birthing lairs and consult with the USFWS and/or NOAA Fisheries, as appropriate, before initiating activities in coastal habitat between October 30 and April 15.

C-2 Best Management Practice

Objective: Protect stream banks, minimize compaction of soils, and minimize the breakage, abrasion, compaction, or displacement of vegetation.
Requirement/Standard:

a. Ground operations shall be allowed only when frost and snow cover are at sufficient depths to protect the tundra. Ground operations shall cease when the spring snowmelt begins (approximately May 5 in the foothills area where elevations reach or exceed 500 feet and approximately May 15 in the northern coastal areas). The exact dates will be determined by the authorized officer.
b. Low-ground-pressure vehicles shall be used for on-the-ground activities off ice roads or pads. Low-ground-pressure vehicles shall be selected and operated in a manner that eliminates direct impacts to the tundra by shearing, scraping, or excessively compacting the tundra mat. **Note**: This provision does not include the use of heavy equipment such as front-end loaders and similar equipment required during ice road construction.
c. Bulldozing of tundra mat and vegetation, trails, or seismic lines is prohibited; however, on existing trails, seismic lines or camps, clearing of drifted snow is allowed to the extent that the tundra mat is not disturbed.
d. To reduce the possibility of ruts, vehicles shall avoid using the same trails for multiple trips unless necessitated by serious safety or superseding environmental concern. This provision does not apply to hardened snow trails for use by low-ground-pressure vehicles such as Rolligons.
e. The location of ice roads shall be designed and located to minimize compaction of soils and the breakage, abrasion, compaction, or displacement of vegetation. Offsets may be required to avoid using the same route or track in the subsequent year.
f. Motorized ground-vehicle use within the Colville River Special Area associated with overland moves, seismic work, and any similar use of heavy equipment shall be minimized within an area that extends 1 mile west or northwest of the bluffs of the Colville River, and 2 miles on either side of the Kogosukruk and Kikiakrorak rivers and tributaries of the Kogosukruk River from April 15 through August 5, with the exception that use will be minimized in the vicinity of gyrfalcon nests beginning March 15. Such use will remain 0.5 mile away from known raptor nesting sites, unless authorized by the authorized officer.

C-3 Best Management Practice
Objective: Maintain natural spring runoff patterns and fish passage, avoid flooding, prevent streambed sedimentation and scour, protect water quality and protect stream banks.
Requirement/Standard: Crossing of waterway courses shall be made using a low-angle approach. Crossings that are reinforced with additional snow or ice ("bridges") shall be removed, breached, or slotted before spring breakup. Ramps and bridges shall be substantially free of soil and debris.

C-4 Best Management Practice
Objective: Avoid additional freeze-down of deep-water pools harboring over-wintering fish and invertebrates used by fish.
Requirement/Standard: Travel up and down streambeds is prohibited unless it can be demonstrated that there will be no additional impacts from such travel to over-wintering fish or the invertebrates they rely on. Rivers, streams, and lakes shall be crossed at areas of grounded ice whenever possible.

C-5 Best Management Practice
Objective: Minimize the effects of high-intensity acoustic energy from seismic surveys on fish..
Requirement/Standard:

a. When conducting vibroseis-based surveys above potential fish overwintering areas (water 6 feet deep or greater, ice plus liquid depth), operators shall follow recommendations by Morris and Winters (2005): only a single set of vibroseis shots should be conducted if possible; if multiple shot locations are required, these should be conducted with minimal delay; multiple days of vibroseis activity above the same overwintering area should be avoided if possible.
b. When conducting air gun-based surveys in freshwater, operators shall follow standard marine mitigation measures that are applicable to fish (e.g., Minerals Management Service 2006): operators will use the lowest sound levels feasible to accomplish their data-collection needs; ramp-up techniques will be utilized (ramp-up involves the gradual increase in emitted sound levels beginning with firing a single air gun and gradually adding air guns until the desired operating level of the full array is obtained).
c. When conducting explosive-based surveys, operators shall follow setback distances from fish-bearing waterbodies based on requirements outlined by Alaska Department of Fish and Game (1991).

D. OIL AND GAS EXPLORATORY DRILLING
D-1 Lease Stipulation
Objectives: Protect fish-bearing rivers, streams, and lakes from blowouts and minimize alteration of riparian habitat.
Requirement/Standard: Exploratory drilling is prohibited in rivers and streams, as determined by the active floodplain, and fish-bearing lakes.

D-2 Lease Stipulation
Objective: Minimize surface impacts from exploratory drilling.

Requirement/Standard: Construction of permanent or gravel oil and gas facilities shall be prohibited for exploratory drilling. Use of a previously constructed road or pad may be permitted if it is environmentally preferred.

E. FACILITY DESIGN AND CONSTRUCTION

E-1 Best Management Practice

Objective: Protect subsistence use and access to subsistence hunting and fishing areas and minimize the impact of oil and gas activities on air, land, water, fish and wildlife resources.

Requirement/Standard: All roads must be designed, constructed, maintained, and operated to create minimal environmental impacts and to protect subsistence use and access to subsistence hunting and fishing areas. The authorized officer will consult with appropriate federal, State, and North Slope Borough regulatory and resources agencies prior to approving construction of roads. Subject to approval by the authorized officer, the construction, operation and maintenance of oil and gas field roads is the responsibility of the lessee unless the construction, operation, and maintenance of roads are assumed by the appropriate governing entity.

E-2 Lease Stipulation

Objective: Protect fish-bearing waterbodies, water quality, and aquatic habitats.

Requirement/Standard: Permanent oil and gas facilities, including roads, airstrips, and pipelines, are prohibited upon or within 500 feet as measured from the ordinary high watermark of fish-bearing waterbodies. Essential pipeline and road crossings will be permitted on a case-by-case basis. **Note**: Also refer to Area-Specific Stipulations and Best Management Practices for Rivers Area (*Lease Stipulation*
K-1) and Deep Water Lakes (*Lease Stipulation K-2*).

Construction camps are prohibited on frozen lakes and river ice. Siting of construction camps on river sand and gravel bars is allowed and encouraged. Where leveling of trailers or modules is required and the surface has a vegetative mat, leveling shall be accomplished through blocking rather than use of a bulldozer.

E-3 Lease Stipulation

Objective: Maintain free passage of marine and anadromous fish and protect subsistence use and access to subsistence hunting and fishing.

Requirement/Standard: Causeways and docks are prohibited in river mouths or deltas. Artificial gravel islands and bottom-founded structures are prohibited in river mouths or active stream channels on river deltas. Causeways, docks, artificial islands, and bottom-founded drilling structures shall be designed to ensure free passage of marine and anadromous fish and to prevent significant changes to nearshore oceanographic circulation patterns and water quality characteristics. A monitoring program, developed in consultation with appropriate federal, State, and North Slope Borough regulatory and resource agencies, shall be required to address the objectives of water quality and free passage of fish.

E-4 Best Management Practice

Objective: Minimize the potential for pipeline leaks, the resulting environmental damage, and industrial accidents.

Requirement/Standard: All pipelines shall be designed, constructed, and operated under an authorized officer-approved quality assurance/quality control plan that is specific to the product transported and shall be constructed to accommodate the best available technology for detecting and preventing corrosion or mechanical defects during routine structural integrity inspections.

E-5 Best Management Practice

Objective: Minimize impacts of the development footprint.

Requirement/Standard: Facilities shall be designed and located to minimize the development footprint. Issues and methods that are to be considered include: (a) use of maximum extended-reach drilling for production drilling to minimize the number of pads and the network of roads between pads; (b) sharing facilities with existing development; (c) collocation of all oil and gas facilities, except airstrips, docks, and seawater-treatment plants, with drill pads; (d) integration of airstrips with roads; (e) use of gravel-reduction technologies, e.g., insulated or pile-supported pads, (f) coordination of facilities with infrastructure in support of offshore development. **Note**: Where aircraft traffic is a concern, consideration shall be given to balancing gravel pad size and available supply storage capacity with potential reductions in the use of aircraft to support oil and gas operations.

E-6 Best Management Practice

Objective: Reduce the potential for ice-jam flooding, impacts to wetlands and floodplains, erosion, alteration of natural drainage patterns, and restriction of fish passage.

Requirement/Standard: Stream and marsh crossings shall be designed and constructed to ensure free passage of fish, reduce erosion, maintain natural drainage, and minimize adverse effects to natural stream flow. **Note**: Bridges, rather than culverts, are the preferred method for crossing rivers. When necessary, culverts can be constructed on smaller streams, if they are large enough to avoid restricting fish passage or adversely affecting natural stream flow.

E-7 Best Management Practice

Objective: Minimize disruption of caribou movement and subsistence use.

Requirement/Standard: Pipelines and roads shall be designed to allow the free movement of caribou and the safe, unimpeded passage of the public while participating in subsistence activities. Listed below are the accepted design practices:

a. Above-ground pipelines shall be elevated a minimum of 7 feet as measured from the ground to the bottom of the pipeline at vertical support members.
b. In areas where facilities or terrain may funnel caribou movement, ramps over pipelines, buried pipelines, or pipelines buried under roads may be required by the authorized officer after consultation with federal, State, and North Slope Borough regulatory and resource agencies (as appropriate, based on agency legal authority and jurisdictional responsibility).
c. A minimum distance of 500 feet between pipelines and roads shall be maintained. Separating roads from pipelines may not be feasible within narrow land corridors between lakes and where pipelines and roads converge on a drill pad. Where it is not feasible to separate pipelines and roads, alternative pipeline routes, designs and possible burial within the road will be considered by the authorized officer.
d. Above-ground pipelines shall have a non-reflective finish.

E-8 Best Management Practice

Objective: Minimize the impact of mineral materials mining activities on air, land, water, fish, and wildlife resources.
Requirement/Standard: Gravel mine site design and reclamation will be in accordance with a plan approved by the authorized officer. The plan shall be developed in consultation with appropriate federal, State, and North Slope Borough regulatory and resource agencies and consider:

a. Locations outside the active floodplain.
b. Design and construction of gravel mine sites within active floodplains to serve as water reservoirs for future use.
c. Potential use of the site for enhancing fish and wildlife habitat.
d. Potential storage and reuse of sod/overburden for the mine site or at other disturbed sites on the North Slope.

E-9 Best Management Practice

Objective: Avoidance of human-caused increases in populations of predators of ground-nesting birds.
Requirement/Standard:

a. Lessee shall utilize best available technology to prevent facilities from providing nesting, denning, or shelter sites for ravens, raptors, and foxes. The lessee shall provide the authorized officer with an annual report on the use of oil and gas facilities by ravens, raptors, and foxes as nesting, denning, and shelter sites.
b. Feeding of wildlife is prohibited and will be subject to non-compliance regulations.

E-10 Best Management Practice

Objective: Prevention of migrating waterfowl, including species listed under the Endangered Species Act, from striking oil and gas and related facilities during low light conditions.
Requirement/Standard: Illumination of all structures between August 1 and October 31 shall be designed to direct artificial exterior lighting inward and downward, rather than upward and outward, unless otherwise required by the Federal Aviation Administration.

E-11 Best Management Practice

Objective: Minimize the take of bird species, particularly those listed under the Endangered Species Act and BLM Special Status Species from direct or indirect interaction with oil and gas facilities.
Requirement/Standard: In accordance with the guidance below, before the approval of facility construction, aerial surveys of the following species shall be conducted within any area proposed for development.

Special Conditions in Spectacled and/or Steller's Eiders Habitats:

a. Surveys shall be conducted by the lessee for at least 3 years before authorization of construction, if such construction is within the USFWS North Slope eider survey area and at least 1 year outside that area. Results of aerial surveys and habitat mapping may require additional ground nest surveys. Spectacled and/or Steller's eider surveys shall be conducted following accepted BLM-protocol. Information gained from these surveys shall be used to make infrastructure siting decisions as discussed in subparagraph b, below.
b. If spectacled and/or Steller's eiders are determined to be present within the proposed development area, the applicant shall work with the USFWS and BLM early in the design process to site roads and facilities in order to minimize impacts to nesting and brood-rearing eiders and their preferred habitats. Such consultation shall address timing restrictions and other temporary mitigating measures, location of permanent facilities, placement of fill, alteration of eider habitat, aircraft operations, and management of high noise levels.
c. To reduce the possibility of spectacled and/or Steller's eiders and other birds colliding with above-ground utility lines (power and communication), such lines shall either be buried in access roads or suspended on vertical support members except in rare cases which are to be few in number and limited in extent. Exceptions are limited to the following situations, and must be reported to the USFWS when exceptions are authorized:
    1. Overhead power or communication lines may be allowed when located entirely within the boundaries of a facility pad;
    2. Overhead power or communication lines may be allowed when engineering constraints at the specific and limited location make it infeasible to bury or connect the lines to a vertical support member; or

3. Overhead power or communication lines may be allowed in situations when human safety would be compromised by other methods.

d. To reduce the likelihood of spectacled and/or Steller's eiders and other birds colliding with communication towers, towers should be located, to the extent practicable, on existing pads and as close as possible to buildings or other structures, and on the east or west side of buildings or other structures if possible. Support wires associated with communication towers, radio antennas, and other similar facilities, should be avoided to the extent practicable. If support wires are necessary, they should be clearly marked along their entire length to improve visibility to low-flying birds. Such markings shall be developed through consultation with the USFWS.

Special Conditions in Yellow-billed Loon Habitats:

a. Aerial surveys shall be conducted by the lessee for at least 3 years before authorization of construction of facilities proposed for development which are within 1 mile of a lake 25 acres or larger in size. These surveys along shorelines of large lakes shall be conducted following accepted BLM protocol during nesting in late June and during brood rearing in late August.

b. Should yellow-billed loons be present, the design and location of facilities must be such that disturbance is minimized. The default standard mitigation is a 1-mile buffer around all recorded nest sites and a minimum 1,625-foot (500-meter) buffer around the remainder of the shoreline. Development will generally be prohibited within buffers unless no other option exists.

Protections for Birds

a. To reduce the possibility of birds colliding with above-ground utility lines (power and communication), such lines shall either be buried in access roads or suspended on vertical support members except in rare cases, which are to be few in number and limited in extent. Exceptions are limited to the following situations:

1. Overhead power or communication lines may be allowed when located entirely within the boundaries of a facility pad;
2. Overhead power or communication lines may be allowed when engineering constraints at the specific and limited location make it infeasible to bury or connect the lines to a vertical support member; or
3. Overhead power or communication lines may be allowed in situations when human safety would be compromised by other methods.

b. To reduce the likelihood of birds colliding with communication towers, towers should be located, to the extent practicable, on existing pads and as close as possible to buildings or other structures, and on the east or west side of buildings or other structures if possible. Support wires associated with communication towers, radio antennas, and other similar facilities, should be avoided to the extent practicable. If support wires are necessary, they should be clearly marked along their entire length to improve visibility to low-flying birds. Such markings shall be developed through consultation with the USFWS.

E-12 Best Management Practice

Objective: Use ecological mapping as a tool to assess wildlife habitat before development of permanent facilities, to conserve important habitat types during development.

Requirement/Standard: An ecological land classification map of the development area shall be developed before approval of facility construction. The map will integrate geomorphology, surface form, and vegetation at a scale, level of resolution, and level of positional accuracy adequate for detailed analysis of development alternatives. The map shall be prepared in time to plan one season of ground-based wildlife surveys, if deemed necessary by the authorized officer, before approval of the exact facility location and facility construction.

E-13 Best Management Practice

Objective: Protect cultural and paleontological resources.

Requirement/Standard: Lessees shall conduct a cultural and paleontological resources survey prior to any ground-disturbing activity. Upon finding any potential cultural or paleontological resource, the lessee or their designated representative shall notify the authorized officer and suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the authorized officer.

E-14 Best Management Practice

Objective: Ensure the passage of fish at stream crossings.

Requirement/Standard: To ensure that crossings provide for fish passage, all proposed crossing designs shall adhere to the best management practices outlined in "Stream Crossing Design Procedure for Fish Streams on the North Slope Coastal Plain" by McDonald et al. (1994), "Fundamentals of Culvert Design for Passage of Weak-Swimming Fish" by Behlke et al. (1991), and other generally accepted best management procedures prescribed by the authorized officer. To adhere to these best management practices, at least 3 years of hydrologic and fish data shall be collected by the lessee for any proposed crossing of a stream whose structure is designed to occur, wholly or partially, below the stream's ordinary high watermark. These data shall include, but are not limited to, the range of water levels (highest and lowest) at the location of the planned crossing, and the seasonal distribution and composition of fish populations using the stream.

E-15 Best Management Practice

Objective: Prevent or minimize the loss of nesting habitat for cliff nesting raptors.

Requirement/Standard:

a. Removal of greater than 100 cubic yards of bedrock outcrops, sand, and/or gravel from cliffs shall be prohibited.

b. Any extraction of sand and/or gravel from an active river or stream channel shall be prohibited unless preceded by a hydrological study that indicates no potential impact by the action to the integrity of the river bluffs.

E-16 Best Management Practice
Objective: Prevent or minimize the loss of raptors due to electrocution by powerlines.
Requirement/Standard: Comply with the most up-to-date industry-accepted suggested practices for raptor protection on powerlines. Current accepted standards were published in "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006" in 2006 by the Avian Power Line Interaction Committee and are updated as needed.

E-17 Stipulation/Best Management Practice
No stipulation/Best Management Practice. Not applicable.

E-18 Best Management Practice
Objective: Avoid and reduce temporary impacts to productivity from disturbance near Steller's and/or spectacled eider nests.
Requirement/Standard: Ground-level activity (by vehicle or on foot) within 200 meters of occupied Steller's and/or spectacled eider nests, from June 1 through August 15, will be restricted to existing thoroughfares, such as pads and roads. Construction of permanent facilities, placement of fill, alteration of habitat, and introduction of high noise levels within 200 meters of occupied Steller's and/or spectacled eider nests will be prohibited. In instances where summer (June 1 through August 15) support/construction activity must occur off existing thoroughfares, USFWS-approved nest surveys must be conducted during mid-June prior to the approval of the activity. Collected data will be used to evaluate whether the action could occur based on employment of a 200-meter buffer around nests or if the activity would be delayed until after mid-August once ducklings are mobile and have left the nest site. The BLM will also work with the USFWS to schedule oil spill response training in riverine, marine, and inter-tidal areas that occurs within 200 meters of shore outside sensitive nesting/brood-rearing periods or conduct nest surveys. The protocol and timing of nest surveys for Steller's and/or spectacled eiders will be determined in cooperation with the USFWS, and must be approved by the USFWS. Surveys should be supervised by biologists who have previous experience with Steller's and/or spectacled eider nest surveys.

E-19 Best Management Practice
Objective: Provide information to be used in monitoring and assessing wildlife movements during and after construction.
Requirement/Standard: A representation, in the form of ArcGIS-compatible shape-files, of all new infrastructure construction shall be provided to the authorized officer. During the planning and permitting phase, shape-files representing proposed locations shall be provided. Within 6 months of construction completion, shape-files (within GPS accuracy) of all new infrastructure shall be provided. Infrastructure includes all gravel roads and pads, facilities built on pads, pipelines and independently constructed powerlines (as opposed to those incorporated in pipeline design). Gravel pads shall be included as polygon feature. Roads, pipelines, and powerlines may be represented as line features but must include ancillary data to denote width, number pipes, etc. Poles for power lines may be represented as point features. Ancillary data shall include construction beginning and ending dates.

E-20 Best Management Practice
Objective: Manage permitted activities to meet Visual Resource Management class objectives described below.
Class I: Natural ecological changes and very limited management activity are allowed. The level of change to the characteristic landscape should be very low and must not attract attention.
Class II: The level of change to the characteristic landscape should be low. Management activities may be seen, but should not dominate the view of the casual observer. Any changes should repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
Class III: The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
Class IV: The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize impacts through location and design by repeating form, line, color, and texture.
Requirement/Standard: At the time of application for construction of permanent facilities, the lessee/permittee shall, after consultation with the authorized officer, submit a plan to best minimize visual impacts, consistent with the Visual Resource Management class for the lands on which facilities would be located. A photo simulation of the proposed facilities may be a necessary element of the plan.

F. USE OF AIRCRAFT FOR PERMITTED ACTIVITIES
F-1 Best Management Practice
Objective: Minimize the effects of low-flying aircraft on wildlife, subsistence activities, and local communities.
Requirement/Standard: The lessee shall ensure that aircraft used for permitted activities maintain altitudes according to the following guidelines (**Note:** This best management practice is not intended to restrict flights necessary to survey wildlife to gain information necessary to meet the stated objectives of the stipulations and best management practices. However, flights necessary to gain this information will be restricted to the minimum necessary to collect such data.):

a. Aircraft shall maintain an altitude of at least 1,500 feet above ground level when within 0.5 mile of cliffs identified as raptor nesting sites from April 15 through August 15 and within 0.5 mile of known gyrfalcon nest sites from March 15 to August 15, unless doing so would endanger human life or violate safe flying practices. Permittees shall obtain information from the BLM necessary to plan flight routes when routes may go near falcon nests.
b. Aircraft shall maintain an altitude of at least 1,000 feet above ground level (except for takeoffs and landings) over caribou winter ranges from December 1 through May 1, unless doing so would endanger human life or violate safe flying practices. Caribou wintering areas will be defined annually by the authorized officer. The BLM will consult directly with the Alaska Department of Fish and Game in annually defining caribou winter ranges.
c. Land user shall submit an aircraft use plan as part of an oil and gas exploration or development proposal. The plan shall address strategies to minimize impacts to subsistence hunting and associated activities, including but not limited to the number of flights, type of aircraft, and flight altitudes and routes, and shall also include a plan to monitor flights. Proposed aircraft use plans should be reviewed by appropriate federal, State, and borough agencies. Consultations with these same agencies will be required if unacceptable disturbance is identified by subsistence users. Adjustments, including possible suspension of all flights, may be required by the authorized officer if resulting disturbance is determined to be unacceptable. The number of takeoffs and landings to support oil and gas operations with necessary materials and supplies should be limited to the maximum extent possible. During the design of proposed oil and gas facilities, larger landing strips and storage areas should be considered to allow larger aircraft to be employed, resulting in fewer flights to the facility.
d. Use of aircraft, especially rotary wing aircraft, near known subsistence camps and cabins or during sensitive subsistence hunting periods (spring goose hunting and fall caribou and moose hunting) should be kept to a minimum.
e. Aircraft used for permitted activities shall maintain an altitude of at least 2,000 feet above ground level (except for takeoffs and landings) over the Teshekpuk Lake Caribou Habitat Area (Maps 2-3K and 2-4K, depending upon alternative) from May 20 through August 20, unless doing so would endanger human life or violate safe flying practices. Aircraft use (including fixed wing and helicopter) by oil and gas lessees in the Goose Molting Area (Maps 2-3K or 2-4K) should be minimized from May 20 through August 20, unless doing so would endanger human life or violate safe flying practices.
f. Aircraft used for permitted activities shall maintain an altitude of at least 2,000 feet above ground level (except for takeoffs and landings) over the Utukok River Uplands Special Area from May 20 through August 20, unless doing so would endanger human life or violate safe flying practices. (**Note:** The boundary of the Utukok River Uplands Special Area differs among Alternatives B-1 through D. See Maps 2-2, 2-3, and 2-4.)
g. Hazing of wildlife by aircraft is prohibited. Pursuit of running wildlife is hazing. If wildlife begins to run as an aircraft approaches, the aircraft is too close and must break away.
h. Fixed wing aircraft used as part of a BLM-authorized activity along the coast shall maintain minimum altitude of 2,000 feet and a 0.5-mile buffer from walrus haulouts, unless doing so would endanger human life or violate safe flying practices. Helicopters used as part of a BLM-authorized activity along the coast shall maintain minimum altitude of 3,000 feet and a 1-mile buffer from walrus haulouts, unless doing so would endanger human life or violate safe flying practices.
i. Aircraft used as part of a BLM-authorized activity along the coast and shore fast ice zone shall maintain minimum altitude of 3,000 feet and a buffer of 1 mile from aggregations of seals, unless doing so would endanger human life or violate safe flying practices.

G. OIL AND GAS FIELD ABANDONMENT

G-1 Lease Stipulation

Objective: Ensure long-term reclamation of land to its previous condition and use.

Requirement/Standard: Prior to final abandonment, land used for oil and gas infrastructure—including but not limited to well pads, production facilities, access roads, and airstrips—shall be reclaimed to ensure eventual restoration of ecosystem function. The leaseholder shall develop and implement an abandonment and reclamation plan approved by the BLM. The plan shall describe short-term stability, visual, hydrological, and productivity objectives and steps to be taken to ensure eventual ecosystem restoration to the land's previous hydrological, vegetative, and habitat condition. The BLM may grant exceptions to satisfy stated environmental or public purposes.

H. SUBSISTENCE CONSULTATION FOR PERMITTED ACTIVITIES

H-1 Best Management Practice

Objective: Provide opportunities for participation in planning and decision making to prevent unreasonable conflicts between subsistence uses and other activities.

Requirement/Standard: Lessee/permittee shall consult directly with affected communities using the following guidelines:

a. Before submitting an application to the BLM, the applicant shall consult with directly affected subsistence communities, the North Slope Borough, and the National Petroleum Reserve-Alaska Subsistence Advisory Panel to discuss the siting, timing and methods of their proposed operations to help discover local traditional and scientific knowledge, resulting in measures that minimize impacts to subsistence uses. Through this consultation, the applicant shall make every reasonable effort, including such mechanisms as conflict avoidance agreements and mitigating measures, to ensure that proposed activities will not result in unreasonable interference with subsistence activities. In the event that no agreement is reached between the parties, the authorized officer shall consult with the directly involved parties and determine which activities will occur, including the timeframes.

b. The applicant shall submit documentation of consultation efforts as part of its operations plan. Applicants should submit the proposed plan of operations to the National Petroleum Reserve-Alaska Subsistence Advisory Panel for review and comment. The applicant must allow time for the BLM to conduct formal government-to-government consultation with Native Tribal governments if the proposed action requires it.

c. A plan shall be developed that shows how the activity, in combination with other activities in the area, will be scheduled and located to prevent unreasonable conflicts with subsistence activities. The plan will also describe the methods used to monitor the effects of the activity on subsistence use. The plan shall be submitted to the BLM as part of the plan of operations. The plan should address the following items:

1. A detailed description of the activity(ies) to take place (including the use of aircraft).
2. A description of how the lessee/permittee will minimize and/or deal with any potential impacts identified by the authorized officer during the consultation process.
3. A detailed description of the monitoring effort to take place, including process, procedures, personnel involved and points of contact both at the work site and in the local community.
4. Communication elements to provide information on how the applicant will keep potentially affected individuals and communities up-to-date on the progress of the activities and locations of possible, short-term conflicts (if any) with subsistence activities. Communication methods could include holding community meetings, open house meetings, workshops, newsletters, radio and television announcements, etc.
5. Procedures necessary to facilitate access by subsistence users to conduct their activities.
6. Barge operators requiring a BLM permit are required to demonstrate that barging activities will not have unmitigable adverse impacts on the availability of marine mammals to subsistence hunters.
7. All vessels over 50 ft. in length engaged in operations requiring a BLM permit must have an Automatic Identification System (AIS) transponder system on the vessel.

d. During development, monitoring plans must be established for new permanent facilities, including pipelines, to assess an appropriate range of potential effects on resources and subsistence as determined on a case-by-case basis given the nature and location of the facilities. The scope, intensity, and duration of such plans will be established in consultation with the authorized officer and NPR-A Subsistence Advisory Panel.

e. Permittees that propose barging facilities, equipment, supplies, or other materials to NPR-A in support of oil and gas activities in the NPR-A shall notify, confer, and coordinate with the Alaska Eskimo Whaling Commission, the appropriate local community whaling captains' associations, and the North Slope Borough to minimize impacts from the proposed barging on subsistence whaling activities.

H-2 Best Management Practice

Objective: Prevent unreasonable conflicts between subsistence activities and geophysical (seismic) exploration.

Requirement/Standard: In addition to the consultation process described in Best Management Practice H-1 for permitted activities, before activity to conduct geophysical (seismic) exploration commences, applicants shall notify the local search and rescue organizations of proposed seismic survey locations for that operational season. For the purpose of this standard, a potentially affected cabin/campsite is defined as any camp or campsite used for subsistence purposes and located within the boundary of the area subject to proposed geophysical exploration and/or within 1 mile of actual or planned travel routes used to supply the seismic operations while it is in operation.

a. Because of the large land area covered by typical geophysical operations and the potential to impact a large number of subsistence users during the exploration season, the permittee/operator will notify all potentially affected subsistence-use cabin and campsite users.

b. The official recognized list of subsistence-use cabin and campsite users is the North Slope Borough's most current inventory of cabins and campsites, which have been identified by the subsistence users' names.

c. A copy of the notification letter, a map of the proposed exploration area, and the list of potentially affected users shall also be provided to the office of the appropriate Native Tribal government.

d. The authorized officer will prohibit seismic work within 1 mile of any known subsistence-use cabin or campsite unless an alternate agreement between the cabin/campsite owner/user is reached through the consultation process and presented to the authorized officer. (Regardless of the consultation outcome, the authorized officer will prohibit seismic work within 300 feet of a known subsistence-use cabin or campsite.)

e. The permittee shall notify the appropriate local search and rescue (e.g., Nuiqsut Search and Rescue, Atqasuk Search and Rescue) of their current operational location within the NPR-A on a weekly basis. This notification should include a map indicating the current extent of surface use and occupation, as well as areas previously used/occupied during the course of the operation in progress. The purpose of this notification is to allow hunters up-to-date information regarding where seismic exploration is occurring, and has occurred, so that they can plan their hunting trips and access routes accordingly. Identification of the appropriate search and rescue offices to be contacted can be obtained from the coordinator of the NPR-A Subsistence Advisory Panel in the BLM's Arctic Field Office.

H-3 Best Management Practice

Objective: Minimize impacts to sport hunting and trapping species and to subsistence harvest of those animals.

Requirement/Standard: Hunting and trapping by lessee's/permittee' s employees, agents, and contractors are prohibited when persons are on "work status." Work status is defined as the period during which an individual is under the control and supervision

of an employer. Work status is terminated when the individual's shift ends and he/she returns to a public airport or community (e.g., Fairbanks, Barrow, Nuiqsut, or Deadhorse). Use of lessee/permittee facilities, equipment, or transport for personnel access or aid in hunting and trapping is prohibited.

I. ORIENTATION PROGRAMS ASSOCIATED WITH PERMITTED ACTIVITIES

I-1 Best Management Practice

Objective: Minimize cultural and resource conflicts.

Requirement/Standard: All personnel involved in oil and gas and related activities shall be provided information concerning applicable stipulations, best management practices, standards, and specific types of environmental, social, traditional, and cultural concerns that relate to the region. The lessee/permittee shall ensure that all personnel involved in permitted activities shall attend an orientation program at least once a year. The proposed orientation program shall be submitted to the authorized officer for review and approval and should:

a. provide sufficient detail to notify personnel of applicable stipulations and best management practices as well as inform individuals working on the project of specific types of environmental, social, traditional and cultural concerns that relate to the region.
b. Address the importance of not disturbing archaeological and biological resources and habitats, including endangered species, fisheries, bird colonies, and marine mammals, and provide guidance on how to avoid disturbance.
c. Include guidance on the preparation, production, and distribution of information cards on endangered and/or threatened species.
d. Be designed to increase sensitivity and understanding of personnel to community values, customs, and lifestyles in areas in which personnel will be operating.
e. Include information concerning avoidance of conflicts with subsistence, commercial fishing activities, and pertinent mitigation.
f. Include information for aircraft personnel concerning subsistence activities and areas/seasons that are particularly sensitive to disturbance by low-flying aircraft. Of special concern is aircraft use near traditional subsistence cabins and campsites, flights during spring goose hunting and fall caribou and moose hunting seasons, and flights near North Slope communities.
g. Provide that individual training is transferable from one facility to another except for elements of the training specific to a particular site.
h. Include on-site records of all personnel who attend the program for so long as the site is active, though not to exceed the 5 most recent years of operations. This record shall include the name and dates(s) of attendance of each attendee.
i. Include a module discussing bear interaction plans to minimize conflicts between bears and humans.
j. Provide a copy of 43 CFR 3163 regarding Non-Compliance Assessment and Penalties to on-site personnel.
k. Include training designed to ensure strict compliance with local and corporate drug and alcohol policies. This training should be offered to the North Slope Borough Health Department for review and comment.
l. Include training developed to train employees on how to prevent transmission of communicable diseases, including sexually transmitted diseases, to the local communities. This training should be offered to the North Slope Borough Health Department for review and comment.

J. ENDANGERED SPECIES ACT—SECTION 7 CONSULTATION PROCESS

J. The lease areas may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or to have some other special status. The BLM may require modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activities that will contribute to the need to list such a species or their habitat. The BLM may require modifications to or disapprove a proposed activity that is likely to adversely affect a proposed or listed endangered species, threatened species, or critical habitat. The BLM will not approve any activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 USC § 1531 et seq., including completion of any required procedure for conference or consultation.

K. ADDITIONAL PROTECTIONS THAT APPLY IN SELECT BIOLOGICALLY SENSITIVE AREAS

K-1 Lease Stipulation/Best Management Practice – Rivers

Note: This measure would be applied to relevant new leases. On lands unavailable for leasing in the respective alternatives, K-1 would be a best management practice.

Objective: Minimize the disruption of natural flow patterns and changes to water quality; the disruption of natural functions resulting from the loss or change to vegetative and physical characteristics of floodplain and riparian areas; the loss of spawning, rearing or over-wintering habitat for fish; the loss of cultural and paleontological resources; the loss of raptor habitat; impacts to subsistence cabin and campsites; the disruption of subsistence activities; and impacts to scenic and other resource values.

Requirement/Standard: Permanent oil and gas facilities, including gravel pads, roads, airstrips, and pipelines, are prohibited in the streambed and adjacent to the rivers listed below at the distances identified. (Gravel mines may be located within the active floodplain consistent with Best Management Practice E-8). On a case-by case basis, and in consultation with federal, State, and North Slope Borough regulatory and resource agencies (as appropriate, based on agency legal authority and jurisdictional responsibility), essential pipeline and road crossings to the main channel will be permitted through setback areas. The above setbacks may not be practical within river deltas. In these situations, permanent facilities shall be designed to withstand a 200-

year flood event. In the below list, if no upper limit for the setback is indicated, the setback extends to the head of the stream as identified in the National Hydrography Dataset.

a. **Colville River:** a 2-mile setback from the boundary of NPR-A where the river determines the boundary along the Colville River as determined by cadastral survey to be the highest high watermark on the left (western or northern) bank and from both banks' ordinary high watermark where BLM-manages both sides of the river up through T5S, R30W, U.M. Above that point to its source at the juncture of Thunder and Storm creeks the setback will be 0.5 mile. **Note**: The planning area excludes conveyed Native lands along the lower reaches of the Colville River. Development of road crossings intended to support oil and gas activities shall be consolidated with other similar projects and uses to the maximum extent possible. **Note**: This provision does not apply to intercommunity or other permanent roads constructed with public funds for general transportation purposes, though the BLM would encourage minimal use of the setback area. This preserves the opportunity to plan, design, and construct public transportation systems to meet the economic, transportation, and public health and safety needs of the State of Alaska and/or communities within National Petroleum Reserve-Alaska.

b. **Ikpikpuk River**: a 2-mile setback from of the ordinary high watermark of the Ikpikpuk River extending from the mouth upstream through T7 N, R11W, U.M.; above that the setback would be for 1 mile to the confluence of the Kigalik River and Maybe Creek

c. **Miguakiak River**: a 0.5-mile setback from the bank's ordinary high watermark.

d. **Kikiakrorak and Kogosukruk Rivers**: A 2-mile setback from the top of the bluff (or ordinary high watermark if there is no bluff) on the Kikiakrorak River downstream from T2N., R4W, U.M. and on the Kogosukruk River (including Branch of Kogosukruk River, Henry Creek, and two unnamed tributaries off the southern bank) downstream from T2N, R3W, U.M. The setback from these streams in the named townships and further upstream as applicable will be a ½-mile from the top of the bluff or bank if there is no bluff.

e. **Fish Creek**: a 3-mile setback from the bank's highest high watermark of the creek downstream from the eastern edge of section 31, T11N, R1E., U.M. and a 0.5-mile setback from the bank's highest high watermark farther upstream.

f. **Judy Creek**: a 0.5-mile setback from the banks' ordinary high watermark.

g. **Ublutuoch (Tiŋmiaqsiugvik) River:** a 0.5-mile setback from the ordinary high water mark.

h. **Alaktak River**: a 1 mile setback from the ordinary high water mark.

i. **Chipp River**: a 1 mile setback from the ordinary high water mark.

j. **Oumalik River**: a 0.5-mile setback from the Oumalik River ordinary high water mark from the mouth upstream to section 5, T8N, R14W, U.M., and a 0.5-mile setback in and above section 5, T8N, R14W, U.M.

k. **Titaluk River**: a 2-mile setback from the ordinary high water mark from its confluence with the Ikpikpuk River upstream through T7N, R12W, U.M.; above that point the setback would be ½-mile from the ordinary high water mark.

l. **Kigalik River**: a 0.5-mile setback from the ordinary high water mark.

m. **Maybe Creek**: a 0.5-mile setback from the ordinary high water mark.

Topagoruk River: a 1 mile setback from the ordinary high water mark.

o. **Ishuktak Creek**: a 0.5-mile setback from the ordinary high water mark.

p. **Meade River**: a 1 mile setback from the ordinary high water mark on BLM-managed lands.

Usuktuk River: a 1 mile setback from the ordinary high water mark on BLM-managed lands.

r. **Pikroka Creek**: a 0.5-mile setback from the ordinary high water mark.

s. **Nigisaktuvik River**: a 1 mile setback from the Nigisakturik River ordinary high water mark upstream from the confluence with the Meade River to section 1, T11N, R25W, U.M. and a 0.5-mile setback further upstream.

t. **Inaru River**: a 1 mile setback from the ordinary high water mark.

u. **Kucheak Creek**: a 0.5-mile setback from the ordinary high water mark.

v. **Avalik River**: a 1 mile setback from the ordinary high water mark.

w. **Niklavik Creek**: a 0.5-mile setback from the ordinary high water mar*k*.

x. **Kugrua River**: a 0.5-mile setback from the ordinary high water mark.

y. **Kungok River**: a 1 mile setback from the ordinary high water mark on BLM-managed lands.

z. **Kolipsun Creek**: a 0.5-mile setback from the ordinary high water mark upstream through T13N, R28W, U.M.

aa. **Maguriak Creek**: a 0.5-mile setback from the ordinary high water mark upstream through T12N, R29W, U.M.

ab. **Mikigealiak River**: a 0.5-mile setback from the ordinary high water mark upstream through T12N, R30W, U.M.

ac. **Kuk River**: a 1 mile setback from the ordinary high water mark on BLM-managed lands.

ad. **Ketik River**: a 1 mile setback from the ordinary high water mark.

ae. **Kaolak River**: a 1 mile setback from the ordinary high water mark.

af. **Ivisaruk River**: a 1 mile setback from the ordinary high water mark.

ag. **Nokotlek River**: a 0.5-mile setback from the ordinary high water mark.

ah. **Ongorakvik River**: a 0.5-mile setback from the ordinary high water mark.

ai. **Tunalik River**: a 0.5-mile setback from the ordinary high water mark.

aj. **Avak River**: a 0.5-mile setback from the ordinary high water mark within the NPR-A.

ak. **Nigu River**: a 0.5-mile setback from the ordinary high water mark from the confluence with the Etivluk River upstream to the boundary of NPR-A

al. **Etivluk River**: a 0.5-mile setback from the ordinary high water mark.

am. **Ipnavik River**: a 0.5-mile setback from the ordinary high water mark.

an. **Kuna River**: a 0.5-mile setback from the ordinary high water mark.

ao. **Kiligwa River**: a 0.5-mile setback from the ordinary high water mark.
ap. **Nuka River**: a 0.5-mile setback from the ordinary high water mark.
aq. **Driftwood Creek**: a 0.5-mile setback from the ordinary high water mark.
ar. **Utukok River**: a 1 mile setback from the ordinary high water mark within the NPR-A.
as. **Awuna River**: a 0.5-mile setback from the ordinary high water mark.
at. **Carbon Creek**: a 0.5-mile setback from the ordinary high water mark.
au. **Kokolik River**: a 1 mile setback from the ordinary high water mark within the NPR-A.
av. **Keolok Creek:** a 0.5-mile setback from the ordinary high water mark.

K-2 Lease Stipulation/Best Management Practice – Deep Water Lakes
Note: This measure would be applied to relevant new leases. On lands unavailable for leasing, K-2 would be a best management practice.
Objective: Minimize the disruption of natural flow patterns and changes to water quality; the disruption of natural functions resulting from the loss or change to vegetative and physical characteristics of deep water lakes; the loss of spawning, rearing or over wintering habitat for fish; the loss of cultural and paleontological resources; impacts to subsistence cabin and campsites; and the disruption of subsistence activities.
Requirement/Standard: Generally, permanent oil and gas facilities, including gravel pads, roads, airstrips, and pipelines, are prohibited on the lake or lakebed and within 0.25 mile of the ordinary high watermark of any deep lake as determined to be in lake zone III (i.e., depth greater than 13 feet [4 meters]; Mellor 1985). On a case-by-case basis in consultation with federal, State and North Slope Borough regulatory and resource agencies (as appropriate based on agency legal authority and jurisdictional responsibility), essential pipeline(s), road crossings, and other permanent facilities may be considered through the permitting process in these areas where the lessee can demonstrate on a site-specific basis that impacts will be minimal.

K-3a Stipulation – Teshekpuk Lake Shoreline
No stipulation/not applicable.

K-3b Lease Stipulation/Best Management Practice – Kogru River, Dease Inlet, Admiralty Bay, Elson Lagoon, Peard Bay, Wainwright Inlet/Kuk River, and Kasegaluk Lagoon, and their associated Islands
Note: This measure would be applied to relevant new leases. On lands unavailable for leasing, K-3b would be a best management practice.
Objective: Protect fish and wildlife habitat (including, but not limited to, that for waterfowl and shorebirds, caribou insect-relief, and marine mammals), preserve air and water quality, and minimize impacts to subsistence activities and historic travel routes on the major coastal waterbodies.
Requirement/Standard (Exploration): Oil and gas exploration operations (e.g., drilling, seismic exploration, and testing) are not allowed on the major coastal waterbodies and coastal islands between May 15 and October 15 of each season. Requests for approval of any activities must be submitted in advance and must be accompanied by evidence and documentation that demonstrates to the satisfaction of the authorized office that the actions or activities meet all of the following criteria:
a. Exploration activities will not unreasonably conflict with subsistence uses or significantly impact seasonally concentrated fish and wildlife resources.
b. There is adequate spill response capability to effectively respond during periods of broken ice and/or open water, or the availability of alternative methods to prevent well blowouts during periods when adequate response capability cannot be demonstrated. Such alternative methods may include improvements in blowout prevention technology, equipment and/or changes in operational procedures and "top-setting" of hydrocarbon-bearing zones.
c. Reasonable efforts will be made to avoid or minimize impacts related to oil spill response activities, including vessel, aircraft, and pedestrian traffic will be conducted to minimize additional impacts or further compounding of "direct spill" related impacts on area resources and subsistence uses.
d. The location of exploration and related activities shall be sited so as to not pose a hazard to navigation by the public using high-use subsistence-related travel routes into and through the major coastal waterbodies, as identified by the North Slope Borough, recognizing that marine and nearshore travel routes change over time, subject to shifting environmental conditions.
e. Before conducting open water activities, the lessee shall consult with the Alaska Eskimo Whaling Commission and the North Slope Borough to minimize impacts to the fall and spring subsistence whaling activities of the communities of the North Slope.
Requirement/Standard (Development): With the exception of linear features such as pipelines, no permanent oil and gas facilities are permitted on or under the water within 0.75 mile seaward of the shoreline (as measured from mean high tide) of the major coastal waterbodies or the natural coastal islands (to the extent that the seaward subsurface is within NPR-A). Elsewhere, permanent facilities within the major coastal waterbodies will only be permitted on or under the water if they can meet all the following criteria:
f. Design and construction of facilities shall minimize impacts to subsistence uses, travel corridors, seasonally concentrated fish and wildlife resources.
g. Daily operational activities, including use of support vehicles, watercraft, and aircraft traffic, alone or in combination with other past, present, and reasonably foreseeable activities, shall be conducted to minimize impacts to subsistence uses, travel corridors, and seasonally concentrated fish and wildlife resources.

h. The location of oil and gas facilities, including artificial islands, platforms, associated pipelines, ice or other roads, bridges or causeways, shall be sited and constructed so as to not pose a hazard to navigation by the public using traditional high-use subsistence-related travel routes into and through the major coastal waterbodies as identified by the North Slope Borough.

i. Demonstrated year-round oil spill response capability, including the capability of adequate response during periods of broken ice or open water, or the availability of alternative methods to prevent well blowouts during periods when adequate response capability cannot be demonstrated. Such alternative methods may include seasonal drilling restrictions, improvements in blowout prevention technology, equipment and/or changes in operational procedures, and "top-setting" of hydrocarbon-bearing zones.

j. Reasonable efforts will be made to avoid or minimize impacts related to oil spill response activities, including vessel, aircraft, and pedestrian traffic that add to impacts or further compound "direct spill" related impacts on area resources and subsistence uses.

k. Before conducting open water activities, the lessee shall consult with the Alaska Eskimo Whaling Commission and the North Slope Borough to minimize impacts to the fall and spring subsistence whaling activities of the communities of the North Slope.

K-4a Lease Stipulation/Best Management Practice – Goose Molting Area

Note: This measure would be applied to relevant new leases. On lands unavailable for leasing, K-4a would be a best management practice.

Objective: Minimize disturbance to molting geese and loss of goose molting habitat in and around lakes in the Goose Molting Area.

Requirement/Standard (General): Within the Goose Molting Area no permanent oil and gas facilities, except for pipelines, will be allowed within 1 mile of the shoreline of goose molting lakes. (See Map 2-3K for the current location of these 1-mile setback areas.) No waiver, exception, or modification will be considered. Prior to the permitting of a pipeline in the Goose Molting Area, a workshop will be convened to determine the best corridor for pipeline construction in efforts to minimize impacts to wildlife and subsistence resources. The workshop participants will include but will not be limited to Federal, state, and North Slope Borough representatives. In addition, only "in field" roads will be authorized as part of oil and gas field development.

Requirement/Standard (Exploration): In goose molting habitat area exploratory drilling shall be limited to temporary facilities such as ice pads, ice roads, and ice airstrips, unless the lessee demonstrates that construction of permanent facilities (outside the identified Goose Molting Restricted Surface Occupancy Areas) such as gravel airstrips, storage pads, and connecting roads is environmentally preferable. (Also see *Stipulation K-11* regarding allowable surface disturbance). In addition, the following standards will be followed for permitted activities:

a. From June 15 through August 20 exploratory drilling and associated activities are prohibited. The intent of this rule is to restrict exploration drilling during the period when geese are present.

b. Water extraction from any lake used by molting geese shall not alter hydrological conditions that could adversely affect identified goose-feeding habitat along lakeshore margins. Considerations will be given to seasonal use by operators (generally in winter) and geese (generally in summer), as well as recharge to lakes from the spring snowmelt.

c. Oil and gas exploration activities will avoid alteration (e.g., damage or disturbance of soils, vegetation, or surface hydrology) of critical goose-feeding habitat types along lakeshore margins (grass/sedge/moss), as identified by the authorized officer in consultation with the USFWS.

Requirement/Standard (Development): In the Goose Molting Area, the following standards will be followed for permitted activities:

a. Within the Goose Molting Area from June 15 through August 20, all off-pad activities and major construction activities using heavy equipment (e.g., sand/gravel extraction and transport, pipeline and pad construction, but not drilling from existing production pads) shall be suspended (see also Lease Stipulation K-5-d), unless approved by the authorized officer in consultation with the appropriate federal, State, and North Slope Borough regulatory and resource agencies. The intent of this requirement is to restrict activities that will disturb molting geese during the period when geese are present.

b. Water extraction from any lakes used by molting geese shall not alter hydrological conditions that could adversely affect identified goose-feeding habitat along lakeshore margins. Considerations will be given to seasonal use by operators (generally in winter) and geese (generally in summer), as well as recharge to lakes from the spring snowmelt.

c. Oil and gas activities will avoid altering (i.e., damage or disturbance of soils, vegetation, or surface hydrology) critical goose-feeding habitat types along lakeshore margins (grass/sedge/moss) and salt marsh habitats.

d. Permanent oil and gas facilities (including gravel roads, pads, and airstrips, but excluding pipelines) and material sites will be sited outside the identified buffers and restricted surface occupancy areas. Additional limits on development footprint apply; (also see Lease Stipulation K-11.)

e. Between June 15 and August, 20 within the Goose Molting Area, oil and gas facilities shall incorporate features (e.g., temporary fences, siting/orientation) that screen/shield human activity from view of any Goose Molting Area lake, as identified by the authorized officer in consultation with appropriate federal, State, and North Slope Borough regulatory and resource agencies.

f. Strategies to minimize ground traffic shall be implemented from June 15 through August 20. These strategies may include limiting trips, use of convoys, different vehicle types, etc. to the extent practicable. The lessee shall submit with the development proposal a vehicle use plan that considers these and any other mitigation. The vehicle use plan shall also include a vehicle-use monitoring plan. Adjustments will be required by the authorized officer if resulting disturbance is determined to be unacceptable.

g. Within the Goose Molting Area aircraft use (including fixed wing and helicopter) shall be restricted from June 15 through August 20 unless doing so endangers human life or violates safe flying practices. Restrictions may include: (1) limiting flights to two round-trips/week, and (2) limiting flights to corridors established by the BLM after discussions with appropriate federal, State, and North Slope Borough regulatory and resource agencies. The lessee shall submit with the development proposal an aircraft use plan that considers these and other mitigation. The aircraft use plan shall also include an aircraft monitoring plan. Adjustments, including perhaps suspension of all aircraft use, will be required by the authorized officer if resulting disturbance is determined to be unacceptable. **Note:** This site-specific lease stipulation is not intended to restrict flights necessary to survey wildlife to gain information necessary to meet the stated objective of the stipulations and best management practices. However, flights necessary to gain this information will be restricted to the minimum necessary to collect such data.

h. Any permit for development issued under this IAP/EIS will include a requirement for the lessee to conduct monitoring studies necessary to adequately determine consequences of development and any need for change to mitigations. Monitoring studies will be site- and development-specific within a set of over-arching guidelines developed by the BLM after conferring with appropriate federal, State, North Slope Borough agencies. The study(ies) will include the construction period and will continue for a minimum of 3 years after construction has been completed and production has begun. The monitoring studies will be a continuation of evaluating the effectiveness of Stipulation K-4a's requirements in meeting the objective of K-4 and determine if any changes to the lease stipulation or any project specific mitigation(s) are necessary. If changes are determined to be necessary, the BLM, with the lessee and/or their representative, will conduct an assessment of the feasibility of altering development operation (e.g., reduced human activity, visibility barriers, noise abatement). Any changes determined necessary will be implemented prior to authorization of any new construction.

K-4b Best Management Practice – Brant Survey Area

Objective: Minimize the loss or alteration of habitat for, or disturbance of, nesting and brood rearing brant in the Brant Survey Area.

Requirement/Standard:

a. Aerial surveys for brant nesting colonies and brood-rearing areas shall be conducted for a minimum of 2 years before authorization of construction of permanent facilities. At a minimum, the survey area shall include the proposed development site(s) (i.e., the footprint) and the surrounding 0.5-mile area. These surveys shall be conducted following accepted BLM protocol.

b. Development may be prohibited or activities curtailed within 0.5 mile of all identified brant nesting colonies and brood-rearing areas identified during the 2-year survey.

(Same text as in Northwest NPR-A 2004 Record of Decision)

K-5a Lease Stipulation/Best Management Practice –Teshekpuk Lake Caribou Habitat Area

Note: None of the area is available for oil and gas leasing or exploratory drilling. Therefore, K-5 will apply as a best management practice. Portions of K-5 that apply to permanent infrastructure are only relevant to the portion of the Teshekpuk Lake Caribou Habitat Area available to application for such infrastructure, i.e., to those areas outside of the approximately 1.1 million acres near the lake where no new non-subsistence permanent infrastructure will be permitted.

Objective: Minimize disturbance and hindrance of caribou, or alteration of caribou movements through portions the Teshekpuk Lake Caribou Habitat Area that are essential for all season use, including calving and rearing, insect-relief, and migration.

Requirement/Standard: In the Teshekpuk Lake Caribou Habitat Area the following standards will be applied to permitted activities:

a. Before authorization of construction of permanent facilities (limited as they may be by restricted surface occupancy areas established in other lease stipulations), the lessee shall design and implement and report a study of caribou movement unless an acceptable study(s) specific to the Teshekpuk Caribou Herd has been completed within the last 10 years. The study shall include a minimum of four years of current data on the Teshekpuk Caribou Herd movements and the study design shall be approved by the authorized officer in consultation with the appropriate federal, State, and North Slope Borough wildlife and resource agencies. The study should provide information necessary to determine facility (including pipeline) design and location. Lessees may submit individual study proposals or they may combine with other lessees in the area to do a single, joint study for the entire Teshekpuk Lake Caribou Habitat Area. Study data may be gathered concurrently with other activities as approved by the authorized officer and in consultation with the appropriate federal, State, and North Slope Borough wildlife and resource agencies. A final report of the study results will be prepared and submitted. Prior to the permitting of a pipeline in the Teshekpuk Lake Caribou Habitat Area, a workshop will be convened to identify the best corridor for pipeline construction in efforts to minimize impacts to wildlife (specifically the Teshekpuk Caribou Herd) and subsistence resources. The workshop participants will include but will not be limited to federal, State, and North Slope Borough representatives. All of these modifications will increase protection for caribou and other wildlife that utilize the Teshekpuk Lake Caribou Habitat Area during all seasons.

b. Within the Teshekpuk Lake Caribou Habitat Area, lessees shall orient linear corridors when laying out oil and gas field developments to address migration and corralling effects and to avoid loops of road and/or pipeline that connect facilities.

c. Ramps over pipelines, buried pipelines, or pipelines buried under the road may be required by the authorized officer, after consultation with appropriate federal, State, and North Slope Borough regulatory and resource agencies, in the Teshekpuk Lake Caribou Habitat Area where pipelines potentially impede caribou movement.

d. Major construction activities using heavy equipment (e.g., sand/gravel extraction and transport, pipeline and pad construction, but not drilling from existing production pads) shall be suspended within Teshekpuk Lake Caribou Habitat Area from May 20 through August 20, unless approved by the authorized officer in consultation with the appropriate federal, State, and North Slope Borough regulatory and resource agencies. The intent of this requirement is to restrict activities that will disturb caribou during calving and insect-relief periods. If caribou arrive on the calving grounds prior to May 20, major construction activities will be suspended. The lessee shall submit with the development proposal a "stop work" plan that considers this and any other mitigation related to caribou early arrival. The intent of this latter requirement is to provide flexibility to adapt to changing climate conditions that may occur during the life of fields in the region.

e. The following ground and air traffic restrictions shall apply in the areas and time periods indicated. Ground traffic restrictions apply to permanent oil and gas-related roads:

1. Within the Teshekpuk Lake Caribou Habitat Area, from May 20 through August 20, traffic speed shall not exceed 15 miles per hour when caribou are within 0.5 mile of the road. Additional strategies may include limiting trips, using convoys, using different vehicle types, etc., to the extent practicable. The lessee shall submit with the development proposal a vehicle use plan that considers these and any other mitigation. The vehicle use plan shall also include a vehicle-use monitoring plan. Adjustments will be required by the authorized officer if resulting disturbance is determined to be unacceptable.
2. The lessee or a contractor shall observe caribou movement from May 20 through August 20, or earlier if caribou are present prior to May 20. Based on these observations, traffic will be stopped:
   a. temporarily to allow a crossing by 10 or more caribou. Sections of road will be evacuated whenever an attempted crossing by a large number of caribou appears to be imminent. The lessee shall submit with the development proposal a vehicle use plan that considers these and any other mitigation.
   b. by direction of the authorized officer throughout a defined area for up to four weeks to prevent displacement of calving caribou.

   The vehicle use plan shall also include a vehicle-use monitoring plan. Adjustments will be required by the authorized officer if resulting disturbance is determined to be unacceptable.
3. Major equipment, materials, and supplies to be used at oil and gas work sites in the Teshekpuk Lake Caribou Habitat Area shall be stockpiled prior to or after the period of May 20 through August 20 to minimize road traffic during that period.
4. Within the Teshekpuk Lake Caribou Habitat Area aircraft use (including fixed wing and helicopter) shall be restricted from May 20 through August 20 unless doing so endangers human life or violates safe flying practices. Authorized users of the NPR-A may be restricted from using aircraft larger than a Twin Otter, and limited to an average of one fixed-wing aircraft takeoff and landing per day per airstrip, except for emergency purposes. Restrictions may include prohibiting the use of aircraft larger than a Twin Otter by authorized users of the NPR-A, including oil and gas lessees, from May 20 through August 20 within the Teshekpuk Lake Caribou Habitat Area, except for emergency purposes. The lessee shall submit with the development proposal an aircraft use plan that considers these and other mitigation. The aircraft use plan shall also include an aircraft monitoring plan. Adjustments, including perhaps suspension of all aircraft use, will be required by the authorized officer if resulting disturbance is determined to be unacceptable. This lease stipulation is not intended to restrict flights necessary to survey wildlife to gain information necessary to meet the stated objective of the stipulations and best management practices. However, flights necessary to gain this information will be restricted to the minimum necessary to collect such data.
5. Aircraft shall maintain a minimum height of 1,000 feet above ground level (except for takeoffs and landings) over caribou winter ranges from December 1 through May 1, and 2,000 feet above ground level over the Teshekpuk Lake Caribou Habitat Area from May 20 through August 20, unless doing so endangers human life or violates safe flying practices. Caribou wintering ranges will be defined annually by the authorized officer in consultation with the Alaska Department of Fish and Game. This lease stipulation is not intended to restrict flights necessary to survey wildlife to gain information necessary to meet the stated objective of the stipulations and best management practices. However, flights necessary to gain this information will be restricted to the minimum necessary to collect such data.

K-5b Best Management Practice – Caribou Study Area

No best management practice.

K-6 Lease Stipulation – Coastal Area

Objective: Protect coastal waters and their value as fish and wildlife habitat (including, but not limited to, that for waterfowl, shorebirds, and marine mammals), minimize hindrance or alteration of caribou movement within caribou coastal insect-relief areas; protect the summer and winter shoreline habitat for polar bears, and the summer shoreline habitat for walrus and seals; prevent loss of important bird habitat and alteration or disturbance of shoreline marshes; and prevent impacts to subsistence resources activities.

Requirement/Standard:

a. Exploratory well drill pads, production well drill pads, or a central processing facility for oil or gas would not be allowed in coastal waters or on islands between the northern boundary of the Reserve and the mainland, or in inland areas within one mile of the coast. (Note: This would include the entirety the Kasegaluk Lagoon and Peard Bay Special Areas.) Other facilities necessary for oil and gas production within NPR-A that necessarily must be within this area (e.g., barge landing, seawater treatment plant, or spill response staging and storage areas) would not be precluded. Nor would this stipulation preclude infrastructure associated with offshore oil and gas exploration and production or construction, renovation, or replacement of

facilities on existing gravel sites. Lessees/permittees shall consider the practicality of locating facilities that necessarily must be within this area at previously occupied sites such as various Husky/USGS drill sites and Distant Early Warning-Line sites. All lessees/permittees involved in activities in the immediate area must coordinate use of these new or existing sites with all other prospective users. Before conducting open water activities, the lessee shall consult with the Alaska Eskimo Whaling Commission, the North Slope Borough, and local whaling captains associations to minimize impacts to the fall and spring subsistence whaling activities of the communities of the North Slope. In a case in which the BLM authorizes a permanent oil and gas facility within the Coastal Area, the lessee/permittee shall develop and implement a monitoring plan to assess the effects of the facility and its use on coastal habitat and use.

b. Marine vessels used as part of a BLM-authorized activity shall maintain a 1-mile buffer from the shore when transiting past an aggregation of seals (primarily spotted seals) using a terrestrial haulout unless doing so would endanger human life or violate safe boating practices. Marine vessels shall not conduct ballast transfers or discharge any matter into the marine environment within 3 miles of the coast except when necessary for the safe operation of the vessel.

c. Marine vessels used as part of a BLM-authorized activity shall maintain a 0.5-mile buffer from shore when transiting past an aggregation of walrus using a terrestrial haulout.

K-7 Lease Stipulation – Colville River Special Area

Note: This measure would be applied to relevant new leases. On lands unavailable for leasing in the respective alternative, K-7 would be a best management practice

Objective: Prevent or minimize loss of raptor foraging habitat (also see Lease Stipulation K-1; Rivers Area).

Requirement/Standard for Facilities: If necessary to construct permanent facilities within the Colville River Special Area, all reasonable and practicable efforts shall be made to locate permanent facilities as far from raptor nests as feasible. Additionally, within 15 miles of raptor nest sites, significant alteration of high quality foraging habitat shall be prohibited unless the lessee can demonstrate on a site-specific basis that impacts would be minimal. Of particular concern are ponds, lakes, wetlands, and riparian habitats. **Note:** On a case-by-case basis, and in consultation with appropriate federal and State regulatory and resource agencies, essential pipeline and road crossings will be permitted through the Colville River Special Area where no other feasible or prudent options are available.

K-8a Lease Stipulation – Pik Dunes

Note: This measure would be applied to relevant new leases. On lands unavailable for leasing in the respective alternative, K-8a would be a best management practice.

Objective: Retain unique qualities of the Pik Dunes, including geologic and scenic uniqueness, insect-relief habitat for caribou, and habitat for several uncommon plant species.

Requirement/Standard: Surface structures, except approximately perpendicular pipeline crossings and ice pads, are prohibited within the Pik Dunes.

K-8b Best Management Practice – Kasegaluk Lagoon Special Area

This measure would be applied to relevant new leases. On lands unavailable for leasing in the respective alternative, K-8b would be a best management practice

Objective: Protect the habitat of the fish, waterfowl, and terrestrial and marine wildlife resources of Kasegaluk Lagoon, and protect subsistence uses and public access to and through Kasegaluk Lagoon for current and future generations of North Slope residents.

Requirement/Standard: No permanent oil and gas surface facilities are permitted in the Kasegaluk Lagoon and an area one mile inland from the lagoon.

K-9 Lease Stipulation/Best Management Practice – Teshekpuk Lake Caribou Movement Corridors

Note: None of the area is available for oil and gas leasing or exploratory drilling. Therefore, K-9 will apply as a best management practice. All of the former movement corridor northwest of Teshekpuk Lake and all but the eastern-most part of the other corridor that lies north of the Kogru River are within an area prohibiting new non-subsistence infrastructure. Therefore, this best management practice only applies to the lands in the former corridor north of the Kogru River in Ts. 14-15 N., R. 2 W., U.M.

Objective: Minimize disturbance and hindrance of caribou, or alteration of caribou movements (that are essential for all season use, including calving and rearing, insect-relief, and migration) in the area extending from the eastern shore of Teshekpuk Lake eastward to the Kogru River and the area between Teshekpuk Lake and an unnamed lake in T16−17 N, R8 W, U.M.

Requirement/Standard: Within the Teshekpuk Lake Caribou Movement Corridor, no permanent oil and gas facilities, except for pipelines or other infrastructure associated with offshore oil and gas exploration and production, will be allowed. Prior to the permitting of permanent oil and gas infrastructure in the Caribou Movement Corridors, a workshop will be convened to identify the best corridor for pipeline construction in efforts to minimize impacts to wildlife and subsistence resources. The workshop participants will include but will not be limited to federal, State, and North Slope Borough representatives.

K-10 Lease Stipulation/Best Management Practice – Teshekpuk Lake Southern Caribou Calving Area

Note: This measure would be applied to relevant new leases. On lands unavailable for leasing in the respective alternative, K-10 would be a best management practice. Would generally prohibit non-subsistence permanent infrastructure in all, or nearly all, of this area.
Objective: Minimize disturbance and hindrance of caribou, or alteration of caribou movements (that are essential for all season use, including calving and post calving, and insect-relief) in the area south/southeast of Teshekpuk Lake.
Requirement/Standard: Within the Southern Caribou Calving Area, no permanent oil and gas facilities, except pipelines or other infrastructure associated with offshore oil and gas exploration and production, will be allowed. Prior to the permitting of permanent oil and gas infrastructure in the Southern Caribou Calving Area, a workshop will be convened to identify the best corridor for pipeline construction in efforts to minimize impacts to wildlife and subsistence resources. The workshop participants will include but will not be limited to federal, State, and North Slope Borough representatives.
Note: In addition to the general stipulations and best management practices, site-specific *Stipulations K-4, K-5, K-6, and K-11* would also apply.

K-11 Lease Stipulation/Best Management Practice
No lease stipulation/best management practice. Not applicable.

K-12 Lease Stipulation/Best Management Practice – Western Arctic Herd Habitat Area
Note: This measure would be applied to relevant new leases. On lands unavailable for leasing in the respective alternative, K-12 would be a best management practice. This stipulation applies to the configuration of the Utukok River Uplands Special Area.
Objective: Minimize disturbance and hindrance of caribou, or alteration of caribou movements through the Utukok River Uplands Special Area that are essential for all season use, including calving and rearing, insect-relief, and migration.
Requirement/Standard: In the Utukok River Uplands Special Area the following standards will be applied to permitted activities:

a. Before authorization of construction of permanent facilities, the lessee shall design and implement and report a study of caribou movement unless an acceptable study(s) specific to the Western Arctic Herd has been completed within the last 10 years. The study shall include a minimum of four years of current data on the Western Arctic Herd's movements and the study design shall be approved by the authorized officer in consultation with the appropriate federal, State, and North Slope Borough wildlife and resource agencies and the Western Arctic Caribou Herd Working Group. The study should provide information necessary to determine facility (including pipeline) design and location. Lessees may submit individual study proposals or they may combine with other lessees in the area to do a single, joint study for the entire Utukok River Uplands Special Area. Study data may be gathered concurrently with other activities as approved by the authorized officer and in consultation with the appropriate federal, State, and North Slope Borough wildlife and resource agencies. A final report of the study results will be prepared and submitted. Prior to the permitting of a pipeline in the Utukok River Uplands Special Area, a workshop will be convened to identify the best corridor for pipeline construction in efforts to minimize impacts to wildlife (specifically the Western Arctic Herd) and subsistence resources. The workshop participants will include but will not be limited to federal, State, and North Slope Borough representatives. All of these modifications will increase protection for caribou and other wildlife that utilize the Utukok River Uplands Special Area during all seasons.
b. Within the Utukok River Uplands Special Area, lessees shall orient linear corridors when laying out oil and gas field developments to address migration and corralling effects and to avoid loops of road and/or pipeline that connect facilities.
c. Ramps over pipelines, buried pipelines, or pipelines buried under the road may be required by the authorized officer, after consultation with appropriate federal, State, and North Slope Borough regulatory and resource agencies, in the Utukok River Uplands Special Area where pipelines potentially impede caribou movement.
d. Major construction activities using heavy equipment (e.g., sand/gravel extraction and transport, pipeline and pad construction, but not drilling from existing production pads) shall be suspended within Utukok River Uplands Special Area from May 20 through August 20, unless approved by the authorized officer in consultation with the appropriate federal, State, and North Slope Borough regulatory and resource agencies. The intent of this requirement is to restrict activities that will disturb caribou during calving and insect-relief periods. If caribou arrive on the calving grounds prior to May 20, major construction activities will be suspended. The lessee shall submit with the development proposal a "stop work" plan that considers this and any other mitigation related to caribou early arrival. The intent of this latter requirement is to provide flexibility to adapt to changing climate conditions that may occur during the life of fields in the region.
e. The following ground and air traffic restrictions shall apply to permanent oil and gas-related roads in the areas and time periods indicated:
    1. Within the Utukok River Uplands Special Area, from May 20 through August 20, traffic speed shall not exceed 15 miles per hour when caribou are within 0.5 mile of the road. Additional strategies may include limiting trips, using convoys, using different vehicle types, etc., to the extent practicable. The lessee shall submit with the development proposal a vehicle use plan that considers these and any other mitigation. The vehicle use plan shall also include a vehicle-use monitoring plan. Adjustments will be required by the authorized officer if resulting disturbance is determined to be unacceptable.
    2. The lessee or a contractor shall observe caribou movement from May 20 through August 20, or earlier if caribou are present prior to May 20. Based on these observations, traffic will be stopped:
        a. Temporarily to allow a crossing by 10 or more caribou. Sections of road will be evacuated whenever an attempted crossing by a large number of caribou appears to be imminent. The lessee shall submit with the development proposal a vehicle use plan that considers these and any other mitigation.

b. By direction of the authorized officer throughout a defined area for up to four weeks to prevent displacement of calving caribou.

The vehicle use plan shall also include a vehicle-use monitoring plan. Adjustments will be required by the authorized officer if resulting disturbance is determined to be unacceptable.

3. Major equipment, materials, and supplies to be used at oil and gas work sites in the Utukok River Uplands Special Area shall be stockpiled prior to or after the period of May 20 through August 20 to minimize road traffic during that period.
4. Within the Utukok River Uplands Special Area aircraft use (including fixed wing and helicopter) shall be restricted from May 20 through August 20 unless doing so endangers human life or violates safe flying practices. Authorized users of the NPR-A may be restricted from using aircraft larger than a Twin Otter, and limited to an average of one fixed-wing aircraft takeoff and landing per day per airstrip, except for emergency purposes. Restrictions may include prohibiting the use of aircraft larger than a Twin Otter by authorized users of the NPR-A, including oil and gas lessees, from May 20 through August 20 within the Utukok River Uplands Special Area, except for emergency purposes. The lessee shall submit with the development proposal an aircraft use plan that considers these and other mitigation. The aircraft use plan shall also include an aircraft monitoring plan. Adjustments, including perhaps suspension of all aircraft use, will be required by the authorized officer if resulting disturbance is determined to be unacceptable. This lease stipulation is not intended to restrict flights necessary to survey wildlife to gain information necessary to meet the stated objective of the stipulations and best management practices. However, flights necessary to gain this information will be restricted to the minimum necessary to collect such data.

5. Aircraft shall maintain a minimum height of 1,000 feet above ground level (except for takeoffs and landings) over caribou winter ranges from December 1 through May 1, and 2,000 feet above ground level over the Utukok River Uplands Special Area from May 20 through August 20, unless doing so endangers human life or violates safe flying practices. Caribou wintering ranges will be defined annually by the authorized officer in consultation with the Alaska Department of Fish and Game. This lease stipulation is not intended to restrict flights necessary to survey wildlife to gain information necessary to meet the stated objective of the stipulations and best management practices. However, flights necessary to gain this information will be restricted to the minimum necessary to collect such data.

L. SUMMER VEHICLE TUNDRA ACCESS

L-1 Best Management Practice

Objective: Protect stream banks and water quality; minimize compaction and displacement of soils; minimize the breakage, abrasion, compaction, or displacement of vegetation; protect cultural and paleontological resources; maintain populations of, and adequate habitat for birds, fish, and caribou and other terrestrial mammals; and minimize impacts to subsistence activities.

Requirement/Standard: On a case-by-case basis, BLM may permit low-ground-pressure vehicles to travel off of gravel pads and roads during times other than those identified in Best management Practice C-2a. Permission for such use would only be granted after an applicant has:

a. Submitted studies satisfactory to the authorized officer of the impacts on soils and vegetation of the specific low-ground-pressure vehicles to be used. These studies should reflect use of such vehicles under conditions similar to those of the route proposed for use and should demonstrate that the proposed use would have no more than minimal impacts to soils and vegetation.
b. Submitted surveys satisfactory to the authorized officer of subsistence uses of the area as well as of the soils, vegetation, hydrology, wildlife and fish (and their habitats), paleontological and archaeological resources, and other resources as required by the authorized officer.
c. Designed and/or modified the use proposal to minimize impacts to the authorized officer's satisfaction. Design steps to achieve the objectives and based upon the studies and surveys may include, but not be limited to, timing restrictions (generally it is considered inadvisable to conduct tundra travel prior to August 1 to protect ground-nesting birds), shifting of work to winter, rerouting, and not proceeding when certain wildlife are present or subsistence activities are occurring. At the discretion of the authorized officer, the plan for summer tundra vehicle access may be included as part of the spill prevention and response contingency plan required by 40 CFR 112 (Oil Pollution Act) and Required Operating Procedure A-4.

M. GENERAL WILDLIFE AND HABITAT PROTECTION

M-1 Best Management Practice

Objective: Minimize disturbance and hindrance of wildlife, or alteration of wildlife movements through the NPR-A.

Requirement/Standard: Chasing wildlife with ground vehicles is prohibited. Particular attention will be given to avoid disturbing caribou.

M-2 Best Management Practice

Objective: Prevent the introduction, or spread, of non-native, invasive plant species in the NPR-A.

Requirement/Standard: Certify that all equipment and vehicles (intended for use either off or on roads) are weed-free prior to transporting them into the NPR-A. Monitor annually along roads for non-native invasive species, and initiate effective weed control measures upon evidence of their introduction. Prior to operations in the NPR-A, submit a plan for the BLM's approval, detailing the methods for cleaning equipment and vehicles, monitoring for weeds and weed control.

M-3 Best Management Practice

Objective: Minimize loss of populations of, and habitat for, plant species designated as Sensitive by the BLM in Alaska.
Requirement/Standard: If a development is proposed in an area that provides potential habitat for a BLM Sensitive Plant Species, the development proponent would conduct surveys at appropriate times of the summer season and in appropriate habitats for the Sensitive Plant Species that might occur there. The results of these surveys will be submitted to the BLM with the application for development.

M-4 Best Management Practice
Objective: Minimize loss of individuals of, and habitat for, mammalian species designated as Sensitive by the BLM in Alaska.
Requirement/Standard: If a development is proposed in an area that provides potential habitat for the Alaska tiny shrew, the development proponent would conduct surveys at appropriate times of the year and in appropriate habitats in an effort to detect the presence of the shrew. The results of these surveys will be submitted to BLM with the application for development.