



**U.S. Fish & Wildlife Service**

# **Selawik National Wildlife Refuge**

*Revised Comprehensive Conservation Plan*

**June 2011**





## **U.S. Fish and Wildlife Service Mission Statement**

*The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people.*



## **Refuge System Mission Statement**

*The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.*

*—National Wildlife Refuge System Improvement Act of 1997*

The comprehensive conservation plan details program planning levels that are substantially greater than current budget allocations and, as such, is for strategic planning and program prioritization purposes only. This plan does not constitute a commitment for staffing increases or funding for future refuge-specific land acquisitions, construction projects, or operational and maintenance increases.

On the Cover: Selawik Science-Culture Camp, 2004

Photo from the image library of the Selawik National Wildlife Refuge

# Revised Comprehensive Conservation Plan

## Selawik National Wildlife Refuge

June 2011

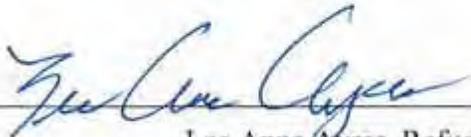
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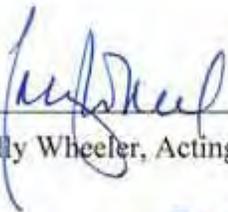
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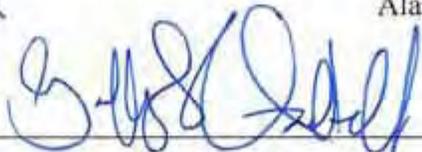
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June 2011

Dear Reader:

This is the Final Revised Comprehensive Conservation Plan (comprehensive plan) for the Selawik National Wildlife Refuge. It will guide management of the refuge until 2026. This comprehensive plan provides a vision, goals, and objectives for management of the refuge. It addresses the issues raised during public scoping and comments received during public review of the draft plan. Based on comments received, we revised and adopted Alternative B (the Preferred Alternative) that we developed in the draft plan.

A summary of the public review, comments on the draft, and our responses are included in this document in Appendix K. The environmental assessment and draft plan are on file at our offices in Kotzebue and Anchorage.

Draft compatibility determinations for Selawik refuge were included in the public review process as part of the draft plan. Our responses to public comments on the draft compatibility determinations are in Appendix K, and the final signed compatibility determinations are in Appendix D.

You may obtain a copy of this comprehensive plan, a summary, or a compact disk containing both at the offices listed below. You may also view the comprehensive plan online at <http://alaska.fws.gov/nwr/planning/plans.htm>.

Requests for copies, CD-ROM, or further information should be directed to:

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***We thank everyone who participated in this revision. Your comments and contributions helped us create a better comprehensive plan!***



# Selawik

## The Significance of a Place Name



A Selawik youngster displays a sheefish caught while jigging through the ice in April on Selawik Lake.

*Siilvik* is the Iñupiaq name for the village of Selawik, meaning “place of sheefish,” an apt description for a community situated on a river with one of only two sheefish spawning areas in the region. Early explorers recorded this name as “*Chilivik*,” “*Sal-a-wik*,” and other variations, applying the term to the river and lake as well as the local settlements. The Iñupiat in the area call themselves *Siilviñmiut*. Until the mid-1800s, the Selawik River was occupied by two separate but closely allied nations of *Siilviñmiut*: the *Kiitaaġmiut* (“people down below”) in the western or lower portion of the river and the *Siilviim Kaŋjaniġmiut* (“Selawik headwaters people”) in the eastern or upriver portion. Sheefish, an important and highly prized subsistence food, is available nearly year-round in the Selawik area.

## **Acknowledgements**

We would like to thank the numerous people who helped with this document but were not listed in Appendix G as official preparers. Many were involved in editing specific sections or reading and commenting on the entire plan.

We acknowledge Christina Westlake, Barbara Atoruk, and Hannah Loon for their work with the Iñupiaq language translations that appear in the first chapter. Drs. Kenji Yoshikawa and Ben Crosby contributed substantially to the discussion of permafrost found in the fourth chapter. Brittany Sweeney took the lead in designing and editing the summary of the comprehensive plan.

We thank the Native Villages of Selawik, Noorvik, Buckland, Kiana, Ambler, Shungnak, Kobuk, and Kotzebue for taking the time to participate in this planning process. We are grateful to the many individuals who welcomed us into their communities and their homes, sharing their food, knowledge, and ideas.

The authors of the plan wish to thank the members of the public, agencies, non-governmental organizations, and local and State governments who attended scoping meetings or provided comments on drafts of this comprehensive plan. This plan would not be the same without your insightful perspectives.

## **Dedication**

This plan is dedicated to those who call the Selawik refuge home. Their generosity of time and spirit, deep connections to the land, and willingness to share knowledge and experience greatly improved this document and will continue to inspire those responsible for its implementation.

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## **1. Introduction**

The Selawik National Wildlife Refuge encompasses approximately 3.2 million acres (12,950 km<sup>2</sup>) in northwestern Alaska. When land conveyances under the Alaska Native Claims Settlement Act of 1971 are complete, approximately 2.5 million acres are expected to remain under the administration of the U. S. Fish and Wildlife Service (Service).

This document is a revision of the 1987 Comprehensive Conservation Plan (comprehensive plan) for the Selawik National Wildlife Refuge (refuge; Selawik refuge). This revision is now the final comprehensive plan for the refuge and replaces the management direction described in the original Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review/Wild River Plan (USFWS 1987a) and Record of Decision (USFWS 1987b).

This chapter provides background information about the framework used by the Service to develop the final comprehensive plan. Section 1.1 describes the purpose and need. Section 1.2 outlines the context of refuge planning. Section 1.3 summarizes the laws that direct refuge planning and management. Section 1.4 presents the purpose, vision, and goals of the refuge. Section 1.5 gives a brief overview of the refuge's history, ecology, and people. Section 1.6 summarizes the special values of the refuge. Sections 1.7 and 1.8 describe the steps that the Service was required to complete before the comprehensive plan could be published. Section 1.9 summarizes the major issues and concerns identified by the public and the planning team.

### **1.1 Purpose and Need for Action**

Section 304(g) of the Alaska National Interest Lands Conservation Act of 1980 (ANILCA), as amended, directs the Secretary of the Interior to prepare and, from time to time, revise a comprehensive plan for each refuge in Alaska.

The purpose was to revise, update, and replace the management direction found in the original comprehensive plan, adopted in 1987. This comprehensive plan provides broad policy guidance and establishes both long- and short-term goals and objectives for managing the Selawik refuge for the next 15 years. This comprehensive plan identifies which activities and uses are compatible with the purposes of the Selawik refuge and the mission of the National Wildlife Refuge System (Refuge System). The Service considers this comprehensive plan to be a dynamic and living document subject to periodic reviews and possible updates if needed.

This comprehensive plan follows guidance found in ANILCA and other Federal laws—primarily the National Wildlife Refuge System Administration Act of 1966 (Refuge System Administration Act), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Refuge System Improvement Act); and the National Environmental Policy Act of 1969 (NEPA), as amended. The comprehensive plan allows the Service to:

- Update management direction related to national and regional policies and guidelines that are used to implement the Federal laws that govern refuge management.
- Incorporate new knowledge and scientific information into refuge management.
- Evaluate current refuge management direction based on changing public demand for use of the refuge and its resources, including public recreation and visitor management.

The comprehensive plan includes an updated description of the refuge environment, including ecological and social aspects such as land ownership, physical and biological resources, cultural and historic features, communities in the refuge area, and human activities and uses on refuge lands.

The comprehensive plan was designed to:

- Ensure that the purposes of the refuge and the mission of the Refuge System are fulfilled.
- Ensure that national policy is incorporated into management of the refuge.
- Ensure that interested parties have an opportunity to participate in the development of management direction.
- Identify, describe, and protect the resources and special values of the Selawik refuge.
- Provide a systematic process for making and documenting resource management decisions.
- Establish broad management direction for refuge programs and activities.
- Provide continuity in refuge management.
- Provide a basis for budget requests.
- Provide a basis for monitoring and evaluating accomplishments.

## 1.2 Planning Context

The Selawik refuge is part of a national system of refuges. The Service manages individual refuges in a manner that reflects both the priorities of the Refuge System and the purposes for which the refuges were established. This comprehensive plan adheres to the individual purposes of the Selawik refuge while contributing to national-level goals and objectives.

### 1.2.1 The United States Fish and Wildlife Service

The Service is the principal Federal agency responsible for conserving, protecting, and enhancing fish, wildlife, plants, and their habitats. In addition to the Refuge System, the Service also operates national fish hatcheries, fishery resource offices, and ecological services field stations. The Service enforces Federal wildlife laws, administers the Endangered Species Act, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, and helps foreign governments with their conservation efforts. It oversees the Wildlife and Sport Fish Restoration program that distributes substantial revenue to State fish and wildlife agencies from excise taxes on the sale of fishing and hunting equipment.

The mission of the Service is:

*Working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people*  
(Service Manual 602 FW 1.6).

### 1.2.2 The National Wildlife Refuge System

The Refuge System comprises approximately 96 million acres of Federal lands, encompassing more than 552 national wildlife refuges, thousands of small wetlands, and other special management areas. Refuge System lands are located in all 50 states and the territories of the United States. The conservation mission of the Refuge System enables Americans to participate

in compatible recreation activities such as fishing and hunting and to better appreciate the value of fish and wildlife conservation through education and other visitor services.

Alaska contains 16 national wildlife refuges (Figure 1-1). These refuge lands contain a wide range of habitats with varied terrain, including mountains, glaciers, tundra, grasslands, wetlands, lakes, woodlands, and rivers. Together, the 16 refuges comprise 76.8 million acres and constitute about 80 percent of the Refuge System.

The mission of the Refuge System is:

*To administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (Refuge System Administration Act, as amended).*



Figure 1-1. Location of the Selawik refuge within Alaska.

### 1.3 Legal and Policy Guidance and State Coordination

Management of the Selawik refuge is dictated, in large part, by the legislation that created it and by the refuge purposes and goals described in the comprehensive plan. Refuge management is also guided by other laws, regulations, and policies, as well as by agreements with the State of Alaska. This section identifies the laws and the policy guidance that were integral for developing this comprehensive plan.

### **1.3.1 Legal Guidance**

Operation and management of refuges throughout the Refuge System are influenced by a wide variety of laws, treaties, and executive orders. Among the most important are the Refuge System Administration Act, as amended by the Refuge System Improvement Act; the Refuge Recreation Act; the Endangered Species Act; and the Wilderness Act. These acts are described briefly in Appendix A, along with other laws that affect management of the Selawik refuge.

For national wildlife refuges in Alaska, the Alaska Native Claims Settlement Act of 1971 (ANCSA) and ANILCA, as amended, provide management direction that is highly influential. In 1980, ANILCA established the refuge, set forth its purposes, defined provisions for planning and management, and authorized studies and programs related to wildlife and other resources, subsistence, recreation, and economic activities. ANILCA also provided specific direction for managing designated wilderness areas and for protecting and continuing subsistence uses on Federal public lands in Alaska.

The designated Selawik Wilderness Area includes about 240,000 acres of the Waring Mountains and extends from the headwaters of the Fish River on the west to the upper reaches of the Kugarak River on the east. The 1987 Record of Decision document did not include a proposal to Congress for further wilderness designations at Selawik refuge (USFWS 1987b). This comprehensive plan identifies and describes wilderness values for the Selawik refuge as required by Section 304(g) of ANILCA and provides management direction for protection and stewardship of wilderness values. The Service conducted no further wilderness reviews, and no additional lands were recommended for wilderness designation.

The upper segment of the Selawik River is a designated Wild river under the Wild and Scenic Rivers Act of 1968. The Service conducted no further river reviews, and no additional rivers were recommended for designation. This comprehensive plan describes river values and provides better direction for how the Selawik refuge can be managed to protect those values in perpetuity.

The intent of the Service is to provide improved direction for how the Selawik refuge as a whole can be better managed to protect and conserve its wildland characteristics and the unique values associated with remote and undeveloped refuges in Alaska.

### **1.3.2 Policy Guidance**

Policy documents provide critical direction and guidance for planning and managing national wildlife refuges. These documents include:

- The Service manual.
- Director's orders.
- National policies.
- Handbooks.
- Director's memoranda.
- Regional directives.

Several of these documents direct that an ecosystem approach be used in refuge management. Managers must consider the health of the entire ecosystem when managing the Selawik refuge.

This requires coordination with the State of Alaska and our other partners both within and outside the conservation profession. Appendix A provides a brief description of ecosystem management and several of the national and regional management plans, programs, and legal documents that were reviewed during the planning process. Other key policies and programs were used such as the compatibility policy, the biological integrity policy, the Strategic Habitat Conservation framework, the Landscape Conservation Cooperative framework, the Service's strategic plan for responding to accelerating climate change, and the strategic plan for inventories and monitoring on national wildlife refuges (Appendix A).

### 1.3.3 Coordination with the State of Alaska

The Alaska Department of Fish and Game (ADF&G) has the primary responsibility for managing resident fish and wildlife populations in Alaska. On refuge lands, the Service and ADF&G share a concern for all fish and wildlife resources and their habitats, and both agencies engage in extensive fish and wildlife conservation, management, and protection programs, including research. In 1982, the Service and ADF&G signed a Master Memorandum of Understanding (Appendix B) that defines the cooperative management roles of each agency and outlines a framework for cooperation. The Service and ADF&G recommitted to this formal agreement in 2006.

The State is divided into 26 game management units (GMUs), most of which are further divided into subunits. The State developed management objectives for populations of wildlife within each GMU. Most of the Selawik refuge is situated within GMU 23 (Map 1-1).

The State of Alaska establishes fishing, hunting, and trapping regulations for each GMU at the direction of the Alaska Boards of Fisheries and Game; these regulations apply to Federal public lands unless superseded by Federal subsistence regulations (50 CFR 100.10(d)(4); Appendix A, Section A.1.2.4). If there was a clear and legitimate need for the Service to regulate general hunting or fishing on refuge lands, it would be done through a public rulemaking process or through closures or restrictions under 50 CFR 36.42.

The Alaska Department of Natural Resources (DNR) and its various divisions are key management partners with all refuges in Alaska. The DNR manages all land, water, and surface and subsurface resources owned by the State except for fish and game. The Division of Mining, Land, and Water manages the State's water and land interests within the refuge. Issues related to State interests will most likely expand during the life of the comprehensive plan, especially with regard to water rights, navigable waters, ownership of submerged lands, and rights-of-way over refuge lands.

This comprehensive plan was developed in consultation with ADF&G and DNR. The Service routinely consulted with ADF&G and DNR personnel during the planning process. One representative each from ADF&G and DNR participated as members of the core planning team and had a formal opportunity to participate in all meetings of the core planning team. This comprehensive plan is consistent with State of Alaska management plans and objectives for fish and wildlife.

## 1.4 Refuge Purposes, Vision, and Goals

### 1.4.1 Refuge Purposes

Section 101(b) of ANILCA identifies purposes for conservation system units in Alaska:

“It is the intent of Congress in this Act to preserve unrivaled scenic and geological values associated with natural landscapes; to provide for the maintenance of sound populations of, and habitat for, wildlife species of inestimable value to the citizens of Alaska and the Nation, including those species dependent on vast relatively undeveloped areas; to preserve in their natural state extensive unaltered arctic tundra, boreal forest, and coastal rainforest ecosystems; to protect the resources related to subsistence needs; to protect and preserve historic and archeological sites, rivers, and lands, and to preserve wilderness resource values and related recreational opportunities, including but not limited to hiking, canoeing, fishing, and sport hunting, within large arctic and subarctic wild lands and on free-flowing rivers; and to maintain opportunities for scientific research and undisturbed ecosystems.”

Section 302(7) (B) of ANILCA states that the purposes of Selawik refuge include:

- (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Western Arctic caribou herd (including participation in coordinated ecological studies and management of these caribou), waterfowl, shorebirds and other migratory birds, and salmon and sheefish;
- (ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- (iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- (iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge.

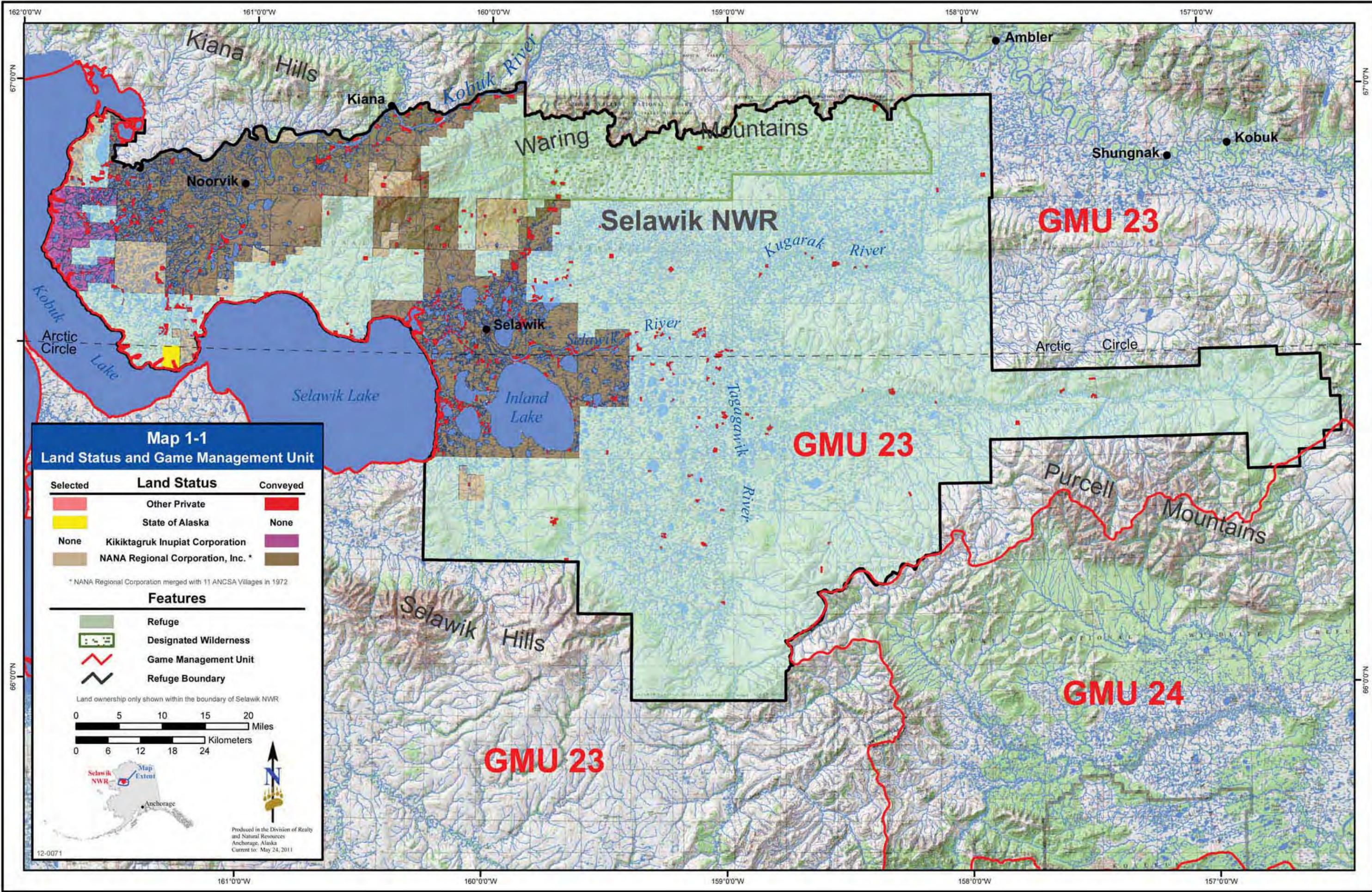
The purposes of the congressionally designated Selawik Wilderness Area are to secure an enduring resource of wilderness, protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System (NWPS), and administer the area for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as designated wilderness.

### 1.4.2 Refuge Vision

Service policy (Service Manual 602 FW 3.4G) directs each refuge to develop a vision statement during its comprehensive planning process. A refuge vision is a concise statement of what the refuge should be, or what we hope it will become, and it is primarily based on the mission of the Refuge System, the purposes of the Selawik refuge, and other mandates (Service Manual 602 FW 1.6Z). We included the Iñupiaq version to honor the Alaska Native peoples of the region and to provide an opportunity for the refuge vision to be read aloud in the local communities both now and in the future.

### 1.4.3 Refuge Vision Statement in English

As a trusted resource steward and community partner, the Selawik National Wildlife Refuge will enhance and protect the quality of life found in northwest Alaska by sustaining the ecological integrity of the Selawik River drainage and Kobuk River delta. Fish and wildlife will continue to thrive in this remarkable environment, as will subsistence, cultural, and



Back of Map 1-1.

recreational uses of these resources. With vision and resourcefulness, the refuge will proactively monitor the uncertainties associated with climate change. The refuge will foster productive relationships with local communities and governments, Alaska Native peoples, visitors, scientists, neighboring landowners, and others to promote resource health, respond to community and educational needs, and perpetuate an enduring natural legacy for future generations of Americans.

#### 1.4.4 Refuge Vision Statement in Iñupiaq

Siilvium Nunañani Niġrutit Annaumaagviat

Tallimaŋat Aglaat

Qiñiqquuraaglugu sivunniutaat

Tunŋavigipluta tamatkuniŋa qaunaksraptitnik suli piqatigipluta Siilvium niġrutinun annaksimaagvian nakuqsilaaglugu suli qaunagilugu igliqtillugu suaqũilaakun taavruma Siilvium kuunŋan salumaluni taunuŋa paanun suli Kuuvaum paanani.

Qaliutlu aŋŋutitlu iñuusrugaaġutiŋ, iñugiaksilutiŋlu innayaqtut salumaruami iñuuviniġmikni, suli taamna aŋuniatiq, irrusriq suli aliasrunġisaaliq piviqaġuni. Taatna qiñiqquuraaglugu suli savaagiyusrilugu, taimma tamanna nuna ittaunġiguta qaunagigisigikput sila atlanuŋhani. Taamna nuna nautchigisiruiq ilagiillautaguta nunaaqiurani suli nunaaqiuram aŋalataiñi, tamaaniġmiunik. Tamaakŋaqtanik, tamaunnaaqataqtuanik, ilisimarit, qanimi nunaligaat, suli atlat nakuuniaqtitchiruat tamatkuniŋa, piŋŋaaruat sumun tikitpan nunaaqiq unniñ ilisautrilutiŋ sumik atuġnakkaptitnik, suli igliqtitchilutiŋ itchumiñaqtuamik piññaaktaaksraŋatnik kiñuviagiich nunaqativut.

#### 1.4.5 Refuge Goals

Refuge goals are based on the purposes of the Selawik refuge and the refuge's vision statement. These goals contribute to the mission of the Refuge System and reflect legal responsibilities of the Service. Collectively, the mission statements, refuge purposes, vision, and goals lay the foundation on which the management direction in this comprehensive plan was developed and evaluated.

#### 1.4.6 Goal Statements in English

##### Goal 1: Fish, Wildlife, and Habitat

Conserve the diversity of fish and wildlife and their habitats on refuge lands, while allowing natural ecological processes to shape the environment.

##### Goal 2: Water Quality and Quantity

Maintain the integrity and promote the environmental health of waters and aquatic habitats within the refuge.

##### Goal 3: Subsistence

Provide and promote opportunities for rural residents to engage in subsistence activities on the refuge.

**Goal 4: Visitor Experience**

Provide quality visitor experiences and enjoyment of refuge resources through compatible recreation activities, including hunting, fishing, wildlife viewing, and photography, in ways that minimize conflicts among visitor groups and residents.

**Goal 5: Outreach and Education**

Provide outreach and education to foster a sense of stewardship and respect for fish, wildlife, cultural values, and the environment.

**Goal 6: Cultural Resources**

Preserve and protect the cultural, historical, and archeological resources of the refuge.

**Goal 7: Partnerships**

Develop and maintain credibility and open communication with partners in resource management and conservation, including Federal and State agencies, local communities, Native corporations, tribal governments, neighboring landowners, and businesses and organizations.

**Goal 8: Climate Change**

Develop a leadership role in addressing climate change in northwest Alaska.

**1.4.7 Goal Statements in Iñupiaq**

**TIKISAKSRAT**

Sivulliq tikisaksraq

Iñugiaktinniaglugich atlakaagiich qaluich suli nigrutit suli irvigisruukkanjich tamanna annaksimaviatni nunami, manna kimmutigilugu iluatluguni ittuksraq avativut suli Nunavut.

**TUVLIQ**

Napallugu suli pitchuksaagutigilugu puyiasinnialiksraja tamanna imiq kuugum suli qalliviich ittuat annagviñmi tarani.

**PINAYUAT**

Piviksriglugich suli pitchuksaaglugich tarani iñuuniaqtuat anuniağutiñ katitchiñiaqtuksrat tarani annagviñmi.

**SISAMANAT**

Piviqatillugich avakñ aggiqsuat suliaqataagutiñ piññañniaqtuamik qiñigiaqtauluni anuniağutiñ, qaluñniağutiñ qiñiqtuagutiñ, agliutruğutiñ, nakuqsilugu iluqiatñi iglaatlu tamaaniğmiutlu.

**TALLIMANAT**

Piviqatillugich, pitchuksaaglugich ilitchuktuat ilisautilugich taluğnalhatigun makua nigrutit suli iñuuniañiqput maani nunaptitni suli avatititni.

## ITCHAKSRAT

Taatna ittillugu tugluaqsimaaglugu iñuuniafiñat qaṇavak taimakña tarani iñuuniaqtuat annagviñmi.

## TALLIMAT MALGUK

Tugluaqsimaaglugu suli napallugu ilumutun uqaliksrapput katiluta uqaaqsiyupta tamarrumuuna nunakun Qaunaksriqatiuptitnun taavakña ittuniñ, naaqaa maligutaksraptitni savaktuat, unnii iñupiaqatiuptitnik. Naaqaa makua Qaukñiuraḡikkavut nunaaqqiuraptitni. Suli tamatkua sunik tasramma napapchiañiaqtuat.

## TALLIMAT PINASRUT

Sivunniuguta qanugli iñuuniaqsaliksraptitnik uvva silavut atlanuqman maani iñuuniaḡviptitni.

## 1.5 Refuge Overview

### 1.5.1 Refuge Establishment

In 1971, Congress enacted ANCSA, which conveyed to Native village corporations and Native groups several hundred thousand acres of the 3.2 million acres within the future exterior boundary of the Selawik refuge. On December 2, 1980, President Jimmy Carter signed ANILCA. Section 302 of ANILCA established the Selawik refuge as part of the Refuge System. Section 702 (12) of ANILCA established the Selawik Wilderness Area as part of the National Wilderness Preservation System, and Section 602 (41) established the Selawik Wild River under the Wild and Scenic Rivers Act.

### 1.5.2 Physical Environment

Selawik refuge straddles the Arctic Circle east of Kotzebue Sound in northwestern Alaska. The refuge boundary begins approximately 21 miles east of Kotzebue and extends 150 miles to the east, with the eastern boundary about 360 miles northwest of Fairbanks. The refuge extends 72 miles from north to south at its widest point. It is bordered in part on the north by the Kobuk Valley National Park and on the southeast by the Koyukuk National Wildlife Refuge.

The majority of the refuge lies within a large basin, the Kobuk-Selawik Lowland, characterized by broad river floodplains and approximately 24,000 lakes. Major drainages of the lowlands are the Selawik and Kobuk rivers. These drain into Selawik Lake and Hotham Inlet (locally know as Kobuk Lake), respectively. Streams within the refuge are mainly sluggish and meandering, having moderately low gradients and numerous side sloughs. The lowlands are mostly underlain by permafrost.

Highland areas of the refuge include the Waring Mountains in the north and their southwest extension, the Hockley Hills. The flat summits of the Selawik Hills are located to the south. The east side of the refuge includes part of the Sheklukshuk Range (locally referred to as Rabbit Mountain), the Kiliovilik Range, and the Purcell Mountains.

The region generally has a maritime climate during the ice-free periods of the year (late May to early October) and long cold periods during the winter months (Figure 1-2). Temperature variations can reach annual extremes of near 90 °F to -60 °F. Annual precipitation averages between 15 and 20 inches in the lowlands and up to 30 inches in some of the higher elevations. Approximately half of the precipitation occurs in the months of July and August. Strong,

persistent prevailing winds blow from the northeast in winter and from the west in summer. Resources on refuge lands and the Alaska Native communities in and near the Selawik refuge are vulnerable to accelerating climate change.



Figure 1-2. Along the Arctic Circle, the season of snow and ice lasts far longer than the open water season. Long shadows and pastel colors bathe the land on this mid-January afternoon in the village of Selawik.

### 1.5.3 Biological Resources

Extensive tundra wetlands containing grass and sedge meadows dominate the refuge landscape, while boreal spruce forests, alder, and willow thickets trace stream and river drainages (Figure 1-3). The area is in a transition zone where the northernmost boreal forest gives way to open arctic tundra. Alpine tundra occurs at higher elevations.

The wildlife of the Selawik refuge includes an array of resident and migratory mammals, waterfowl, songbirds, shorebirds, and fish. Large mammals found on the refuge include moose, which began using the refuge in the 1940s, and occasionally muskoxen. Both black and grizzly bears are present due to the occurrence of both forest and tundra habitats. The Western Arctic Caribou Herd (WACH) migrates through the refuge on its way between calving and wintering grounds. In mild winters, small bands of caribou remain on the refuge to forage in the lichen-covered foothills. Wolves, arctic and red fox, lynx, wolverine, beaver, muskrat, marten, and snowshoe hares are year-round residents. A host of small mammals occurs on the refuge such as red-backed voles, tundra voles, and Arctic shrews.

Multitudes of migratory waterfowl and shorebirds breed and stage on the thousands of lakes and ponds within the refuge. During the short summers, large numbers of white-fronted geese and tundra swans arrive to breed or to rest during their migratory journeys. Sandhill cranes, northern pintails, greater scaup, black scoters, and Pacific loons are among other bird species using the wetlands. For thousands of shorebirds, these wetlands are among the last stopping areas during their migration to breeding locations in the high Arctic. Common species include American golden plovers, semi-palmated and western sandpipers, red-necked phalaropes, and whimbrels. Songbirds such as the yellow wagtail, yellow warbler, white-crowned sparrow, and Lapland longspur nest in tussocks or in forest and willow thickets.



Figure 1-3. Boreal forest and shrubs line the streams and rivers, while tundra dominates in the remainder of the landscape in the middle Selawik valley.

Fisheries on the refuge are diverse due to the presence of rivers, lakes, sloughs, and adjacent wetlands. The Selawik and Kobuk River drainages support large populations of resident and anadromous fish. The refuge provides spawning grounds for northern pike, Arctic grayling, burbot (locally known as mud shark), and various types of whitefish, including sheefish, also called inconnu.

#### 1.5.4 Human Presence and Activities

The lands within the Selawik refuge have been the hunting and fishing grounds of the Iñupiat for thousands of years. Because of its remoteness (350 miles from the nearest road), the refuge is primarily used by people from the communities near or within the refuge boundary. Most residents of these communities are of Iñupiaq descent. The villages of Selawik and Noorvik are within the refuge's external boundary. The larger city of Kotzebue (population approximately 3,500) and the villages of Ambler, Buckland, Shungnak, Kiana, and Kobuk are all within 30 miles of the refuge.

Historically, sheefish, other whitefish, salmon, Arctic grayling, northern pike, caribou, seals, small game, and abundant migratory birds were the major subsistence resources used by area residents. The names of both the Selawik River and the refuge originated from the Iñupiaq word "*siilvik*," which means "place of sheefish." The sheefish, or inconnu, is an important and highly desired food resource. The subsistence way of life and other Alaska Native traditions continue today, and most of the people in the local communities depend on the natural resources of the area for their livelihoods. The Iñupiat have adapted and updated some of their methods of harvest and backcountry travel over time.

Access to the refuge is possible only by boat, float- or ski-equipped airplane, snowmachine, or dog team. Snowmachine trails provide vital links between communities in winter and are usually passable to travelers through the end of April. Three shelter cabins exist along the trails on the refuge and receive some maintenance from area residents. An administrative cabin, maintained by refuge staff, is located on the refuge.

The amount of public use of the refuge from outside the local communities is difficult to estimate with certainty because there are no controlled entry points where visitors are counted. There are no public recreation facilities located on the refuge. Non-local visitors mainly engage in hunting caribou, moose, and bear or fishing for sheefish. Visitors to the refuge can find information to use when planning their trips at the refuge headquarters in Kotzebue.

## **1.6 Special Values**

Section 304(g) of ANILCA directs the Service to identify and describe “special values of the refuge, as well as any other archaeological, cultural, ecological, geological, historical, paleontological, scenic, or wilderness values of the refuge.” The following special values have been identified for the Selawik refuge.

### **1.6.1 Western Arctic Caribou Herd**

The WACH is the largest caribou herd in Alaska, numbering 348,000 animals in 2009. Caribou from the herd are seasonally abundant on the refuge during the spring and fall migration. Caribou are a highly desirable subsistence resource for local residents and account for the majority of mammals harvested on refuge lands.

### **1.6.2 Wetlands and Waterfowl**

Selawik refuge contains a diversity of outstanding staging and nesting habitats for migratory waterfowl. The Selawik and Kobuk River deltas, located on the eastern shores of Selawik Lake and Kobuk Lake, respectively, provide a complex array of freshwater and brackish lakes, estuaries, tidal flats, riparian areas, and wet meadows. On refuge lowlands, the approximately 21,000 lakes create a large, tundra lake complex, the most extensive system of this type within the Alaskan refuges.

### **1.6.3 Whitefish Spawning**

Several species of whitefish are abundant in the northwest Arctic region of Alaska. The upper Selawik and Fish rivers, in the refuge, have been identified as spawning locations for sheefish and other whitefish species, which are an important local food resource (Brown 2005; Georgette and Shiedt 2005).

### **1.6.4 Natural Processes**

Flooding and wildland fire are the two main ecosystem drivers in the refuge and both provide resource benefits. Flooding occurs regularly on the refuge during spring break-up. It brings vital nutrients to the soil and allows water exchange with lakes and sloughs not otherwise connected to rivers. The cyclical occurrence of fire continually shapes the landscape by releasing nutrients into the ecosystem. Due to size and remoteness and to maintain the fire cycle, wildland fires on the refuge are often allowed to burn unimpeded. Geological, glacial, flooding, and fire processes have combined through time to produce a diverse and productive landscape. Climate is also a substantial driver of ecosystem processes in the Selawik refuge (Woodward and Beaver 2011).

### 1.6.5 Subsistence Way of Life

The subsistence way of life affects local kinship, group cohesion, and personal and community identities. Subsistence harvests of resources on refuge lands provide local residents with social, economic, and political sustenance. Many local people specifically depend on fish, wildlife, and plants found on the refuge for their nutritional and cultural sustenance and livelihood (Figure 1-4).



Figure 1-4. Blueberries, abundant on the refuge in most years, are one of the many resources harvested for subsistence by local residents.

### 1.6.6 Wilderness Values and Designation

The Selawik Wilderness Area, similar to most of the refuge, is remote and undeveloped, offering the occasional outside visitor outstanding opportunities for solitude and a primitive, backcountry recreation experience. The Selawik Wilderness Area was designated under ANILCA and the Wilderness Act and encompasses approximately 240,000 acres within the Waring Mountains, which are underlain primarily by sedimentary rock, allowing for unique plant communities. The Selawik Wilderness Area includes a group of rolling, vegetated sand dunes that were formed by the last glacial recession, part of a larger system that once included the Great Kobuk Sand Dunes to the north. This is one of the most topographically interesting and scenic parts of the refuge, with spruce forests, alpine habitats, and foothills rising in elevation to about 1,700 feet.

### 1.6.7 Wild River Designation

The upper 168-mile segment of the Selawik River was recognized for its outstandingly remarkable scenic, geologic, wildlife, fishery, cultural, and recreational values and for its water quality (Bureau of Outdoor Recreation 1976). Approximately 117,000 acres are managed as a Wild River corridor under the Wild and Scenic Rivers Act (USFWS 1987a).

### 1.6.8 Hot Springs

The refuge contains hot springs in a small tributary at the headwaters of the Selawik River. The creek remains open in this area during some of the coldest months of the year due to the thermal springs that rise from deep in the earth. Historically, both the coastal Iñupiat and the interior Athabascans used the Selawik hot springs for medicinal purposes and as an important

gathering and healing place. The hot springs are visited today by many local residents as an enjoyable winter destination.

### **1.6.9 Cultural and Historic Resources**

The Selawik area is one of the most archaeologically significant areas in the region, with ties to the Bering Land Bridge. Several hundred historical and traditional sites have been identified in the northwest Arctic region, and it is likely that many more exist. Known archaeological sites span 10,000 years of human history in the region. A large proportion of the sites identified on the refuge have been listed on the Alaska Heritage Resource Survey (USFWS 1987a).

### **1.6.10 Dog Sledding Competition**

Established in the 1970s, the Kobuk 440 is an annual mid-distance out and back dog sled race, with the start and finish in Kotzebue (Figure 1-5). The 440-mile route passes through the villages of Noorvik, Kiana, Ambler, Shungnak, and Kobuk before doubling back; the trail makes a detour through Selawik on either the outbound or inbound leg, depending on the year. It attracts Alaska's top mushers and is a popular event in the communities within and nearby the refuge. Approximately 80 miles of this historic race occur on refuge lands under special use permit.



Figure 1-5. Mushers and bystanders get ready for the start of the Kobuk 440 dog sled race on the ice in front of Kotzebue. Photo by Tina Moran.

## **1.7 Planning Requirements**

Section 304(g) of ANILCA directs that comprehensive plans be developed for each refuge. The following must be identified and described prior to developing a plan for any refuge:

- The populations and habitats of the fish and wildlife living on the refuge.
- Significant problems that may adversely affect these habitats and populations of fish and wildlife.
- The special values of the refuge, including archeological, cultural, social, ecological, geological, historical, paleontological, scenic, or wilderness values.
- Areas within the refuge suitable for use as administrative sites or visitor facilities, or for visitor services, as provided for in ANILCA sections 1305 and 1306.

- Current and potential future requirements for access to the refuge, as provided for in ANILCA Title XI.

The Service uses the comprehensive plan to categorize and designate areas within refuges according to their respective resource values and compatible uses. For each area of a refuge, the Service is directed to specify which conservation programs it intends to implement. The Service uses the comprehensive plan to describe and propose opportunities for refuge visitors to hunt, fish, and otherwise enjoy and learn about wildlife and other resources, including scientific research. The Service specifies the uses and activities within each area that are compatible with refuge purposes.

The Service is required to ensure that adequate opportunities exist for interagency coordination and public participation during the planning process. Any interested and affected parties, such as State agencies, Native corporations, and local and national residents that may be affected by planning decisions, must be provided meaningful opportunities to communicate their views and opinions. Prior to approving this comprehensive plan, the Service published a notice of its availability in the Federal Register. Copies of the comprehensive plan were made available on the Internet and in regional offices of the Service throughout the United States. The Service wrote a summary of the major issues and management proposals contained in the comprehensive plan and mailed it to the public for review and comment.

## 1.8 The Planning Process

This section describes the process used to develop this comprehensive plan. The Service followed the planning requirements specified in Section 304(g) of ANILCA; the Refuge System Administration Act, as amended; the Service's planning policy (602 FW 1 and 3); the National Environmental Policy Act (42 U.S.C. 4321-4347); and the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR 1500-1508). The Service used an eight-step planning process to revise the comprehensive plan for the Selawik refuge (Figure 1-6).

1. Design the planning process (preplanning).
2. Initiate public involvement and scoping.
3. Determine significant issues.
4. Develop and analyze alternatives.
5. Prepare a draft comprehensive plan and NEPA document.
6. Prepare and adopt a final comprehensive plan.
7. Implement, monitor, and evaluate the final plan.
8. Review and revise the final plan as necessary.



Figure 1-6. The planning process.

### 1.8.1 Design the Process

In spring 2008, the Service began reviewing the 1987 Selawik comprehensive plan to determine if it should be revised, or if the Service should prepare a new comprehensive plan. The Service found that on-the-ground management actions were predominantly meeting refuge purposes and objectives. New management direction in the Refuge System Improvement Act, other regulations and policies, and changes such as the Federal subsistence program within Alaska refuges needed to be included in the comprehensive plan. The Service decided that a revision of the Selawik comprehensive plan was necessary.

The Service identified relevant laws, regulations, policies, and other direction that would have to be considered during revision of the comprehensive plan. These were discussed earlier in this chapter; additional details can be found in Appendix A. The Service formed a diverse planning team (Appendix G) to review the available data on the biophysical and human environments of the Selawik refuge, conduct a public participation process, and identify areas in which additional work was needed.

### 1.8.2 Initiate Public Involvement and Scoping

The Service informed the national and local publics that the refuge was beginning the revision and asked them to help identify major planning issues. Formal public scoping began with publication of a Notice of Intent to revise the Selawik comprehensive plan and prepare an Environmental Assessment in the Federal Register on October 1, 2008 (Vol. 73, No. 191, pg. 57143).

In fall 2008, a planning newsletter was mailed to approximately 3,200 individuals, agencies, and organizations. The newsletter announced that the Service was revising the comprehensive plan and seeking public input. The newsletter described issues identified by the planning team and provided an opportunity for the public to identify other issues that

should be addressed. This information and opportunity to participate was also made available through the Internet. Over 70 written comments were received.

To gather additional input from the public, members of the planning team held an open house meeting in Kotzebue, attended by 18 community members. Visits were made to Buckland, Kiana, Noorvik, Selawik, and Shungnak, where team members attended city and tribal council meetings to inform residents of the planning process and to hear them speak about the issues. Nearly 50 village elders and community leaders were interviewed in person during these visits.

The planning team asked for written comments about why people value the Selawik refuge. People's values were categorized into four interrelated topics: (1) subsistence; (2) aesthetics, natural habitat, and wildness; (3) fish and wildlife; and (4) research and education.

***Subsistence.*** People identified subsistence and the importance of the Selawik refuge as a place for pursuing a subsistence way of life as a value. Such comments included:

*"[I value] subsistence users continuing their way of life through fishing, hunting, camping, berry picking, firewood collecting, etc."*

*"[I value] the animals and plants we harvest for food, the solitude of camping with my family preparing for the winter."*

*"I value the whole refuge because it is great country that everyone should visit. It's a good subsistence area."*

***Aesthetics, Natural Habitats, and Wildness.*** People described certain characteristics of the place associated with the wild, undeveloped setting of the refuge landscape (i.e., inherent qualities of protected areas in Alaska and elsewhere).

*"[I value] opportunities for solitude and wilderness."*

*"[I value] the wildlife, wildness, and untrammelled beauty."*

*"[I value] that habitat is managed for the natural ecosystem that exists."*

*"[T]he value of Alaska's unspoiled lands is unmatched anywhere in America, and therein lies its value. I am ... old and probably won't get back to Alaska, but I do greatly enjoy receiving the Wildlife Refuge newsletters and summaries of the different conservation plans."*

***Fish and Wildlife.*** People identified the nonhuman residents of the refuge as a value.

*"[I value] the wildlife and game."*

*"[I value a] home for birds, animals, and fish."*

*"[I value] the habitat provided for tundra swans and other wildlife that deserve to live free from human intrusion and consumption."*

***Research and Education.*** What people can learn from and about the place is a value.

*"[I value] partnership with locals on research, including youth."*

*“I value the constant studies being done in the refuge, which benefits everyone, particularly the local residents.”*

*“[I value] the activities within our village that are associated [with the refuge] ... opportunities for youth and adults. It’s very interesting, and it keeps some cultural activities moving forward with preservation.”*

### **1.8.3 Determine Planning Issues**

The planning team reviewed and summarized the comments and the issues raised by members of the public, refuge staff, and other Service divisions. Their analysis determined the most important issues to be addressed in the comprehensive plan. These issues were within the management purview of the refuge and presented multiple options regarding what could be done to address them. Section 1.9 in this chapter describes the planning issues and gives more detail on the process used to determine these issues.

### **1.8.4 Develop and Analyze Alternatives**

In April 2009, the planning team met in Kotzebue for two days of discussion to develop a set of draft alternatives, or management proposals, to address the issues. In November 2009, the planning team finalized three alternatives that were presented to the regional director of the Service and to the public for comment as part of the public review draft.

### **1.8.5 Prepare Draft Plan and Environmental Assessment**

The Service produced a draft for public review, which described the alternatives (including no action) for managing the Selawik refuge during the next 15 years. To comply with NEPA, the Service prepared an Environmental Assessment (EA) that was published as part of the draft comprehensive plan. The EA described an analysis of the potential effects of implementing each alternative and described how the Service selected the preferred alternative. The public review draft also described management direction that would stay the same no matter which alternative was implemented. The draft was announced in the Federal Register on October 21, 2010 (Vol. 75, No. 203, pg. 65026), mailed to over 3,000 interested individuals or organizations, and posted on the Internet. Refuge staff visited communities within and near the Selawik refuge to listen to people’s comments. The Service provided a 145-day public review and comment period (Federal Register Vol. 76, No. 17, pg. 4719). Approximately 40 comments were received.

### **1.8.6 Prepare and Adopt a Final Plan**

The planning team reviewed and summarized all public comments on the draft comprehensive plan, modified the document as needed, and developed this final comprehensive plan. A Finding of No Significant Impact (FONSI) was signed by the regional director in May 2011. A Notice of Availability of the final comprehensive plan was published in September 2011 in the Federal Register, and the full document, summary, and FONSI were posted to the Internet and distributed.

### **1.8.7 Implement Plan, Monitor, and Evaluate**

The Service and the refuge staff will work with partners to implement the final comprehensive plan (Chapter 5). A critical component of implementing this management direction is

monitoring. Monitoring is defined as measuring and assessing resource and social conditions to make sure that progress is being made toward meeting refuge purposes, goals, and objectives. Monitoring should be used to determine if the methods used to implement the comprehensive plan are effective in meeting management objectives for the Selawik refuge. The refuge applies an adaptive management approach in which information and experience learned from monitoring are used to evaluate and modify both methods of implementation and objectives as needed.

### **1.8.8 Review and Revise the Plan**

The Selawik refuge staff will periodically review the comprehensive plan to assess the need for changes (Chapter 5). The Service will revise it when new information becomes available, when ecological conditions change, or when an important need becomes evident. If major changes are proposed, public meetings may be held and a NEPA process initiated if required. Consultation with appropriate State agencies, Native governments, and other organizations would occur during any future revisions. Full review and revision of the comprehensive plan will occur approximately every 15 years. The refuge staff will continue to inform and involve the public throughout implementation and monitoring by reporting its activities at community meetings and by mailing updates and newsletters.

## **1.9 Planning Issues**

The planning team identified eight major planning issues. Several methods were used during scoping to identify issues: a public open house, comment card mailing (i.e., two-page worksheet, return postage paid), visits to local communities, interviews with village elders and other knowledgeable citizens, and internal discussions by the planning team and refuge staff. The issues are problems, concerns, opportunities, or unsettled matters that could be addressed in a variety of ways. The Service objectively considered a wide range of approaches to address each issue. The goals, objectives, and management direction described in the final comprehensive plan provide the refuge manager with appropriate guidance for addressing the issues.

The planning team identified a broad range of topics underlying potential issues. This bulk of information was refined and clarified during working meetings. Concise statements were written by a subcommittee to summarize the key issues.

### **1.9.1 How will the refuge protect fish, wildlife, habitat, subsistence, and the wild character of the refuge while addressing community needs?**

When asked what they valued most about the refuge, people overwhelmingly mentioned either subsistence or the refuge's wild beauty, abundance of wildlife, and natural habitat. Many people mentioned both subsistence and these other qualities. Considerable public interest exists from many sectors of the public to maintain the refuge in its current state, which includes unspoiled habitats, opportunities for subsistence activities, and experiences of solitude and remoteness in a wild, natural setting. Many people did not favor increased visitation to the refuge. Others commented on the need for local community and economic development, including tourism, timber harvest, gravel mining, utilities, and energy options. The high cost of living and lack of infrastructure in communities within and adjacent to the refuge elevate the importance of this question. Opinions differed on community development issues among both local and national publics.

Representative comments include:

*“It is a beautiful habitat and I subsistence [hunt and fish] frequently in the area. Just keep it the way it is.”*

*“[The refuge] supports our livelihood—hunting caribou and moose, trapping, fishing, and picking berries. ... Preservation of how we use the land is of utmost importance.”*

*“Keep it wild.”*

*“We like its remote location and natural, safe environment for all the animals and fish and also its abundance of wildlife.”*

*“... [I]t is imperative that the refuge continues to be an undisturbed and quiet retreat for both species and people alike.”*

*“[Keep] it the way it is but [make] way for future work for roads and whatever is planned for our lands.”*

*“I wouldn’t encourage ecotourism—at least that’s my view.”*

*“We don’t want to see more visitors on the refuge. We like it how it is.”*

*“Resource development issues should be addressed in the plan. For instance, does the refuge have information on natural gas seeps in the area?”*

*“How we used to get logs for house, cache, or lumber is not the same anymore. The regulations on harvesting live timber have completely ignored our way of harvesting them. Now it requires a lot of work and gas to get a few logs, too far back from the river and too few from one place.”*

*“Develop tourism with locals building, managing, and guiding tourists.”*

*“Is it possible to lay fiber-optic cable across the Refuge to improve the region’s broadband capability?”*

**1.9.2 How will the refuge address long-term transportation needs in the region and access to refuge lands?**

None of the communities in the Northwest Arctic Borough are linked by road, and no roads connect this region to the rest of Alaska. Public discussion of road development in the region has resurfaced recently in response to skyrocketing fuel costs and economic hardships in outlying villages. Selawik, Noorvik, and Kiana are villages centrally located in the region and within or adjacent to the refuge that would likely to be among the early targets for road development, should it occur. Opinions on roads are divided. The refuge needs to explore options for addressing future road development and its many ancillary effects.

During scoping, refuge staff and a non-governmental organization identified various forms of motorized transportation such as all-terrain vehicles (ATVs) and helicopters as a concern.

None of these forms of motorized transportation appear to be key issues at this time but have potential to become issues in the future.

Representative comments include:

*“I’d like to see a road from Kiana to Selawik, especially now that I’m getting old.”*

*“What about roads between the villages? We need roads between the villages to reduce the cost of fuel.”*

*“I wouldn’t go for it, for roads connecting villages. There’s no point in connecting Noorvik, Kiana, and Selawik. What purpose would we use these roads for?”*

*“For safety, roads would be good between the villages. Early and late in the winter people still try to travel when the conditions are dangerous. We’ve fought roads for so long, but maybe it would be good.”*

*“Regarding helicopters, we strongly support prohibitions on recreational helicopter access in all refuges in Alaska including Selawik.”*

*“[We] strongly urge the U.S. Fish and Wildlife Service to restrict jet ski use on Selawik refuge and believe jet skis should not be allowed on Alaskan refuges.”*

### 1.9.3 How will the refuge maintain fish and wildlife populations?

Considerable support for maintaining fish, wildlife, and their habitats was expressed in the comments. Several people mentioned wildlife as what they valued most about the refuge, while others listed wildlife management as an important future issue facing the refuge. Other comments addressed changes in the caribou migration, the need for additional research on fish and wildlife, and protection of sheefish. The most frequently mentioned wildlife concern was management of the beaver population. Many people in Selawik believed the local beaver population was too high, and some wanted the refuge to take a more active role in managing this animal. With the State of Alaska and other partners, the refuge will explore ways to address this concern.

Representative comments include:

*“Wildlife understandings [are important to me]—about how the local animals live, [how to] help predict game declines, and research why.”*

*“Caribou migration routes keep changing.”*

*“[I’m] concerned about the possibility of overharvesting sheefish.”*

*“Will there be wildlife left for our grandchildren?”*

*“We have too many beaver. They are blocking creeks and polluting water. We have too many. We’ve been complaining to young hunters that they need to harvest them.”*

*“Control the beaver population. The beaver is affecting the Selawik River fish and spawning areas, damming the lakes and rivers, and polluting the water....”*

*“We’re getting more and more beaver. It’s hard to say what Fish and Wildlife Service should do about beaver. It would be good to clear out those close to the village—that’s the only source of water around here and we need to keep it clean.”*

#### **1.9.4 How will the refuge maintain quality hunting opportunities and experiences within the refuge boundary?**

The conflict between non-local hunters and subsistence hunters is a serious and longstanding concern in the northwest Arctic region. This conflict is a complicated problem, involving social and cultural values and other components related to hunter access, hunting opportunity, and the timing and routes of migrating caribou. With the exception of one particularly troublesome year, the conflict tends to be less intense on Selawik refuge lands than in other more heavily hunted parts of the region. Nonetheless, it remains a serious concern to the Service, local residents, and subsistence hunters who use refuge lands.

State and Federal agencies have attempted to address this complex issue for years with mixed results. Past management actions in one part of the region frequently displaced the conflict to another part of the region. A multi-stakeholder group, the GMU 23 Working Group (Working Group), formed in 2008 to address the issue on a region-wide basis in a deliberate and coordinated way aided by a facilitator. The Working Group held its fifth official meeting in May 2010, completing the initial phase of its work and meeting its original objectives. At the end of the final meeting, group consensus was to continue informally meeting once a year to maintain communication (GMU 23 Working Group 2010). Because the Selawik refuge was a participant in phase one, the Service supported funding a second phase of the Working Group for a period of one to four years. The second phase was funded by the partners, and the Working Group met in May 2011. The new role and objective of the Working Group is to closely review and provide suggestions on agency management plans in the region.

During public scoping, many people expressed concern about the numbers of non-local hunters, lack of limits on transporters, and impacts of big game hunting guides on subsistence hunters. One person requested a prohibition on hunting on the refuge, another person expressed concern that non-local hunters were being unreasonably restricted in their hunting on the refuge, and some expressed interest in a muskoxen hunt on the refuge.

##### Representative comments include:

*“Too many fly-in hunters”*

*“There should be a limit on the number of clients a transporter can take.”*

*“Transporter issues should be addressed. The agencies should look at transporter concession areas, like the big game guides have. Give them a concession area that they have motivation to treat well. The guides seem to do a good job; it’s the transporters who create problems.”*

*“Aircraft interfere with the caribou migration and turn them back. Caribou are very touchy—the first herd migrating is very touchy.”*

*“Hunting guides are the biggest issue. It only takes one operator to ruin the whole [caribou] migration by moving them away from local hunters. Residents are restricted to areas they can access by boat, so if a guide messes it up, it’s really bad for the whole community.”*

*“The double standard of allowing unlimited harvest of wildlife by Native hunters while excluding non-Native hunters through limited permits and denied access has made the area of little value to most Americans.”*

*“We appreciate the Refuge’s active participation in the Game Management Unit (GMU) 23 Working Group and ongoing efforts to resolve user conflicts through this interagency cooperative process.”*

*“I would like to be able to hunt lone bull musk ox in the Selawik River basin—excellent meat and a useful skin.”*

### **1.9.5 How will the refuge address local public use needs on the refuge, including trails, shelter cabins, the Singauruk (Siñiaġruk) Bridge, and the Hot Springs?**

Several established winter trails cross the refuge that link Selawik to Buckland, Noorvik, Kiana, Ambler, and Shungnak. With no roads in the area, these trails serve as the “highways” of the region, providing critical transportation routes for subsistence activities and inter-village travel. Many are heavily travelled from fall freeze-up to spring break-up. Maintaining the trail markers and the emergency shelter cabins (Figure 1-7) along these routes is an annual demand involving numerous individuals and communities and coordination by the Northwest Arctic Borough. Many comments were received during the scoping process on the marking of existing trails and the maintenance of shelter cabins on the refuge. Other comments suggested possibilities for additional marked trails and shelter cabins.

Several comments expressed concern about the design or location of the Singauruk (*Siñiaġruk*) Bridge, which spans a major stream on the Noorvik to Selawik winter trail (Figure 1-8). Designed for snowmachine use, the bridge was built by the Selawik refuge and Northwest Arctic Borough to traverse an area with chronic overflow and open water. For several reasons, the bridge is not as useful as had been hoped, largely because the approaches are too narrow and too steep.

The Hot Springs, located at the far eastern edge of the refuge, is an important public use area for local residents. Several comments expressed the need for cabin improvements at the Hot Springs, better trail marking, and an improved trash disposal system.



Figure 1-7. Shelter cabins, such as this one at *Paniqsivik*, contribute to public safety by providing winter travelers with emergency protection from stormy or cold weather.

Representative comments include:

*“Have GPS coordinates for the winter trails and have those available on a website so residents can download a map and important coordinates.”*

*“I have concerns about the conditions of the shelter cabins. I want users of the cabins to be more respectful of cabin conditions (e.g., how they leave the cabin when finished there). Cabins are important resources for winter travelers.”*

*“I’d recommend permanent markers for the trails. Just putting little pieces of spruce or willow isn’t enough.”*

*“A trail south of Selawik to winter hunting area might be a good idea.”*

*“The [Sijagrak] bridge has too much arc. It’s hard to get up with a loaded sled, and [the sled load] pushes you down on the other side. [It] needs to be about 150 feet further downstream.”*

*“We could use more stakes on the Hot Springs trail. Sometimes it gets real stormy on the tundra and people get lost.”*

*“The cabins at Hot Springs are getting old and rotten. It would be good to fix them up.”*

*“Need a good incinerator at the Hot Springs so bears and other animals won’t get into it.”*



Figure 1-8. The Singauruk (*Sijjaġruk*) Bridge along the Noorvik-Selawik winter trail spans a major stream that often has overflow or open water.

### 1.9.6 How will the refuge monitor and address the effects of climate change?

Climate change was frequently mentioned in the scoping comments as one of the most important issues facing the refuge in the future. Both the local and national publics seem to be well aware of the change occurring in the Arctic and its implications for humans and wildlife alike. As one of only a few refuges north of the Arctic Circle, the Selawik refuge is situated to experience the direct impact of these changes. Though uncertain, predicted changes for the refuge include warmer temperatures, especially in winter; a longer growing season; thawing permafrost; drying wetlands; increased precipitation but drier conditions due to warmer temperatures; and a possible increase in fire frequency and intensity. Public scoping comments on climate change were a mix of personal observations of environmental change, requests for continued monitoring of changes, and interest in information exchange and outreach.

#### Representative comments include:

*“Climate change has been observed. Less snow has really reduced hunting due to poor traveling conditions these last couple of years. Birds seem to be coming later and leaving more suddenly.”*

*“Things are a lot different now. We don’t have the cold weather we used to. We don’t have the storms. When I was a boy going to school, we used to have deep, deep drifts. We used to have cold spells for two to three weeks, one month. ... The permafrost is melting—the ground drops right down.”*

*“Climate change is one of the greatest threats facing ecosystems and wildlife populations today, and the refuge should make this issue a priority....”*

*“[Expanding] weather monitoring across the refuge would be important for understanding both wildlife and habitat management goals.”*

*“It would be good to keep people informed about what is happening today.”*

### 1.9.7 How will the refuge address water quality and quantity issues?

Public comments indicated a concern about contamination of water and subsistence resources from specific sites off the refuge, including aging village garbage dumps, sewage facilities, and an abandoned submerged airplane in the Selawik River. Demand for water for ice road construction within the refuge boundary was identified internally as a potential issue. The refuge will work cooperatively with appropriate landowners and managers, including the State of Alaska, to address water quality and quantity concerns.

#### Representative comments include:

*“The dump really needs to be cleaned up. During the spring it overflows and runs into the river.”*

*“We have water quality concerns. We have the plane in the river, the dump along the river, and water always coming in and going out. Is there a way the borough, city, tribal council, and FWS could write a letter to get the plane out of the water?”*

### 1.9.8 How will the refuge enhance its relationship with communities, provide more outreach, and better communicate with the public?

Many public scoping comments reflected the broad topics of education, outreach, and the refuge’s relationship with local communities. The specifics of these comments ranged widely, covering such issues as search and rescue, traditional knowledge, elder involvement, youth programs, environmental education, communication of research results, local hiring of refuge staff, clarification of refuge regulations and policies, and location of office facilities. Many comments were complimentary of refuge staff and programs, while others pointed out new opportunities or areas needing improvement. The refuge highly values good relationships with its neighbors and partners, understands the importance of timely and relevant communication with the public, and appreciates the need for environmental education and programs for youth. The challenge for the refuge is to prioritize the many possibilities given available staff time and resources.

#### Representative comments include:

*“It would be good to get word out in the [Arctic] Sounder (local newspaper) or in the EPA newsletter about climate change (local environmental program partnering with U.S. Environmental Protection Agency). We would like to know more about it in this area.”*

*“When something happens on public lands—NPS or FWS—I wonder about search and rescue. It’s always up to the villages to carry out search and rescue, but I wonder what the agency policies are for search and rescue.”*

*“Do you have any plans to place a more extensive refuge office in the Village of Selawik?”*

*“We need an update on any changes that happen, [such as a] monthly newspaper.”*

*“What are the regulations for gathering firewood?”*

*“Really positive about what FWS is doing with the kids and the Elder camps. [It] has made a big difference in what people think of the agency.”*

*“It would be good to have FWS staff teach survival ... young people need to know about survival.”*

*“More consultation from elders [is needed].”*

*“Glad to see local people more involved.”*

*“It would be good to work with children more. Let them know what you do and what kind of employment opportunities there are. Let them learn about the outdoors.”*

*“FWS research is good in general, but I would like to see researchers communicate better back to the people what they find as results.”*

## 1.10 References

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## **2. Management Direction for Selawik National Wildlife Refuge**

This chapter identifies and describes general principles, practices, and goals for managing the Selawik refuge. This chapter also outlines specific management actions, including detailed management objectives, to be implemented at Selawik refuge as part of the Revised Comprehensive Conservation Plan (comprehensive plan).

### **2.1 Introduction**

The Refuge System Administration Act, as amended, states that each refuge shall be managed to fulfill both the mission of the Refuge System and the purposes for which individual refuges were established. Managers at Selawik refuge ensure that any uses or activities at the refuge are compatible with the refuge's purposes. Compatible uses and activities do not materially interfere with nor detract from fulfillment of the mission of the Refuge System or the purposes of the Selawik refuge.

Managers must anticipate future conditions to maintain the health of individual refuges and the Refuge System as a whole. Managers must act proactively to avoid adverse impacts and take actions to conserve and protect refuge environments and visitor experiences. To be proactive, managers must recognize the relationships that connect natural resources, local communities, and broader stakeholder groups. Proactive managers acknowledge that refuges are parts of larger social and ecological systems.

Managers at Selawik refuge actively seek opportunities to forge partnerships and work with other Federal and State agencies, tribes, Alaska Native corporations, nongovernmental organizations, and research scientists. Effective partnerships allow managers to efficiently protect, conserve, and restore native fish, wildlife, plants, other organisms, and their habitats on refuge lands. Partners may help the refuge staff review and revise study plans, gather information and conduct formal data collection, or review and revise reports; or they may participate on planning and project teams.

#### **2.1.1 General Principles and Standard Practices**

The Selawik refuge operates in accordance with many laws, Executive orders, regulations, and Service policies that guide natural resource management (Appendix A). This section summarizes this larger body of management direction into a set of guiding principles and standard practices used to manage the Selawik refuge:

- Monitor and address the effects of accelerating climate change at a landscape level.
- Conserve, protect, and maintain fish and wildlife populations, habitat values, ecological processes, and biological diversity and integrity.
- Coordinate and cooperate with adjacent landowners and State fish and wildlife agencies.
- Maintain adequate water quantity and quality to meet refuge purposes and protect the Selawik Wild River corridor.
- Work with the State of Alaska to acquire necessary water rights.
- Provide opportunities to pursue research on wildlife and habitats and conduct inventory and monitoring projects for fish, wildlife, and plants.
- Provide opportunities to pursue social, cultural, and economic research.
- Protect and monitor cultural resources and historical sites.

- Protect the Selawik Wilderness Area and maintain the wild character of the refuge.
- Maintain opportunities for compatible wildlife-dependent recreation and learning experiences on refuge lands through active planning.
- Prioritize and increase opportunities for individuals, youth, and families to hunt, fish, observe and photograph wildlife, or participate in environmental interpretation and education.
- Allow appropriate and compatible private and commercial uses.
- Provide methods of public access currently allowed by law and regulation.
- Provide and support law enforcement on refuge lands.
- Implement the biological objectives described in this comprehensive plan.
- Implement the visitor services and public use objectives described in this comprehensive plan.

## **2.2 Management Goals and Objectives**

The refuge vision and purposes (Chapter 1, Section 1.4) provided the framework for developing goals and objectives for managing the Selawik refuge. Objectives are often applicable to more than one goal. To avoid duplication, the objectives have been listed under the most applicable goal. Details and justification for each objective are described in the rationales.

The full range of objectives is presented here to provide an overview of the management priorities that should be addressed during the life of this comprehensive plan. The objectives span three broad time frames: (1) current and ongoing priorities, (2) near-term priorities (within 5–8 years), and (3) long-term priorities (within 15 years).

The Service will cooperate with the State of Alaska, Native governments, and other partners to achieve these objectives. Funding and staffing will need to be increased during the next 15 years to achieve many of the objectives outlined in the comprehensive plan.

### **2.2.1 Goal 1: Conserve the diversity of fish and wildlife and their habitats on refuge lands, while allowing ecological processes to shape the environment.**

#### *Current and Ongoing Priorities*

**Objective 1:** Develop and implement an Inventory and Monitoring plan (I & M plan) for the refuge that integrates and directs inventory and monitoring activities of plants, fish, wildlife, and habitats, and complies with national Service policy. Revise and update plan as necessary.

Rationale: An I & M plan is required (Service Manual 701 FW 2). The Selawik refuge I & M plan was approved in June 2009 (Appendix E; USFWS 2009). This plan documents the rationale, techniques, and schedule for routinely conducting inventories and monitoring projects. This step-down plan is the core of the refuge’s biological program, and it ensures that information is collected in a biologically and statistically sound manner. Although refuge lands are the focus of the biological program, an ecosystem approach requires that a larger scale be used for long-term monitoring projects (Appendix A; Woodward and Beaver 2010). Objectives 2–8 under Goal 1 are planned for and will be implemented through the refuge’s I & M plan.

**Objective 2:** Work with international, national, State, local, and private entities to monitor migratory bird species abundance and distribution and assist in maintaining healthy bird populations throughout the United States and Western Hemisphere.

*Rationale:* The refuge has legal mandates, including refuge purposes, to (1) conserve and protect migratory bird species on the refuge and (2) fulfill international treaty obligations, including the Migratory Bird Treaty Act. Migratory bird species use wintering, staging, and migration stopover areas outside refuge boundaries. Cooperative projects allow the refuge to share expertise and limited funds across multiple organizations and coordinate regional, national, and international projects. The refuge assists its partners with larger management efforts by monitoring migratory bird species on the refuge and actively supporting similar endeavors throughout the migration pathways.

**Objective 3:** Monitor spring and fall migration and staging of waterfowl on the refuge and adjacent areas.

*Rationale:* Migratory waterfowl are specifically mentioned for conservation in the refuge's purposes. Because of increasing concern for mid-continent greater white-fronted geese and diving and sea ducks such as greater scaup and black scoters, the refuge contributes to studies involving these species. In cooperation with the Office of Migratory Bird Management, the Selawik refuge currently participates in a statewide breeding population survey for black scoters and a breeding pair survey for greater white-fronted geese. Staff members survey the refuge's coastal areas in the fall to monitor distribution and abundance of staging waterfowl and other birds.

**Objective 4:** Monitor and assist with management of the Western Arctic Caribou Herd to ensure conservation of the herd and the habitats upon which it depends.

*Rationale:* The Western Arctic Caribou Herd (WACH) is specifically mentioned for conservation in the refuge's purposes. The WACH is seasonally abundant on the refuge with a majority of the herd crossing the refuge during the spring and fall migration. Caribou are a highly desirable subsistence resource for local residents and account for the majority of mammals harvested on refuge lands. In 2009, the WACH was estimated to number 348,000 caribou, a continued modest decline since the 2003 high of 490,000 caribou (GMU 23 Working Group 2010; WACH Working Group 2010; ADF&G 2011).

Biologists are currently concerned about potential deterioration of forage conditions on the herd's winter range. A majority of the WACH range, including calving and winter habitat, is outside the refuge boundary. As a result, many of the human activities that could affect the herd (e.g., hunting and habitat management) are outside the refuge's area of management authority. To effectively meet the refuge's legal mandates, it is essential that the refuge support and participate in cooperative management efforts with other agencies and organizations.

The refuge actively participates in the WACH Working Group (Working Group), the primary cooperative management effort for the herd. The Working Group developed a management plan that allows State, Federal, and Native organizations to work together to ensure the long-term conservation of the WACH and the landscape on which it depends and to maintain access, both traditional and other, for the public benefit. Each agency agreed to assist in the implementation of the WACH Cooperative Management plan, published in 2003, by focusing on management actions consistent with their respective mandates and authorities while at the

same time coordinating with other agencies and the Working Group. The WACH Cooperative Management plan will be revised as necessary by the Working Group and its partners.

**Objective 5:** Inventory and monitor key species of mammals on the refuge to help ensure healthy and sustainable populations, including but not limited to wolves, black and brown bears, beavers, lynx, snowshoe hares, and other furbearers.

*Rationale:* Little is known about the number of bears, wolves, furbearers, and beavers on the refuge. Refuge staff should assess existing and emerging techniques for monitoring mammals to determine reliable and cost-effective techniques that would suit its needs.

Brown bear hunting regulations have been liberalized in recent years, and little is known about the impact of this on bear populations, which highlights the need for baseline data about bears and a monitoring program.

Snowshoe hares are of particular interest due to their cyclical nature, their role as a prey species, and their effect on vegetation. Other furbearers represent part of the species diversity within the refuge and have economic and cultural importance to trappers. Costly population estimates for furbearers are not necessary given the current low level of trapping activity, but data on general distribution and relative abundance are desirable. The refuge requires baseline data about snowshoe hares, wolves, and other furbearers, and it needs to monitor these species.

Beaver is an important species on the refuge. Their foraging and water manipulation activities influence aquatic and terrestrial habitats of fish and wildlife, and they are prey species for larger predators. Historically, beavers are new to the area, moving westward from interior Alaska approximately 60 years ago, and the perception of local residents is that the population is increasing. Local public concerns about more beavers on the refuge and their effects on fisheries and water quality point to a need for additional research and monitoring and communication with local residents. Techniques have been developed for estimating the number of beaver caches. Repeated surveys should be conducted to assess trends in population size for beavers on the refuge.

**Objective 6:** At intervals of 2-4 years, or more frequently based on conservation concerns, obtain a moose population estimate for the refuge, including age and sex ratios, by conducting aerial surveys in cooperation with neighboring State and Federal land managers when possible.

*Rationale:* Moose are important to the refuge in both ecological and human terms (Figure 2-1). They are an important subsistence species, and non-local hunters come to the refuge to hunt them. Moose populations on the refuge and adjacent lands are monitored in a regional effort with ADF&G, Bureau of Land Management, and National Park Service, which allows agencies to share limited resources, personnel, and funds. Partnering with these neighbors will improve conservation in the Selawik refuge area (Meretsky et al. 2006).



Figure 2-1 Moose expanded their range into the Selawik valley in the 1950s and have since become a subsistence food for local residents. Photo by Chris Zimmerman.

**Objective 7:** Inventory and monitor the abundance, distribution, and habitats of fish, including northern pike, sheefish, and whitefish species on the refuge.

*Rationale:* Sheefish conservation is specifically mentioned in the refuge's purposes. Whitefish, northern pike, and especially sheefish are important subsistence food sources for local residents. Over 20,000 sheefish are harvested each year in subsistence, sport, and commercial fisheries (Georgette and Loon 1990; Saveriede 2002; Georgette and Koster 2005). Given the importance of whitefish in the drainage, it is important to understand the life history, stock structure and dynamics, and habitat availability and use for their long-term sustainability.

The Fishery Management plan for Selawik refuge (USFWS 1993) documented issues and concerns regarding fisheries resources on the refuge. Among its objectives are: (1) to define important habitat locations (spawning, wintering, and rearing) for sheefish and whitefish stocks for three rivers, and (2) to define important habitat locations for Selawik River northern pike stocks. Determining seasonal distribution of whitefish and pike and mapping spawning areas of non-anadromous and resident fish are high priorities for the refuge.

**Objective 8:** Monitor landscape changes of vegetation and physical features at appropriate intervals or after significant disturbance.

*Rationale:* Studying and identifying changes in landscape is important for updating management needs, including meeting refuge purposes and addressing accelerating climate change. The refuge should monitor landscape-level changes in vegetation (e.g., resulting from fire, insect outbreak, temperature shifts) and physical features (e.g., rivers, wetlands) using tools such as medium- and high-resolution satellite imagery. This technology provides a cost-effective and reasonably accurate method for assessing vegetation and habitat change over time, updating land cover maps, and assessing the long-term effects and effectiveness of fire management actions. The refuge is currently working with researchers to monitor a thermokarst (an irregular land surface formed in a permafrost region by melting ground ice) on the upper Selawik River that has changed the flow and turbidity. Long-term vegetation plots are also monitored on the refuge.

**Objective 9:** Develop stronger partnerships with research and academic institutions, including U.S. Geological Survey, University of Alaska Fairbanks, and others, to better understand ecological processes on the refuge.

*Rationale:* Combining efforts to understand ecological processes in the northwest Arctic region of Alaska is an efficient way to gain knowledge and meet the challenges of limited budgets and expertise for research. Partnerships with conservation scientists at these institutions will strengthen the ecological foundations of the refuge's management goals, objectives, and strategies (Meretsky et al. 2006).

**Objective 10:** Implement and maintain an updated Fire Management plan for the Selawik refuge.

*Rationale:* The refuge contains a variety of ecosystems ranging from coastal tundra in the west to interior tundra and taiga ecosystems in the east. Fire is the major recycler of nutrients in the tundra and taiga ecosystems. Fire and flooding are two of the most important forces that determine the overall health and vigor of the refuge's ecosystems.

Service policy requires all refuges with vegetation capable of sustaining fire to develop a fire management plan. The plan provides management strategies that enable the Service to conserve, protect, or enhance habitats. Objectives within the plan address ecological relationships as well as human health and safety issues.

The Selawik National Wildlife Refuge Fire Management plan (USFWS 2005) will be revised as a step-down plan upon completion of this comprehensive plan to reflect new concerns, issues, and techniques. Option maps for wildfire suppression are reviewed annually. Changes in response levels or zone boundaries are submitted by March 15 each year to be incorporated into the Alaska Fire Service's atlas for the upcoming fire season.

*Near-term Priorities (within 5–8 years)*

**Objective 11:** Work cooperatively with private landowners and other partners to develop and implement a Land Protection plan for the Selawik refuge.

*Rationale:* A Land Protection plan (LPP) is a step-down management plan that is required for all refuges by policies of the Department of the Interior and the Service (Chapter 3, Section 3.3.4). It is used to identify priorities for habitat conservation on private lands within refuge boundaries. The LPP will be used to guide the refuge's land conservation activities and provide a framework for cooperation between the Service and private landowners. The LPP for the Selawik refuge is scheduled to be completed by December 31, 2013.

**Objective 12:** Work cooperatively with the Fairbanks Fish and Wildlife Field Office, ADF&G, and others to revise and update the Fishery Management plan for the Selawik refuge.

*Rationale:* A Fishery Management plan provides management objectives and strategies that enable the Service to conserve, protect, and enhance fish habitats. The current Fishery Management plan for Selawik refuge (USFWS 1993) was completed in close collaboration with the Fairbanks Fish and Wildlife Field Office, which has played an active role in its implementation. Within 5–8 years, the refuge will work with partners to update objectives in the Fishery Management plan to reflect current techniques, methods, protocols, and technology. The revised plan should focus on understanding ecological relationships, identifying key issues such as contaminants related to human health, and designing and conducting studies to fill gaps in what is known about fisheries resources on the refuge.

**Objective 13:** Develop a geodatabase model, with a supporting database system, that is compatible with the refuge's geographic information system (GIS). The model and supporting

database must be capable of storing and managing the refuge's current data collections and should include provisions for streamlining entry of data in both electronic and paper formats.

*Rationale:* GIS can be a powerful tool for assembling, storing, manipulating, and displaying geographically referenced information. A geodatabase is a database designed to store, query, and manipulate geographic information and spatial data. Over the course of the refuge's history, a wide variety of biological and management activities have occurred. Using these historic efforts as a starting point, it is possible to develop a geodatabase model that can accommodate the existing legacy data and much of the data collected in the foreseeable future. A geodatabase designed in this fashion will simplify data collection and will allow refuge staff to more efficiently manage and use data.

**Objective 14:** Complete entry and validation of all legacy, biological, and abiotic data within five years of development of the geodatabase model and supporting system as staffing capability allows.

*Rationale:* Conversion of existing legacy data into an electronic format and linking these data geographically (where possible) enables the data to be accessed by the refuge's GIS. Assembling biological and abiotic information into a compatible database will make this information readily accessible to more researchers and managers, minimize duplication, and maximize GIS implementation as an analysis and management tool.

### 2.2.2 Goal 2: Maintain the integrity and promote the environmental health of waters and aquatic habitats within the refuge.

*Near-term Priorities (within 5–8 years)*

**Objective 1:** In cooperation with the Service's Water Resources Branch, collect necessary hydrologic and biological data to quantify stream flow on key spawning areas for sheefish and whitefish, and apply for refuge instream water rights through the State of Alaska.

*Rationale:* Hydrologic processes create the dynamic habitat necessary to support plants, wildlife, and fisheries throughout the refuge. Changes in rivers and streams can affect the diversity and abundance of fish, wildlife, and plants. Clean water in sufficient quantities is critical for all species of plants and animals, including humans. Despite its importance, little is currently known about the hydrologic conditions within the Selawik refuge. Collecting and analyzing inventory and monitoring data on river and stream resources would substantially improve understanding of hydrology and help the refuge meet legal mandates to conserve water quality and quantity. One of the objectives in the refuge's Fishery Management plan is to develop a water quality database for five streams on the refuge (USFWS 1993). The refuge staff should work with specialists from other Service branches or outside the Service to design and implement feasible and productive studies.

**Objective 2:** Collaborate with the State of Alaska and others to initiate a water quantity and quality monitoring program for waters within the refuge boundary that includes investigating and addressing impacts to water resources related to human activities and settlements.

*Rationale:* Ensuring water quality and quantity necessary for the conservation of fish, wildlife, and their habitats is one of the purposes of the Selawik refuge. A water quantity and quality monitoring program would directly support this purpose and would identify and address human-caused influences that might affect water quantity or quality. Improper waste

disposal, fuel spills, and oil from motor boats and snowmachines are possible sources of pollution within the refuge. Collecting pertinent data will help the refuge compare changes over time and assess the impacts from pollution sources on and near the refuge. Collaboration on these projects with the State of Alaska and others is cost effective and allows for better management coordination.

### *Long-term Priorities (within 15 years)*

**Objective 3:** Formulate a strategy to inventory wetland and lake resources within the refuge, including aquatic plants, fish, wetland-dependent wildlife, aquatic invertebrates, and physical and chemical properties of lakes and wetlands.

*Rationale:* Changes in wetland characteristics can affect the diversity and abundance of fish, wildlife, and plants within the refuge, but existing conditions are currently not assessed or monitored. Data derived from wetland inventory and monitoring would greatly advance the understanding of lakes and wetlands within refuge boundaries, including the plants and wildlife that are dependent on them, and would establish a baseline for comparison of future conditions. This program would also examine the health of waters utilized by individuals in local communities and traditional camps. The refuge staff will coordinate with specialists from other Service branches or outside the Service to design and implement feasible and productive studies.

**Objective 4:** Assess the feasibility of developing a hydrologic model for the refuge's principal watersheds.

*Rationale:* A hydrologic model examines the movement of water on and below the surface of the earth and in the atmosphere. Developing a hydrologic model for the refuge's principal watersheds would enable the refuge to track and predict changes in the properties, distribution, and circulation of water and evaluate the effect of these changes on fish, wildlife, plants, and human communities. This model could allow the refuge to map directional flow of the rivers in the refuge and where aquifers may exist; explore the effects of accelerating climate change and changes in precipitation patterns that could affect flooding systems and water quantity; and examine the melting of permafrost, the alteration of drainage patterns, and changes in water temperature that could affect the survival of fish, aquatic plants, and invertebrates. The refuge staff will talk with elders and local community members to discuss current and historical water levels, water uses, and permafrost conditions and work with the local communities for placement of monitoring devices. Models are highly dependent on the availability and quality of data inputs; although the refuge does not currently have the information necessary to develop a successful hydrologic model, it hopes to do so within 15 years.

**Objective 5:** Investigate increased sedimentation in the upper Selawik River, especially due to a major thaw slump event in 2004, and determine its effects on water quality and fish habitat.

*Rationale:* A thaw slump is a slope failure resulting from thawing of ice-rich permafrost. Investigation of the increased sedimentation in the upper Selawik River due to a major thaw slump event in 2004 will provide managers with information that documents its occurrence and extent of distribution. Research is needed to assist resource managers in assessing the effects of this thaw slump on water quality and fish habitat. This information will be available to resource managers and the public and may be used to support future management efforts to address the sedimentation in the upper Selawik River related to this event and other sedimentation and water quality issues.

### 2.2.3 Goal 3: Provide and promote opportunities for local residents to engage in subsistence activities on the refuge.

#### *Current and Ongoing Priorities*

**Objective 1:** Continue the refuge information technician (RIT) program to enhance information exchange with local communities about refuge issues, particularly those dealing with subsistence. Expand the RIT program to Noorvik and other refuge communities when and where possible.

*Rationale:* Residents of most villages in and adjacent to the Selawik refuge generally have less contact with refuge staff than do residents of Kotzebue, where the refuge headquarters office is located. As local hires in the villages, RITs help bridge this gap by serving as informational and educational contacts for village residents. RITs are excellent refuge liaisons to tribal councils, schools, community organizations, and individuals who do not have ready access to the refuge office. RITs personally deliver information, answer questions, assist with research logistics, provide feedback to refuge staff, and advise refuge staff on local etiquette. Many local residents are comfortable interacting with a familiar person who better understands the local language, culture, and community. The refuge has had one RIT position in Selawik since the late 1980s. Expanding this program to Noorvik or other nearby communities as time and funding allow would increase the visibility and effectiveness of refuge programs.

**Objective 2:** Support community and regional efforts to educate and engage youth and adults in subsistence activities and to share the knowledge and experience of elders.

*Rationale:* Subsistence activities are a vital cultural and economic feature of community life in rural Alaska (Figure 2-2). Providing the opportunity for continued subsistence activities by local residents is one of the purposes of the refuge. The refuge can play an important role in perpetuating subsistence by supporting opportunities for the local public to learn from those skilled in traditional activities. Examples of these opportunities might include the Iñupiaq Days celebration, culture camps, survival training, indoor and outdoor demonstrations, elder interviews, radio spots, posters, and publications.

**Objective 3:** Continue to work closely with tribal councils, ADF&G, State Fish and Game advisory committees, the Office of Subsistence Management, the Northwest Arctic Subsistence Regional Advisory Council, the WACH Working Group, the GMU 23 Working Group, and other local and regional groups to address issues and concerns of local subsistence harvesters.

*Rationale:* The refuge is mandated by the Alaska National Interest Lands Conservation Act (ANILCA) to provide opportunities for continued subsistence activities by local residents. Subsistence activities account for a majority of public visits to the refuge. As a result of the importance and extent of subsistence, concerns related to subsistence regularly surface from local residents. The refuge and its partners play an important role in raising awareness about subsistence issues and working cooperatively to achieve common subsistence goals for the refuge. To achieve this objective, the refuge and its partners should regularly attend subsistence-related meetings, provide information on the status of resources utilized for subsistence purposes, and comment on proposals related to subsistence management.



Figure 2-2. Selawik residents frequently harvest whitefish with nets under the ice in early winter. Photo by Susan Georgette.

**Objective 4:** Continue to develop outreach tools that make hunting and fishing regulations understandable to the public.

*Rationale:* The Iñupiat have hunted and fished on refuge lands for countless generations in accordance with traditional rules and practices regarding harvest timing, methods, and limits. Today, the State of Alaska and the Federal government provide subsistence hunting and fishing opportunities within refuge boundaries, which has required local hunters to adapt to new and often complicated regulations. In some cases, the State and Federal regulations are identical, and in other cases, they diverge widely. It is not easy, especially for the local public, to understand the many facets of these regulations published in several multi-page booklets. Improving public understanding of hunting and fishing regulations will provide for a safer, more enjoyable hunting and fishing experience and lead to better compliance and reduced violations.

**Objective 5:** Seek opportunities to support and participate in research that contributes to management of subsistence resources and increases our understanding of subsistence practices.

*Rationale:* Iñupiaq elders in northwest Alaska hold substantial knowledge of the land, the resources, and harvest activities. Despite multiple research projects over the years, much of this knowledge remains undocumented. With a small staff, the refuge has limited capacity to conduct this research. However, the refuge in the past has helped support efforts by other researchers to document topics such as traditional knowledge of whitefish, the historic range of Western Arctic caribou, and historic uses of the Hot Springs. Continuing to support similar efforts would be a significant contribution to the refuge and the region, particularly because this type of knowledge is being lost as elders pass away. Possible topics for documentation include traditional knowledge of northern pike and burbot, historic trapping practices, traditional uses of furbearers, and traditional knowledge of caribou.

**Objective 6:** Coordinate and cooperate with partners to mark and maintain the winter trail system to provide safer travel on the refuge for subsistence and other activities.

*Rationale:* With no roads connecting communities, local residents rely on a network of winter trails for traveling between villages and accessing subsistence areas by snowmachine. This

trail system is the main public access to the refuge for seven or more months of the year. The refuge has five marked trails, linking the village of Selawik to Noorvik, Kiana, Ambler, Shungnak, and Buckland.

To be functional and safe in poor weather conditions, these trails must be well marked with willows, tripods, rods, or similar staking materials. These trail markers frequently fall down for various reasons or disappear when river and lake ice melt in the spring. Maintaining these markers is an annual effort coordinated by the Northwest Arctic Borough and carried out by community search and rescue organizations and many individuals. The refuge has been contributing to this effort in recent years by providing trail staking materials and staff time. The public has expressed interest in the possibility of marking additional trails, including one from Shungnak to the Hot Springs. Additional interest has been expressed in providing GPS routes for these trails on the Internet.

*Near-term Priority (within 5–8 years)*

**Objective 7:** Conduct a historical access study in cooperation with the State of Alaska and Alaska Native tribal elders and leaders living in communities within and adjacent to the refuge and NANA Regional Corporation and Northwest Arctic Borough as necessary.

*Rationale:* The Alaska National Interest Lands Conservation Act provides that “use for subsistence purposes of snowmobiles, motorboats, and other means of surface transportation traditionally employed” (811(b)) and “use of snowmachines ... motorboats, airplanes, and nonmotorized surface transportation methods for traditional activities” (1110(a)) shall be permitted subject to reasonable regulation. A study of historical access to the lands that now comprise Selawik refuge will help determine where and what activities have occurred on the refuge. An understanding of historical access will assist the refuge in monitoring and managing current and future access.

The preliminary methods for this study will include a thorough review of the Selawik refuge annual narrative reports and 1987 Comprehensive Conservation Plan (USFWS 1987a; 1987b) and other relevant documents and publications of a historical nature. Elders and other long-term residents of the Selawik area will be interviewed to find out what people did on lands that became refuge lands and what methods of access they used.

**2.2.4 Goal 4: Provide quality visitor experiences and enjoyment of resources on refuge lands through compatible recreation activities, including hunting, fishing, wildlife observation, and photography, in ways that minimize conflicts among visitor groups and residents.**

*Current and Ongoing Priorities*

**Objective 1:** Continue to implement and strengthen the refuge’s special use permit program and increase enforcement of and compliance with permit stipulations. Maintain current permit conditions for commercial transporting and guiding.

*Rationale:* The issuance of special use permits and collection of data from permit holders is an important aspect of monitoring refuge visitation and harvest from the Selawik refuge. The special use permit program provides for this information to be collected per regulations.

**Objective 2:** Coordinate with the State of Alaska, Bureau of Land Management, National Park Service, and NANA Regional Corporation to improve law enforcement effectiveness and efficiency on the refuge and surrounding lands.

*Rationale:* The majority of the refuge's law enforcement program is focused on enforcing State and Federal hunting regulations on the refuge and verifying compliance of commercial operators with their permit conditions. For all resource agencies, enforcement demands in the region are highest during the fall hunting season. With the large area of land and limited number of staff, coordination and communication can substantially improve the effectiveness of law enforcement, resulting in improved protection of resources on refuge lands.

Lands belonging to the National Park Service, Bureau of Land Management (BLM), State of Alaska, and private individuals adjoin the refuge. State wildlife officers and refuge enforcement personnel have overlapping jurisdictions and are often involved with the same or similar cases. These agencies benefit from sharing information and coordinating fieldwork. Improving communication between law enforcement personnel and village residents responsible for protection of tribal lands allows the refuge to respond more quickly to public concerns and collect time-sensitive data required for enforcement.

*Near-term Priorities (within 5–8 years)*

**Objective 3:** Consider and, as appropriate, support the initial recommendations of the Game Management Unit (GMU) 23 Working Group and continue to participate in the second phase of this group and any subsequent coordination or education efforts.

*Rationale:* Fall caribou hunting in GMU 23 in northwest Alaska has been the subject of user conflicts of a social and cultural nature since the early 1980s, particularly between local hunters, non-local hunters, and commercial operators (i.e., guides and transporters for big game hunting). There is not a resource concern; the region's caribou population is healthy, and hunting regulations have been modified to protect other species, such as moose and sheep. However, local hunters and other residents have been concerned about high numbers of visiting hunters and a lack of understanding of and perceived disrespect for traditional values and practices held by local residents. There is a perception that visiting hunters may be affecting hunting success in some areas. Non-local hunters want access to public land and quality hunting experiences; commercial guides and transporters want to be able to offer quality experiences to clients and operate profitable businesses.

The GMU 23 Working Group was formed in 2008 to improve communications and discuss issues related to fall hunting. The group has worked toward developing region-wide solutions to this problem of social conflict between local subsistence hunters and nonlocal hunters. The group has focused its efforts on solutions with broad public and agency support. Based on a recommendation of the group, a one-time mandatory education program has been initiated to help address concerns in the region regarding traditional values and practices. Supporting education efforts and other recommendations of the group, once approved, will likely reduce incidents of social conflict and the displacement of hunters to other areas where they may create similar challenges.

**Objective 4:** Produce an appropriate land status map of the refuge of a detail useful for visitors to identify and make a distinction between public and private lands.

Rationale: Public lands and privately owned lands are both located within the exterior boundary of the refuge. Virtually none of these lands are marked on the ground, making it challenging for the public to become familiar with land ownership and to follow the applicable laws and regulations. The Kobuk delta is a particularly challenging area for the public interested in hunting moose or caribou. Refuge land is limited, often located off the river corridor and interspersed with private land. The refuge occasionally receives inquiries from the public for a refuge map. Historically, unsettled land status has deterred the refuge from producing a high-quality product with a long useable life. Within 5–8 years of publishing this comprehensive plan, the refuge will design and print a quality map for the public to use now that Alaska Native land conveyances are mostly complete. (In 2011, lands selected by the State of Alaska were not yet conveyed.)

**Objective 5:** Provide recreational visitors with information on the refuge, highlighting the Selawik Wilderness Area and the Selawik Wild River.

*Rationale:* The National Wildlife Refuge Improvement Act of 1997 mandates that refuges manage for quality wildlife-dependent recreation. Since the refuge is generally remote with no road access, multi-day recreational trips are one of the only means to achieve this objective. Recreational visitors from outside the local area must plan their trip in advance and might face conditions and circumstances with which they are not familiar. The refuge periodically receives inquiries for information from non-local visitors. Current fact sheets on hiking and river floating are 20 years old. Staff members should continue to update these materials and add them to the refuge’s Web site to help the public plan recreational trips.

### **2.2.5 Goal 5: Provide outreach and education to foster a sense of stewardship and respect for wildlife, fish, cultural values, and the environment.**

#### *Current and Ongoing Priorities*

**Objective 1:** Continue to provide the public with timely and accurate information about the refuge through a wide variety of communication tools.

*Rationale:* The refuge has successfully developed a variety of tools to provide the public with accurate information about resources on refuge lands and programs. These tools include newsletters, brochures, fact sheets, Web sites, presentations, radio programs, posters, and personal contact. Staying alert to public information needs and re-evaluating the tools for best conveying information are critical tasks for maintaining and enhancing support of the Service and refuge. The refuge public is quite diverse, including indigenous people residing on the refuge, other Alaskans who visit to hunt and fish, and individuals from around the country and the world with an interest in the refuge. The refuge should continue to explore possibilities for development of new avenues for outreach.

**Objective 2:** As a refuge, become better positioned and able to promote education and stewardship programs that are relevant for local residents by contributing to the region as a familiar and responsive community member, striving to understand local needs and culture.

*Rationale:* Being an involved contributor to the community is highly valued in this region and leads to productive relationships among partners. Given the region’s small-town character, reciprocity is a key feature of community life. Participating in the activities of community organizations and groups creates greater support for refuge programs among residents. It is

important that refuge staff continue to learn about the range of issues facing the region while becoming more familiar with village life and traditions of Iñupiaq culture.

Refuge staff can foster a relevant sense of stewardship and increase support for refuge education programs by visiting local communities on a regular basis, taking part in local events and festivals, and listening to the people’s perspectives and experiences. Refuge staff should make the effort to get to know many local residents to hear what they value about the land and learn of their concerns regarding outreach and education programs on the refuge.

**Objective 3:** Continue to develop methods for delivering resource information in ways that are relevant to the culture by blending local perspectives, traditional knowledge, and scientific information.

*Rationale:* In the smaller communities in or near the refuge, 93–95 percent of the residents are Alaska Native, mostly Iñupiat. In Kotzebue, 77 percent of the population is Alaska Native. Many of the standard public education materials on resources are not appropriate for this population, many of whom reside within the refuge boundaries. Being culturally appropriate and aware facilitates success in all aspects of the work that refuge staff does with Alaska Native communities (Jacobs and Brooks 2010). Adapting education and outreach materials to a local audience by incorporating features of local life, language, and culture shows respect for community traditions, builds trust, and strengthens the ability of the refuge to convey its messages.

**Objective 4:** Participate in and support local science and cultural camps when opportunities arise and time and funding permit.

*Rationale:* Since 2003, the Selawik Science-Culture Camp has provided local students with opportunities to learn about natural history and traditional Iñupiaq life and to spend time in the outdoors (Figure 2-3). The camp is primarily run by the Selawik community, with support from the refuge and others. Over the years, the timing, location, and content of the camp have evolved, adapting to community and educational needs. Similar camps are operated sporadically in other villages in the region. Refuge participation in the Selawik camp should continue, especially with a RIT in the community. The refuge should participate in other community-led camps when funding and personnel are available. The Service’s Challenge Cost Share Program has served as a useful source of financial support for these camps in past years.



Figure 2-3. Students learn to cut and dry fish during the annual Selawik Science-Culture Camp.

**Objective 5:** Promote and support the Alaska Native Science and Engineering Program (ANSEP).

*Rationale:* The Alaska Native Science and Engineering Program (ANSEP) at the University of Alaska began in 1995 as an effort to increase advanced science, technology, engineering, and math education within rural Alaskan villages. In more recent years, a biological sciences component has been added through partnerships with the Service, ADF&G, and others. Recruitment of rural Alaskans, especially Alaska Natives, into the natural sciences—and the Service—is an important step in diversifying the agency and in bringing more local and cultural knowledge into resource management.

**Objective 6:** Increase cooperation with Friends of Alaska National Wildlife Refuges to expand interpretation and environmental education activities in the region.

*Rationale:* The non-profit organization Friends of Alaska National Wildlife Refuges was formed in 2005 to provide public education, assistance to refuges, and funding for refuge-oriented projects in Alaska's 16 national wildlife refuges. From 2006 through 2010, several volunteers from this organization participated in a variety of activities in Kotzebue and nearby villages, including spring bird walks, culture camps, school science fairs, and arts and crafts sessions. These volunteer efforts have expanded the number of educational programs the refuge offers or in which it participates. Enhancing the partnership with the Friends group would provide additional opportunities for outreach and environmental education programs in the region. Volunteers from the Friends group, in turn, gain opportunities for first-hand experiences in Alaska Native communities.

**Objective 7:** Participate in the Service's national and statewide outreach and education efforts.

*Rationale:* At the state and national levels, the Service has many outreach and education initiatives, including the Alaska Migratory Bird Calendar Contest, the online Fish and Wildlife Journal, the Centennial Celebration, and the Connecting People with Nature program. The regional and national offices regularly request outreach and education efforts on topics such as steel shot, avian influenza, duck stamps, endangered species, and invasive species. The refuge will continue to participate in these programs as needed.

**Objective 8:** Promote environmental ethics and "Leave No Trace" standards in the Selawik Wilderness Area and throughout the refuge. Continue to educate commercial operators to do the same for their clients.

*Rationale:* Encouraging "Leave No Trace" principles and techniques will likely decrease impacts associated with visitors to the refuge such as litter, human waste, and campfire scarring. This will help visitors understand the value of designated wilderness, and future visitors will enjoy quality experiences and unimpaired wilderness character. Since commercial operators have contact with a majority of the non-local visitors, they can also play an integral role in disseminating this information.

**Objective 9:** Ensure that administrative activities in the designated Selawik Wilderness Area are appropriate by conducting a Minimum Requirements Analysis for new activities and reviewing existing analyses when necessary.

*Rationale:* Section 4(c) of the Wilderness Act allows activities in designated wilderness that are otherwise prohibited if these activities are determined to be necessary to meet the

minimum requirements for the administration of the area. Such administrative activities are analyzed through a process called a Minimum Requirement Analysis (MRA), which is designed to help managers decide and document how they conduct management actions in designated wilderness (Minimum Requirements Working Group for Alaska 2006; USFWS 2006; Arthur Carhart National Wilderness Training Center 2009; USFWS, Region 7 Policy RW-29). By regularly doing new MRAs and reviewing and updating old ones, the refuge can maintain wilderness character within the Selawik Wilderness Area.

*Long-term Priority (within 15 years)*

**Objective 10:** Complete a Wilderness Stewardship plan for the Selawik Wilderness Area.

*Rationale:* Congress has entrusted the Selawik refuge with stewardship of a 240,000-acre wilderness area. Developing this step-down plan will allow the refuge to meet its wilderness management responsibilities in a unified direction. The refuge staff will prepare the Wilderness Stewardship plan using a public process and in accordance with the Wilderness Act, the Service's national wilderness policy (Service Manual 610 FW 1-4), and the provisions set forth in the ANILCA for managing designated wilderness areas in Alaska (Service Manual 610 FW 5).

## **2.2.6 Goal 6: Preserve and protect the cultural, historical, and archaeological resources of the refuge.**

*Current and Ongoing Priorities*

**Objective 1:** In cooperation with local communities, develop products that capture traditional place names and information connected to those places for the refuge.

*Rationale:* The lands, features, and places within the external boundary of the Selawik refuge are the ancestral homelands of the Iñupiat and remain part of their larger homeland today. The Iñupiat have named these lands, features, and places through time in their own language and in accordance with their cultural beliefs and intimate relationships with the land and the places there. Place names contain an enormous amount of information on traditional activities, culturally significant locations, historic camps and settlements, and other culturally important information. As elders pass away, their in-depth knowledge is lost to future generations if not properly documented. Preliminary compilations of place names in the refuge area already exist (Anderson and Anderson 1977; Anderson et al. 1998; Burch 1998; NANA Regional Corporation 1992). This earlier research should be supplemented with additional interviews and made more available through a publication or multi-media product. This would benefit both the refuge and the local communities.

**Objective 2:** Continue to develop programs that document traditional knowledge of elders and others about the cultural and natural history of the refuge.

*Rationale:* Knowledge of fish and wildlife population dynamics, ecology, and behavior is integral to people and cultures dependent on these resources. The roots of traditional environmental knowledge extend back thousands of years and lifetimes. This wealth of on-the-ground experience and knowledge about local resources can produce valuable insights for refuge biologists and researchers. Documentation of traditional knowledge preserves this information for future generations and provides baseline data on refuge environments. The refuge has supported these kinds of projects in the past, including studies of the historical use

of the Hot Springs and traditional knowledge of whitefish. The refuge should continue to support research that examines traditional knowledge.

*Near-term Priorities (within 5–8 years)*

**Objective 3:** Review and update the refuge’s Cultural Resources guide.

*Rationale:* Protection and preservation of the nation’s archaeological, cultural, historic, and architectural resources has long been a concern. A number of important laws have been passed that specifically protect these types of non-biological resources and values, including the National Historic Preservation Act of 1966 and the Archaeological Resources Protection Act of 1979. A refuge’s Cultural Resources guide serves as an internal guide for the refuge manager and staff in their efforts to meet legal requirements to protect and manage cultural resources (Diters 1997). These documents are written by the Service’s regional archaeological staff and developed in close collaboration with refuge staff and local experts such as village elders. These guides are based on ideas and recommendations of the refuge staff and their partners after considerable study and review of existing sources of information and local knowledge. A Cultural Resources guide was completed for Selawik refuge (USFWS 2002) and will be reviewed and revised to provide new guidance. The revised document will be titled Cultural Resources Management plan, and its development is scheduled to begin in 2012.

**Objective 4:** Support local community efforts to address exposed and eroding gravesites.

*Rationale:* Burial sites on both public and private lands are scattered throughout the area within the refuge’s exterior boundary. Currently, some of these graves are exposed or becoming so as a result of erosion by weather or water. Community members, especially in Selawik, have frequently expressed concern about these eroding gravesites and a desire to move, re-bury, and mark the remains.

Erosion will continue to affect cultural resources on coasts and rivers on refuge lands. Warming temperatures associated with accelerating climate change will affect more sites and remains that were previously frozen, causing loss of information that could be useful to local communities and refuge managers. This is an opportunity to protect cultural sites in partnership with local tribal governments and individual landowners who seek assistance from the refuge while, at the same time, mitigating potential effects of climate change on cultural resources.

**Objective 5:** Research and compile published and unpublished materials containing the cultural history of the refuge, including archival records, historical census data, photographs, audio tapes of interviews with elders, journals, maps, and other sources.

*Rationale:* Valuable cultural and historical information about the refuge is contained in existing published and unpublished materials that are not readily available to the public or refuge staff. This information could be of substantial benefit to the refuge and surrounding communities. Institutions such as the National Archives, Alaska State Library, Alaska Resources Library and Information Services (ARLIS), University of Alaska Rasmuson Library, and Anchorage Museum of History and Art are repositories for valuable historical material. The Northwest Arctic Borough School District and NANA also hold collections of historical interest. It would be useful for cultural resources research and management to explore these collections for data that is specific to the refuge. This material would augment the refuge library and be useful to the public and staff.

**Objective 6:** Identify areas on the refuge to inventory for archaeological and other cultural or historic sites, giving priority to those areas susceptible to erosion and vandalism.

*Rationale:* The National Historic Preservation Act requires the Service to inventory cultural and historic resources on refuge lands. Sites in the Selawik area are at risk from threats such as vandalism and soil erosion. Within 5–8 years, the refuge will perform surveys to identify and prioritize at risk sites in cooperation with local elders and the Service’s regional archaeologist. Then, as funding and personnel allow, the refuge and its partners should work to determine which threatened sites are eligible for inclusion in the National Register of Historic Places.

**2.2.7 Goal 7: Develop and maintain credibility and open communication with partners in resource management and conservation, including Federal and State agencies, educational institutions, local communities, Native corporations, tribal governments, neighboring landowners, businesses, and organizations.**

*Current and Ongoing Priorities*

**Objective 1:** Maintain a presence in the region by visiting communities on a regular basis to consult with local leaders about management programs on the refuge.

*Rationale:* Face-to-face interaction with local residents continues to be the most effective means for maintaining and building working relationships in the region. The local villages are small enough that it is possible to personally interact with local leaders and elders. Visiting community leaders on a regular basis fosters mutual understanding and offers opportunities for refuge staff to share information and hear local concerns and perspectives about resource management on the refuge.

**Objective 2:** Coordinate inventory and monitoring projects with the ADF&G and other agencies to best assure integration and prevent unnecessary duplication.

*Rationale:* The refuge and other Federal land managers conduct inventory and monitoring programs within their area boundaries. In addition, the ADF&G is responsible for basic inventory and monitoring of fish and wildlife on all lands throughout Alaska. Coordinating efforts among agencies is a cost-effective approach that maximizes resources. A model example is the interagency aerial moose population survey each spring (Goal 1, Objective 6).

**Objective 3:** Develop a formal coordination effort with other Federal and State land managers in the region to better communicate and share information on land use planning.

*Rationale:* Formal coordination among public land managers leads to better management across boundaries because it creates consistency for visitors to public lands and reduces concerns associated with displacement of visitors.

**Objective 4:** Actively participate and engage in regional transportation planning.

*Rationale:* Transportation development, particularly roads, has the potential to substantially change the region. Sharply higher prices for fuel and goods beginning in 2008 have led to more serious discussions about transportation alternatives for northwest Alaska. Keeping informed and involved with these planning efforts as an active participant is crucial for long-term management of access to both resources on refuge lands and public uses of the Selawik refuge. Staying involved with regional transportation planning is necessary to meet the missions of the Service and the Refuge System.

Road construction projects under consideration in 2011 included a road to the Ambler Mining District from the Dalton Highway that could eventually extend to Nome or the Red Dog road; a road from the Dalton Highway to Nome along the Yukon River; and a variety of other inter-village secondary roads, such as one linking Kotzebue, Selawik, and Noorvik. If any of the proposed routes crossed the refuge, an environmental impact statement would be required with opportunities for public comment. The process for considering a road within the refuge is outlined in ANILCA Title XI and the related regulations. The refuge can allow roads in some areas, but only if they are compatible with refuge purposes and if there is no economically feasible and prudent alternative route for the road. The State of Alaska has identified rights-of-way for roads and trails on public and private lands within the Selawik refuge (Appendix F).

**Objective 5:** Support and actively participate in the Western Arctic Caribou Herd (WACH) Working Group and other collaborative management efforts.

*Rationale:* Cooperative natural resource management is becoming increasingly common in Alaska. For example, the WACH Working Group developed a collaborative management plan to allow State, Federal, and Native organizations to work together to ensure the long-term conservation of the WACH and the ecosystem on which it depends. This partnership is an important development for the refuge because a majority of the herd's calving and winter range is outside the refuge boundary, which means that many activities that could affect the herd such as hunting and habitat management are outside the authority of the refuge. To effectively conserve resources on refuge lands and to meet the refuge's legal mandate concerning the WACH, it is essential that the refuge actively support and participate in the WACH Working Group as a dedicated partner (Meretsky et al. 2006).

A second group has been created to cooperatively manage muskoxen in northwest Alaska in which the refuge expects to become an active participant.

**Objective 6:** Establish a formal venue for presenting and publishing previously unpublished reports from refuge research projects (i.e., gray literature) to increase credibility and communication with scientists, academia, and the public.

*Rationale:* The refuge supports the development of a technical report series for refuge project reports that may not fit within the parameters of academic journals. The Service is currently working to develop a national technical series. If the national series does not come to fruition, then Region 7 plans to reinstate a regional technical series. The refuge supports and will contribute to a publication series that formally communicates results of refuge research to be made available through the ARLIS consortium library and other local archives.

*Near-term Priorities (within 5–8 years)*

**Objective 7:** Actively participate in the Western Alaska and Arctic Landscape Conservation Cooperatives.

*Rationale:* Landscape Conservation Cooperatives (LCCs) are being formed across the nation. The fundamental role of an LCC is to help address science needs for conservation in a defined geographic area. The general model for implementing the LCC concept is to bring partners together to identify what they can collectively agree on as conservation interests and science needs (Appendix A). Then, the partners determine how they can collectively address those needs in their geographic area. The Western Alaska and Arctic LCCs are both important partnership opportunities for the Selawik refuge. By participating in these LCCs, the refuge

can work with its conservation partners to identify and address shared conservation concerns that span throughout western Alaska and the Arctic.

### **2.2.8 Goal 8: Develop a leadership role in addressing climate change in northwest Alaska.**

#### *Current and Ongoing Priorities*

**Objective 1:** Collaboratively develop and conduct research on accelerating climate change and incorporate new monitoring efforts into the refuge's I & M plan to detect short- and long-term changes to resources on refuge lands.

*Rationale:* Uncharacteristically rapid rates of change in some climate variables, especially warming temperatures in the Arctic, have been documented (Serreze et al. 2000) and linked to human activities (IPCC 2007). The Service has referred to this as accelerating climate change, and responding to its effects on resources on refuge lands is a regional and national priority (Appendix A; USFWS 2010; Woodward and Beever 2011).

Although uncertainty exists, impacts of accelerating climate change on physical and biological systems around the world continue to be documented (Rosenzweig et al. 2008). Research related to climate change in Alaska has examined drying of wetlands (Klein et al. 2005; Riordan et al. 2006), changes in the fire regime (Kasischke and Turetsky 2006), and effects of different fire regimes on caribou habitat (Rupp et al. 2006). More research and monitoring are needed in northwest Alaska to help the Service anticipate and respond to physical and biological changes to refuge habitats.

The Refuge Improvement Act provides the Service with a leadership role in developing research and management partnerships with other organizations and landowners (Meretsky et al. 2006). Partnering with the conservation and research communities across the region is the best strategy for achieving this objective because it is cost effective, combines the expertise and resources of multiple organizations, and leads to better conservation. The refuge will continue to work with universities, the U.S Geological Survey, the ADF&G, and tribal organizations to develop research studies specific to resources on refuge lands.

Two current examples of cooperative projects include (1) investigating the Selawik River thaw slump and associated impacts to fish populations and river dynamics and (2) examining patterns and causes of lake drying. As time and funding allow, the I & M plan will be revised to include projects designed to detect both short- and long-term changes in the ecosystem associated with climate change. Objectives 2–5 under Goal 8 include a collaborative research and monitoring focus designed to help the refuge better understand and respond to potential effects of accelerating climate change in northwest Alaska.

When the Western Alaska LCC is established, the Selawik refuge will work with this LCC partnership to meet shared conservation priorities (Goal 7, Objective 7). Involvement in the LCC, and with other large partnerships such as the WACH Working Group (Goal 7, Objective 5), will be important in evaluating the potential effects of climate change across the landscape. This will enable the refuge to better manage resources and understand its role in the region as ecological processes and biological populations respond to climate change.

**Objective 2:** Monitor Global Research Initiative in Alpine Environments (GLORIA) site at 3-year intervals according to the standardized protocol.

*Rationale:* In 2006, Selawik refuge was accepted as an observation site within a worldwide monitoring network studying the effect of climate change on high mountain environments. The network is known as the Global Observation Research Initiative in Alpine Environments (GLORIA) and headquartered at the Department of Conservation Biology, Vegetation and Landscape Ecology at the University of Vienna in Austria (<http://www.gloria.ac.at/>). The purpose of GLORIA is to establish and maintain a long-term observation network for the comparative study of the effects of climate change on mountain biota. Mountain environments host an outstandingly diverse and highly specialized flora. Climate change threatens much of this unique biodiversity.

GLORIA is studying high mountain environments because these allow the study of impacts caused by climate change without or with minimal masking effects caused by human activities and thus can be more accurately assessed for ecological consequences related to climate change. Most of the network's 47 observation sites are located in Europe; Selawik refuge is the first GLORIA site in the North American Arctic. The site was established in the Hockley Hills in 2007 and will be revisited every three years. The program is described in the Gloria Field Manual – Multi-Summit Approach, which can be viewed at [http://www.gloria.ac.at/downloads/GLORIA\\_MS4\\_Web\\_english.pdf](http://www.gloria.ac.at/downloads/GLORIA_MS4_Web_english.pdf).

*Near-term Priorities (within 5–8 years)*

**Objective 3:** Collaboratively assess and improve climate monitoring on the refuge and in the surrounding region, including installation and maintenance of climate stations.

*Rationale:* Changes in water quality and quantity due to lake drying and thaw slumps can potentially affect waterfowl and fish habitats. Changes in temperature and vegetation may substantially affect the Western Arctic Caribou Herd (WACH).

Establishing additional climate stations within the WACH range will supplement the existing Remote Automatic Weather Stations (RAWS) established by the Alaska Fire Service and the refuge. RAWS sensors monitor air temperature; relative humidity; wind speed, direction, and direction peak; precipitation; fuel temperature; barometric pressure; solar radiation; and fuel moisture. Data from these stations are critical to understanding the stressors and drivers of vegetation changes important to the WACH. These data are used in numerous other applications, including fire weather, climatology, resource management, flood warning, and air quality management.

The Selawik refuge will partner with the National Park Service, National Oceanic and Atmospheric Administration, North Slope Science Initiative, State of Alaska, and others to meet this objective. Opportunities already exist to collaborate with the National Park Service on their climate station network and the U.S. Climate Reference Network in northwest Alaska.

**Objective 4:** Support efforts to integrate both ecological and social scientific data with local traditional knowledge and observations on climate change.

*Rationale:* Rural subsistence communities in Alaska (Callaway et al. 1999; Gray 2007) and other parts of the Arctic (Nuttall 2007) are at risk from the effects of accelerating climate change. Our current level of knowledge about the impacts of these changes on human activities such as subsistence is, at best, uncertain (Duerden 2004). The ecological consequences of climate change are still largely unknown but will likely be far reaching and multi-faceted, possibly including drying lakes, erosion, increased shrubs, shifting distributions

of wildlife, changes in precipitation and water flow, and village relocations. Monitoring these changes can be made easier by incorporating the knowledge and observations of local residents, many of whom are keen observers of the environment with long-term perspectives. More social science research and gathering of local ecological knowledge, both traditional and current, are needed to improve our understanding of and capacity to mitigate the social and ecological impacts of climate change in northwest Alaska. The Selawik refuge will continue to actively support this type of integrated research and knowledge.

**Objective 5:** Using a variety of methods, including education programs, share information with the local public about accelerating climate change and its effects on refuge lands and natural resources in the region.

*Rationale:* The Service has set national goals and objectives to engage and educate the public about accelerating climate change (USFWS 2010). Climate change is not only in the news and on the minds of scientists and managers around the world, but also in the daily lives of those living in northwest Alaska. Numerous studies are taking place in the Arctic to investigate these changes and to develop conservation strategies for addressing them. Scientific results are often highly technical and difficult for the public to understand. Refuge staff can play an important role in engaging local community members if they develop and use education programs and materials that are pertinent and appropriate for the local audience to present findings and conclusions from climate change research. The refuge must also take an active role in communicating with the public about any potential changes to refuge management in response to information learned from climate change research and monitoring.

## 2.3 Specific Management Direction

### 2.3.1 Fisheries

Selawik refuge provides important habitat for a number of fish species, many of which are important subsistence resources. Scientific studies of whitefish species (Brown 2004; Brown 2005) and traditional cultural knowledge about these species (Georgette and Shiedt 2005) have highlighted the importance of accurate life history information about these fisheries and their management on the refuge. The Service and refuge staff will continue working with the State of Alaska, Native elders and communities, and other partners to collect additional information about whitefish and other important fisheries, including Iñupiaq traditional knowledge, as outlined in the Fishery Management plan for the Selawik refuge (USFWS 1993).

### 2.3.2 Migratory Birds

Selawik refuge provides vital breeding and staging habitat for large numbers of migratory waterfowl and shorebirds (Map 4-8). The Migratory Bird Treaty Act was amended in 1996 to legalize subsistence hunting and taking of eggs of migratory birds in Alaska during spring and summer. This amendment led to the establishment of the Alaska Migratory Bird Co-management Council (AMBCC) (Alcorn 2008). The Service and the refuge will continue to work with the AMBCC and other partners to collect accurate and extensive baseline data on species densities and abundance and subsistence harvests—the goals being to ensure that healthy populations are maintained, subsistence opportunities are provided, and the Service's international treaty obligations are fulfilled (i.e., Migratory Bird Treaty Act).

### **2.3.3 Western Arctic Caribou Herd**

The Selawik refuge is a signatory of the Western Arctic Caribou Herd Cooperative Management plan (WACH Working Group 2003). The Service will continue to cooperatively manage refuge lands in a manner consistent with the Western Arctic Caribou Herd Cooperative Management plan and any future revisions or plan amendments.

### **2.3.4 Invasive Species**

Invasive plants and other non-native species represent a relatively new and potentially growing threat to the environmental integrity of the Selawik refuge and the region, especially near developments and in travel corridors where lands have been disturbed. Visitors to the refuge may provide the means of spreading invasive plant species to refuge lands through their clothing, recreational gear, and air or water craft. Other non-native species such as insects and mammals may be expanding their range to include refuge lands due to changes in habitat related to accelerating climate change. The refuge will continue to monitor invasive species and conduct a combination of management activities and other strategies to prevent, control, or eradicate these if necessary.

### **2.3.5 Environmental Contaminants**

The Service conducted a study of contaminants in water, sediments, and fish on the Selawik refuge in 1987 and 1988 and recommended that further work be conducted at the refuge to establish baseline data for concentrations of heavy metals (Mueller et al. 1993).

Routine management activities and public uses (and those proposed in the future) have potential to create sources of contamination, including spills on refuge lands or contaminants from the development of facilities outside or adjacent to refuge boundaries. The Selawik refuge will work with the Service's Environmental Contaminants Program to document baseline environmental conditions and establish a plan for long-term monitoring as developments occur within or adjacent to the refuge.

Scoping comments collected in fall 2008 as part of the environmental assessment for this comprehensive plan indicated local concern about contamination of water and subsistence resources in the lower Selawik River near the village of Selawik. Although it is on private land, the aging garbage dump used by residents of the village is near the river and is a potential contaminant site within the external boundary of the refuge (NWAB 2007). There is also concern over aging sewage facilities and an abandoned airplane submerged in the Selawik River. The Service and the refuge will consult with the village of Selawik, the State of Alaska, and the Service's office of Ecological Services to determine its role in research, monitoring, and potential clean up at this site and other sites where potential sources of contamination may exist.

### **2.3.6 Subsistence**

Providing for continued subsistence opportunities is an important purpose of the Selawik refuge. The Service and the refuge will increase efforts to monitor fish, wildlife, and plant populations and their harvest to ensure that subsistence uses of these resources remain compatible with other refuge purposes.

### **2.3.7 Recreation and Outreach**

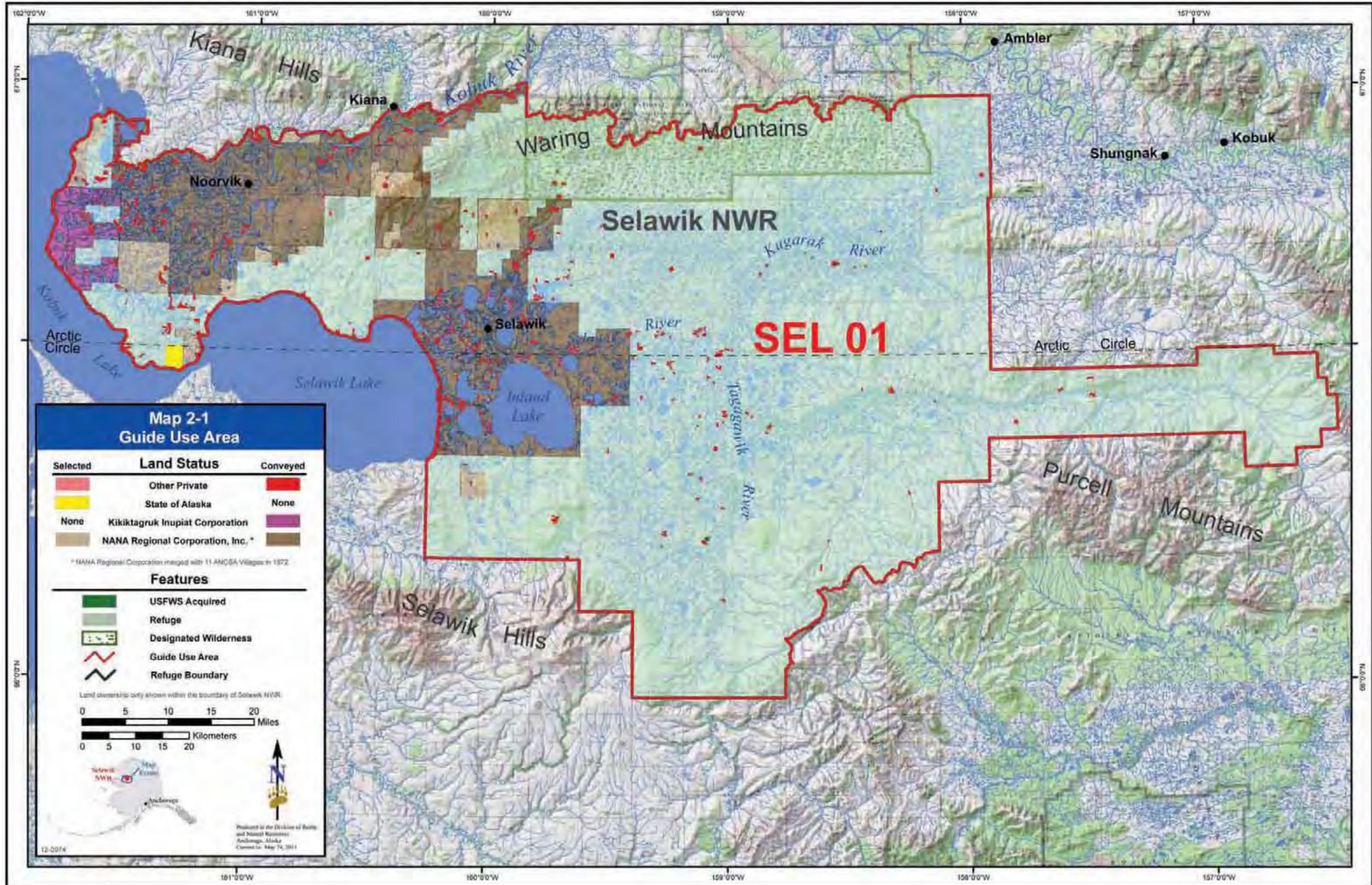
Wildlife observation and photography, environmental education, interpretation, and recreational fishing and hunting are the six priority public uses identified in the Refuge

Improvement Act. The Service and the refuge will encourage these uses where compatible with refuge purposes. The public recreational opportunities that currently exist at Selawik refuge will continue to be provided, including outreach programs in local communities such as science and culture camps.

### **2.3.8 Commercial Use of Refuge Lands**

The refuge is responsible for proactively addressing issues of access to game and social and cultural conflicts associated with big game hunting in the region, which have existed for years (Chapter 1, Section 1.9.4; Chapter 4, Section 4.4.2.3). The Service and refuge staff will continue to coordinate with their partners to closely communicate with and educate commercial guides and transporters—the goal being twofold: (1) minimize social conflicts on refuge lands and trespass on private lands and (2) provide safe and high quality experiences for members of the public who hire commercial services to bring them to the refuge for big game hunting or other types of outdoor recreation. The Selawik refuge will continue to participate as a member of the GMU 23 Working Group as long as it officially exists (Goal 4, Objective 3). The refuge will consider the approved proposals of the GMU 23 Working Group in the same manner it will consider suggestions and proposals from other organizations and the general public.

Commercial guides and transporters for big game hunting are authorized to operate on refuge lands by special use permit. There is one big game Guide Use Area for Selawik refuge (Map 2-1). Special use permits issued by the Service do not authorize commercial guiding, outfitting, or transportation services on private or selected lands located within the refuge boundary. As of 2011, conveyance of Native corporation land selections has substantially reduced the amount of remaining land in selected status, resulting in a patchwork of private Native corporation lands and public refuge lands in the western portion of the Selawik refuge (Map 2-2). During fall hunting season, the situation in this patchwork area requires managers to take a proactive stance when permitting commercial uses to reduce conflicts among hunters and trespass on private lands.



**Map 2-1  
Guide Use Area**

Selected	Land Status	Conveyed
	Other Private	
	State of Alaska	None
None	Kikiktatruk Inupiat Corporation	
	NANA Regional Corporation, Inc. *	

\* NANA Regional Corporation merged with 11 ANCSA Villages in 1972.

**Features**

- USFWS Acquired
- Refuge
- Designated Wilderness
- Guide Use Area
- Refuge Boundary

Land ownership only shown within the boundary of Selawik NWR

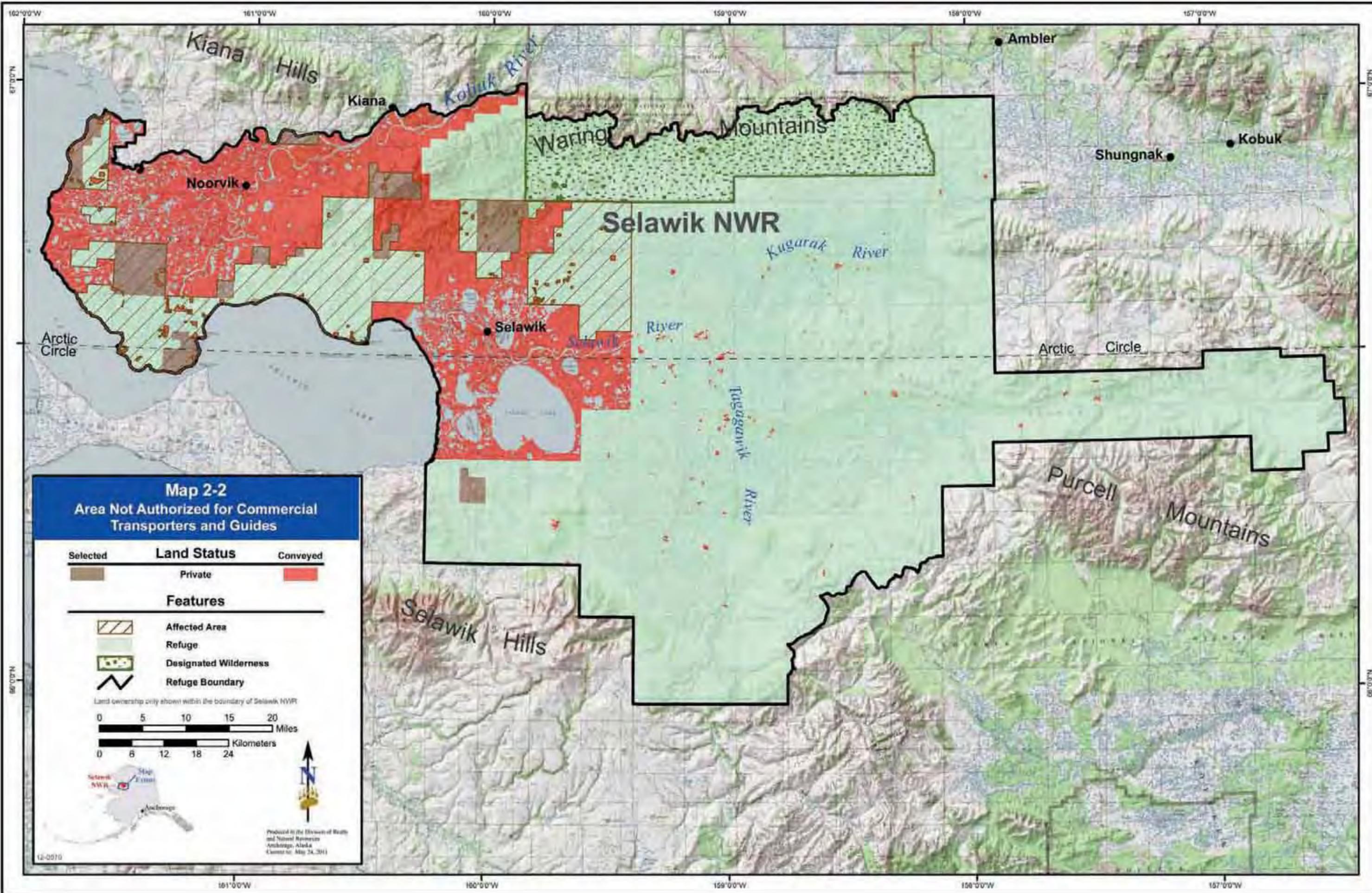
0 5 10 15 20 Miles

0 5 10 15 20 Kilometers



Product of the Division of Biotic and Natural Resources  
Anchorage, Alaska  
Current to: May 24, 2011

(Back of Map 2-1)



**Map 2-2**  
**Area Not Authorized for Commercial Transporters and Guides**

Selected	Land Status	Conveyed
	Private	

**Features**

- Affected Area
- Refuge
- Designated Wilderness
- Refuge Boundary

Land ownership only shown within the boundary of Selawik NWR

0 5 10 15 20 Miles  
 0 6 12 18 24 Kilometers

Produced by the Division of Realty and Natural Resources, Anchorage, Alaska, Current to May 24, 2011

(Back of Map 2-2)

Use by commercial guides and transporters for big game hunting is not authorized by permit stipulation on refuge lands in close proximity to private lands in the northwest portion of the refuge where refuge lands are intermingled with private lands (Map 2-2). The area affected by this permit stipulation is approximately 376,378 acres of refuge lands. The legal definition of the affected area is on file at the refuge headquarters and is available upon request. As the remaining selected land becomes conveyed and other changes occur, the refuge manager will update and revise land status maps showing the affected area and provide these maps to commercial operators as part of their permit packages.

On a case-by-case basis, the refuge manager at Selawik refuge can reauthorize commercial use by special use permit for a specific area or areas within this larger affected area. The refuge manager will use two criteria to evaluate requests for commercial operations in the affected area shown in Map 2-2: (1) a compatibility determination will be completed and (2) an 810 analysis will be conducted.

### **2.3.9 Shared Administrative Facility**

A formal partnership and memorandum of understanding (or other voluntary agreement among partners) will be created between the Service, Selawik refuge, Northwest Arctic Borough (NWAB), NANA Regional Corporation (NANA), Maniilaq, tribal council(s), and city council(s), or some combination of these groups. This partnership will jointly maintain a shared facility of one or more buildings with adequate capacity for office, meeting, storage, and bunkhouse space in the community of Selawik or Noorvik or both. The shared facility will serve as a multi-purpose community center focused on providing refuge activities and programs. The programs will highlight subsistence and the close relationship between the community and refuge lands.

### **2.3.10 Motorized Access to Refuge Lands**

ATVs fall under the definition of off-road vehicle found in the Code of Federal Regulations: “Off-road vehicle means any motor vehicle designed for or capable of cross country travel on or immediately over land, water, sand, snow, ice, marsh, wetland, or other natural terrain, except snowmobiles” or snowmachines; off-road vehicles “includes, but is not limited to, four-wheel drive or low-pressure-tire vehicles, motorcycles and related two-, three-, or four-wheel vehicles, amphibious machines, ground-effect or air-cushion vehicles, air-thrust boats, recreation vehicle campers, and any other means of transportation deriving motive power from any source other than muscle or wind” (CFR 50 36.2).

The use of all-terrain vehicles (ATVs) pursuant to 43 CFR 36.11(g) is not allowed on refuge lands in the Minimal, Wilderness, and Wild River Management categories. ATVs may be authorized only on designated routes in areas within Intensive or Moderate Management or by special use permit upon a finding by the refuge manager that such use is both appropriate and compatible with refuge purposes. No routes or areas are currently designated on Selawik refuge lands for ATV use. There is no known documented historical or established pattern of ATV use for subsistence purposes on Selawik refuge lands. See also Chapter 3, Sections 3.3.13.1 and 3.3.14.2.

The Service and the staff at Selawik refuge will plan and conduct a traditional access study of motorized use on refuge lands for subsistence purposes. This traditional access study would be conducted in close cooperation with the State of Alaska and Native governments, elders, and local communities (Goal 3, Objective 7). The goal of the study is to increase understanding

of ATV use in the Selawik area for the Service, the State of Alaska, and their partners in the communities in and adjacent to the refuge. This study offers an opportunity for cooperation and collaboration among the Service, the State of Alaska, and local communities.

### **2.3.11 Local Public Use Needs**

**Winter Trail Marking.** A formal partnership and memorandum of understanding (or other voluntary agreement among partners) will be created between the Service, Selawik refuge, NWAB, NANA, and Alaska Department of Transportation (DOT) to formalize the roles and responsibilities of each partner in performing regular marking of winter trails and maintenance of trail markers. The goal of this partnership is to support local efforts to mark the winter trails and address the need for more leadership and oversight of the winter trails network on and adjacent to refuge lands.

**Shelter Cabins.** A formal partnership and memorandum of understanding (or other voluntary agreement among partners) will be created between the Service, Selawik refuge, NWAB, NANA, and local SAR organizations to formalize the roles and responsibilities of each partner in performing regular maintenance and/or replacement of shelter cabins on refuge lands. Members of the formal partnership will review the need for additional shelter cabins and appropriate location(s) for them, with the option of joint construction of an additional shelter cabin or relocation of an existing shelter cabin on refuge lands.

**Singauruk (Siñiaḡruk) Bridge.** A formal partnership and memorandum of understanding (or other voluntary agreement among partners) will be created between the Service, Selawik refuge, and NWAB to formalize the roles and responsibilities of each partner in jointly re-evaluating the bridge for rebuilding or repairs. The objective is to assess and address issues related to slope, approach, width, and location for the bridge. Regular management and maintenance of the Singauruk (Siñiaḡruk) Bridge will become the responsibility of this partnership.

**Hot Springs.** A formal partnership and memorandum of understanding (or other voluntary agreement among partners) will be created between the Service, Selawik refuge, the Shungnak and Huslia elders, and other partners as needed, to formalize the roles and responsibilities of each partner in performing joint facility maintenance at the hot springs site. The partnership will develop and maintain a trash disposal system, identify and conduct major repairs of structures, and perform regular cabin maintenance.

### **2.3.12 Competitive Events of Community and Historic Importance**

**Dog Sled Racing.** The Service will authorize, by special use permit, the annual Kobuk 440 and the occasional Kobuk 220 dog sled races on winter trail areas on refuge lands. These races are important both for social and cultural reasons to residents of local communities and to mushers from Alaska and outside the State. The Service will evaluate requests for other dog sled races on a case-by-case basis with any new dog sled racing activities subject to the appropriate use and compatibility determination policies.

**Snowmachine Racing.** The Service will authorize, by special use permit, the annual Willie Goodwin/Archie Ferguson historic snowmachine race on winter trail areas on refuge lands. This race predates establishment of the refuge and is locally important to residents of the region. Currently, a six-mile segment of the over 200-mile race course is on refuge lands. The Service and the refuge will evaluate requests for all other snowmachine races on a case-by-case basis with any new snowmachine racing activities on refuge lands being subject to the appropriate use and compatibility determination policies.

### 2.3.13 Funding and Personnel Requirements

When the refuge implements the management direction described in this chapter, it will substantially expand its existing programs and partnerships. The refuge staff will also work to increase involvement in the resource and youth programs that were identified during scoping by people in Noorvik and Selawik. To accomplish this, three additional staff positions (refuge information technicians, GS-7) are needed, along with office and storage space, in the communities of Noorvik and Selawik. A part-time maintenance position (WG-5) is also needed to assist with the refuge's increased participation in marking and maintaining winter trails and shelter cabins.

Establishing a joint office and community center in Noorvik and Selawik (Section 2.3.9) requires additional funds to assist with remodeling and annual operational costs. Remodeling costs will vary depending on the buildings available. Once office space is ready for occupancy; we expect annual operating cost, including maintenance, to be similar to current costs for leased office and storage space in Selawik. An additional \$25,000 in base funds, adjusted for inflation, will be required to provide administrative facilities in both Noorvik and Selawik.

Addressing public concerns over the Singauruk (*Sijiagruk*) Bridge requires additional funding to explore design modifications, meet environmental compliance regulations, and cover construction costs. A dollar amount is difficult to estimate, but it will likely require \$40,000 in contracting, staff time and logistic support for the first phase of planning. Funds are required to expand the existing winter trail system and provide additional shelter cabins. This amount depends on the nature of trail expansion and construction or relocation of shelter cabins.

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## **3. Regional Management Policies and Guidelines**

### **3.1 Overview**

Sections 3.2 through 3.4 describe direction for the management of national wildlife refuges in Alaska. This management direction is primarily derived from the laws governing the National Wildlife Refuge System (Refuge System) and national and regional regulations, policies, and guidance developed to implement these laws. Although the Selawik refuge is unique, it is only one piece of the system. The management direction presented here represents the common base for management of the Alaska refuges and identifies appropriate sideboards for management of individual refuges.

Some deviations from these regional management policies and guidelines are likely to appear in each comprehensive conservation plan (comprehensive plan), given differing establishing orders or refuge purposes. Any specific departures from these policies and guidelines will be clearly described, along with supporting rationales, in each refuge's revised comprehensive plan.

The descriptions of management categories presented in this comprehensive plan are not identical to those in the 1987 comprehensive plan for the Selawik refuge (USFWS 1987a). These descriptions of management categories will remain constant for all of the comprehensive plans unless an exception is justified and warranted.

### **3.2 Management Categories**

Five management categories (Intensive, Moderate, Minimal, Wilderness, and Wild River) are used to describe the management levels throughout the Alaska refuges. A management category is used to define the level of human activity and development that is appropriate for a specific area of a refuge. A management category is a set of management directions applied to an area based on its resources and existing and potential activities or uses. These categories have been adopted and applied to accomplish refuge purposes and achieve management goals.

Lands within the Selawik refuge currently fall into three management categories: Minimal (approximately 1,800,000 acres), Wild River (approximately 117,000 acres), and Wilderness (approximately 240,000 acres) (Map 3-1). The Management Activities Table (Table 3-1) shows the administrative, public, and commercial activities and facilities that may be allowed in each management category and under what conditions. Management direction is described for the Intensive and Moderate Management categories to provide a basis of comparison and to be available if this comprehensive plan is amended in the future in ways that would require refuge lands to be designated either Intensive or Moderate Management. Management categories that do not apply to current management of the Selawik refuge are shown over a grey background in Table 3-1.

#### **3.2.1 Intensive Management**

The Intensive Management category is designed to allow compatible management actions, public facilities, and economic activities that may result in alterations to the refuge environment. In Intensive Management areas, the presence of human developments and interventions may be very apparent. Roads, buildings, and other structures are likely to be seen. Intensive Management is applied to the smallest area reasonable to accommodate human developments and interventions.

Ecological processes or habitats may be modified through human intervention in an Intensive Management area. Habitats may be highly modified to enhance conditions for one or more species. For example, water regimes may be artificially controlled to improve habitat for waterfowl.

Substantial levels of public use may be accommodated and encouraged through alterations and modifications to the environment such as paving, buildings, developed campgrounds, and other facilities. Public facilities are designed to provide a safe and enjoyable experience of the resources on refuge lands and to increase understanding of fish and wildlife and their habitats for a wide range of visitors. Facilities are designed to accommodate a substantial number of visitors while protecting resources on refuge lands from damage and visitor impacts.

Compatible economic activities or uses of resources on refuge lands that result in alterations to the environment may be authorized in Intensive Management areas. All economic activities or uses must be compatible with refuge purposes and the mission of the Refuge System. Economic activities or uses require official authorizations such as special use permits.

### **3.2.2 Moderate Management**

The intent of Moderate Management is to allow compatible actions, public uses, commercial activities or uses, and facilities that may result in changes to the refuge environment that are temporary or permanent but small in scale and that do not disrupt ecological processes. The natural landscape is the dominant feature of Moderate Management areas, although signs of human activities may be visible.

The intent of Moderate Management is to provide, restore, or enhance habitats to maintain healthy populations of plants and animals where ecological processes predominate. For example, logging and prescribed burning may be used to convert mature forests to an early seral stage to enhance browse for moose. In general, management facilities, both temporary and permanent, will be allowed for the purposes of gathering data to understand and manage resources and ecological systems of the refuges. Structures will be designed to minimize visual impact.

Public facilities provided in Moderate Management are designed to protect refuge habitats and natural resources while allowing the public to enjoy and use resources on refuge lands in relatively low numbers dispersed over a large area. The Moderate category also allows shorter-term enjoyment of resources on refuge lands in focused areas as a means to concentrate visitors and impacts. The emphasis is on small facilities that encourage outdoor experiences. Facilities such as public use cabins, rustic campgrounds, kiosks, boardwalks, viewing platforms, trails, and toilets may be provided. Facilities will be designed to blend with the surrounding environment to minimize visual impacts.

Compatible economic activities may be allowed where impacts to ecological processes and habitats are temporary (e.g., small-scale logging where an earlier seral stage meets management goals; facilities that support guiding and outfitting services such as tent platforms or cabins that encourage enhanced public use). All economic activities and facilities require authorizations such as special use permits.

### **3.2.3 Minimal Management**

Minimal Management is designed to maintain the refuge environment with minimal or no evidence of human modifications or changes. Habitats are allowed to change and function

through ecological processes. Administration will ensure that the resource values and environmental characteristics identified in a refuge comprehensive plan are conserved. Public uses, economic activities or uses, and facilities should minimize disturbance to habitats and resources. Ground-disturbing activities are to be avoided whenever possible.

Management actions in this category focus on understanding ecological systems and monitoring the health of resources on refuge lands. Generally, no roads or permanent structures are allowed (except cabins). Temporary structures may be allowed in situations in which removal of the structure is planned after the period of authorized use, and the site can be rehabilitated using native plantings from the immediate adjacent area. Existing cabins may be allowed for administrative, public, subsistence, commercial, or economic (e.g., guiding) purposes. New subsistence or commercial cabins may be authorized if no reasonable alternatives exist. Public use or administrative cabins may be constructed if necessary for health and safety.

Public use of the refuge is encouraged for hunting, fishing, wildlife observation and photography, interpretation and environmental education, and subsistence activities. Public use facilities are generally not provided. Mechanized and motorized equipment may be allowed when the overall impacts are temporary or where its use furthers management goals.

If a transportation or utility system, as defined in Section 1102 of the Alaska National Interest Lands Conservation Act (ANILCA), is proposed to cross an area in Minimal Management, the authorization process would incorporate a corresponding comprehensive conservation plan amendment to change the management category in the affected area from Minimal to Moderate or Intensive Management, as appropriate.

Compatible economic activities may be allowed where the evidence of those activities does not last past the season of use, except as noted in the preceding discussion of cabins. The primary economic activities are likely to be guiding and outfitting of recreation activities such as hunting, fishing, hiking, river floating, and sightseeing. All economic activities and facilities require authorizations such as special use permits.

### **3.2.4 Wilderness Management**

The Wilderness Management category applies to areas designated by Congress as units of the National Wilderness Preservation System. The refuge manages the Selawik Wilderness Area, which was designated under ANILCA in 1980 and encompasses approximately 240,000 acres within the Waring Mountains. Any areas proposed for wilderness designation will be managed under Minimal Management, consistent with Section 1317(c) of ANILCA and U.S. Fish and Wildlife Service (Service) policy. Designated wilderness will be managed under the Wilderness Act of 1964 and the exceptions provided by ANILCA. Because the Selawik Wilderness Area is part of a nationwide, multi-agency system, the Service recognizes that responsibilities for managing designated wilderness go beyond the mission of the Service and that the purposes of the Wilderness Act are within and supplemental to the other purposes for which the Selawik refuge was established. (See Section 3.3.20 for guidelines on management of designated wilderness areas in Alaska.)

The history and intent of the Wilderness Act encourages managers to hold a broad perspective of the refuge landscape, one that extends beyond managing designated wilderness solely as wildlife habitat. It is managed as an area “retaining its primeval character and influence.” Designated wilderness provides visitors with opportunities for “solitude or a primitive and

unconfined type of recreation.” Recreation in designated wilderness areas has been characterized by an array of experiences such as discovery, self-reliance, remoteness, closeness to nature, challenge, self-reflection, and freedom from societal and managerial constraints (e.g., Hollenhorst and Jones 2001; Landres et al. 2008; Patterson et al. 1998).

Designated wilderness areas are managed to preserve numerous experiential values for people as well as aesthetic, scientific, and other related values. Research has shown that some values of designated wilderness areas extend beyond their boundaries to people who may never visit but who benefit from the protection of ecological processes—benefits such as clean air and water and the knowledge that such places exist (Cordell et al. 1998). In managing designated wilderness, refuge managers are encouraged to consider, in decision making, these off-site and symbolic values as well as tangible resource values.

Permanent structures are generally prohibited; exceptions include historic and cultural resources and, in certain circumstances, administrative structures or cabins that predate ANILCA, cabins that are necessary for trapping activities, and public use cabins necessary for the protection of human health and safety. Facilities and structures are rustic and unobtrusive in appearance.

Compatible commercial activities or uses of designated wilderness areas are generally limited to those activities that facilitate solitude and a primitive, unconfined type of recreation (e.g., guided fishing, hunting, and float or hiking trips into designated wilderness areas). All commercial activities and facilities require authorizations such as special use permits.

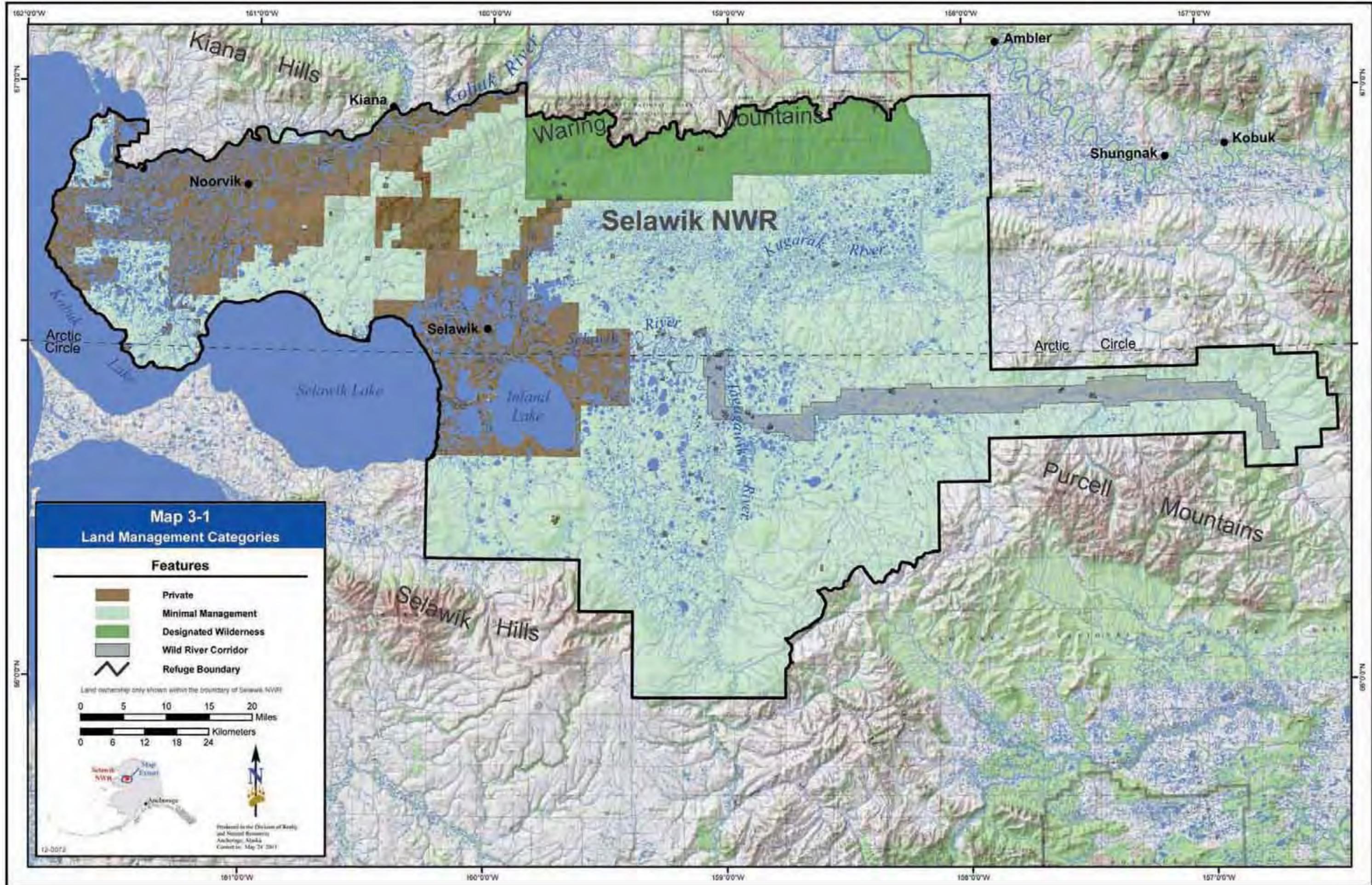
Actions such as prescribed fires or invasive species control may be conducted when it is necessary to protect life or property or when it is necessary to restore, maintain, or protect the mentioned values of designated wilderness. Management activities must be found to be the minimum requirements for the administration of the area as designated wilderness.

### **3.2.5 Wild River Management**

The Wild and Scenic Rivers category applies to those rivers and corridors of the adjacent lands that have been designated by Congress as part of the Wild and Scenic Rivers System. This is a national system of designated rivers that have outstandingly remarkable scenic, recreational, geologic, fish, wildlife, historic, cultural, or other similar values. All designated rivers on refuges in Alaska are classified as Wild Rivers. Wild rivers are those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and waters unpolluted.

Within this management category, water bodies are maintained in natural, free-flowing, and undisturbed conditions. The ecological functions of the river system are maintained. The appearance and scenic quality of the river and sense of wildness are preserved. Evidence of human activities is minimized.

Each river within the Wild and Scenic Rivers System has particular values for which it was designated; the management of a wild river must protect those specific values. Management actions focus on understanding, monitoring, and maintaining the natural resources, ecosystem function, and aesthetics of the river corridor.



**Map 3-1**  
**Land Management Categories**

**Features**

- Private
- Minimal Management
- Designated Wilderness
- Wild River Corridor
- Refuge Boundary

Land ownership only shown within the boundary of Selawik NWR

0 5 10 15 20 Miles

0 6 12 18 24 Kilometers

Produced by the Division of Reclamation and Natural Resources, Anchorage, Alaska. Current to May 24, 2011.

(Back of Map 3-1)

Permanent structures generally are not allowed, with the exception of historic and cultural resources and, in certain limited circumstances, subsistence or administrative cabins and associated structures. Cabins, temporary structures, and hardened sites should not be visible from the river; where this is impractical, facilities and structures are to be rustic or unobtrusive in appearance. Public use facilities would provide opportunities for low-impact, backcountry recreation experiences.

The upper 168-mile segment of the Selawik River was recognized for its outstandingly remarkable values and characteristics. Approximately 117,000 acres of the Selawik refuge were designated by ANILCA to be managed as a Wild River corridor under the Wild and Scenic Rivers Act (USFWS 1987a).

The following outstandingly remarkable values were identified for the Selawik Wild River corridor (Bureau of Outdoor Recreation 1976):

- **Subsistence** – hunting and/or fishing, traditional camps, house logs, and firewood.
- **Recreational** – float trips, camping, hunting and/or fishing, wildlife observation, and photography.
- **Scenic** – pristine forested corridor, diverse landscape, and wildness.
- **Wildlife habitats** – migratory waterfowl, other bird species, and large game.
- **Fishery** – northern pike, sheefish, whitefish, and Arctic grayling populations.
- **Cultural and/or historical** – early Iñupiaq archeological sites and medicinal hot springs used as traditional healing place by Iñupiat and Athabascans.
- **Hydrologic** – quality drinking water, free-flowing, and wetlands.

Compatible uses of the Selawik Wild River corridor will be allowed where those activities do not detract from these values. Primary commercial activities or uses are likely to be recreation services such as guided float trips, sightseeing, photography, fishing, and hunting trips. The Service may take management actions to preserve these values and characteristics of the Selawik Wild River corridor. All commercial activities and facilities require authorizations such as special use permits.

### 3.2.6 Special Management Areas

Special management lands are managed within one of the categories described previously with added requirements related to their establishment and special status.

In 2006, Selawik refuge was accepted as an observation site within a worldwide monitoring network, which was established to study the effects of climate change on high mountain environments. The network is known as the Global Observation Research Initiative in Alpine Environments (GLORIA) and headquartered at the Department of Conservation Biology, Vegetation and Landscape Ecology at the University of Vienna in Austria (<http://www.gloria.ac.at/>). The purpose of GLORIA is to establish and maintain a long-term observation network for the comparative study of the effects of climate change on mountain environments, which contain diverse and highly specialized plant species. The site in the Selawik refuge was established in the Hockley Hills in 2007 and will be revisited every three years. The program is described in the GLORIA Field Manual ([http://www.gloria.ac.at/downloads/GLORIA\\_MS4\\_Web\\_english.pdf](http://www.gloria.ac.at/downloads/GLORIA_MS4_Web_english.pdf)).

### ***3.2.6.1 Management of Selected Lands***

The Service retains management responsibility for lands selected but not yet conveyed to Native village and regional corporations or to the State of Alaska. The appropriate Native corporation or agency of the State of Alaska will be contacted and its views considered prior to issuing a permit involving these lands. Fees collected for special use or right-of-way permits will be held in escrow until the selected lands are conveyed or relinquished. Management of selected lands will be the same as for adjacent refuge lands.

## **3.3 Management Policies and Guidelines**

### **3.3.1 Introduction**

Refuge management is governed by Federal laws such as the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd), as amended, (Refuge Administration Act); the National Wildlife Refuge System Improvement Act of 1997, an amendment to the Refuge Administration Act (P.L. 105-57) (Refuge Improvement Act); and ANILCA; by regulations implementing these laws; by treaties; by Service policy; and by principles of sound resource management—all of which establish standards for resource management or limit the range of potential activities that may be allowed on the refuges.

ANILCA authorizes traditional activities such as subsistence, the exercise of valid commercial fishing rights, hunting, fishing, and trapping in accordance with State and Federal laws. Service regulations state that “public recreation activities within the Alaska National Wildlife Refuges are authorized as long as such activities are conducted in a manner compatible with the purposes for which the areas were established” (50 CFR 36.31(a)). Such recreation activities include but are not limited to sightseeing, nature observations and photography, hunting, fishing, boating, camping, hiking, picnicking, and related activities. The Refuge Administration Act, as amended by the Refuge Improvement Act, defines “wildlife-dependent recreation” and “wildlife-dependent recreational use” as “hunting, fishing, wildlife observation and photography, or environmental education and interpretation” (16 U.S.C. § 668ee). These public activities are encouraged and emphasized in visitor management programs on refuge lands in Alaska.

### **3.3.2 Management Emergencies**

It may be necessary, when emergencies occur on the refuge, to deviate from policies and guidelines discussed in this comprehensive plan. Activities not allowed on the refuge or under a specific management category, as shown in Table 3-1, may occur during or as a result of emergencies. For example, if naturally occurring or human-caused actions (e.g., landslides, floods, fires, droughts) adversely affect resources on refuge lands, it may be necessary to undertake rehabilitation, restoration, habitat improvement, water management, fisheries enhancement, or other actions that would not otherwise be allowed to the same extent on the refuge. Threats to human health and safety may also result during emergencies. In emergencies, the refuge manager is authorized to take prudent and reasonable actions to protect human life and to address immediate health, safety, or critical resource protection needs.

### **3.3.3 Land Exchanges and Acquisitions**

Under Section 1302 of ANILCA, and subject to certain restrictions, the Service may acquire by purchase, donation, or exchange any lands within the boundaries of Alaska refuges. Proposed land exchanges or acquisitions must benefit fish and wildlife resources, satisfy other purposes for which the refuge was established, or be necessary to satisfy other national interests.

Other laws provide the Service authority to purchase conservation easements (Service Manual 341 FW 1, Exhibit 1) or enter into cooperative management agreements to satisfy refuge purposes, national interests, or other objectives.

### 3.3.4 Land Protection Plans

Department of Interior and Service policies require development of a step-down plan, called a land protection plan, to address priorities for habitat conservation within refuge boundaries. Land protection plans inform private landowners what land within refuge boundaries the Service would like to see conserved for fish and wildlife habitat. The plans do the following:

- Identify the private lands within the refuge boundary that the Service believes should be conserved.
- Display the relative protection priority for each parcel.
- Discuss alternative means of land and resource conservation.
- Analyze the impacts on local residents of acquisition.

The Service acquires land from only those landowners who are willing to sell, and it only does so when other methods of achieving goals are not appropriate, available, or effective. Sometimes resource conservation goals can be met through cooperative management agreements with landowners or by similar means. The Service and the Selawik refuge would work with all landowners to ensure that overall fish, wildlife, and habitat values within the refuge are conserved.

A land protection plan for the Selawik refuge is scheduled to be completed by December 31, 2013.

A pre-acquisition environmental site assessment is required for all real property proposed for acquisition by the Service or for public domain lands returning to Service jurisdiction (Service Manual 341 FW 3).

### 3.3.5 Appropriate Refuge Uses

Comprehensive conservation plans include a review of the appropriateness and compatibility of existing refuge uses and of any planned future public uses. All uses of a national wildlife refuge over which the Service has jurisdiction must be determined to be appropriate under the Appropriate Refuge Uses Policy (Service Manual 603 FW 1). An appropriate use of a national wildlife refuge is a proposed or existing use that meets at least one of the following four conditions.

- (1) The use is a wildlife-dependent recreational use as identified in the Refuge Improvement Act, Section 5(2) (i.e., “hunting, fishing, wildlife observation and photography, or environmental education and interpretation”).
- (2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Refuge Improvement Act was signed into law.
- (3) The use involves the take of fish and wildlife under State regulations.
- (4) The refuge manager has evaluated the use following guidelines in the Service Manual 603 FW 1.11 in the subsequent text and found it appropriate.
  - (a) Do we have jurisdiction over the use?

- (b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?
- (c) Is the use consistent with applicable Executive orders, Department of the Interior and Service policies?
- (d) Is the use consistent with public safety?
- (e) Is the use consistent with goals and objectives in an approved management plan or other document?
- (f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?
- (g) Is the use manageable within available budget and staff?
- (h) Will this be manageable in the future within existing resources?
- (i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?
- (j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality, compatible, wildlife-dependent recreation into the future?

This comprehensive plan identifies those existing and proposed uses that are found appropriate and for which compatibility determinations were drafted for public review (Appendix D). The following uses have been found appropriate for Alaska refuges:

- Alaska Department of Fish and Game Management and Bureau of Wildlife Enforcement Activities.
- Commercial Big Game Hunting (and other hunting) Guide Services.
- Commercial Transporter Services.
- Subsistence and Trapping Cabins.
- Commercial Recreational Fishing Guide Services.
- Fishing (general and other).
- Helicopter Landings to Support Authorized Activities by other Federal, Tribal, State, and Local Governments, Universities, etc.
- Subsistence Harvest of House Logs.
- Recreational Hunting.
- Non-Wildlife Dependent Recreational Activities.
- Wildlife Observation and Photography, Environmental Education and Interpretation.
- Reburial of Archaeological Human Remains per State and Federal Guidelines.
- Research and Surveys.
- Subsistence Activities.
- Native Allotment Surveys.
- Trapping.

All current appropriate use documentation for the Selawik refuge is on file at the refuge headquarters and the Alaska Regional Office. If additional activities or uses not addressed in this comprehensive plan are proposed for the refuge, the refuge manager will determine if they are appropriate uses following the guidance in Service Manual 603 FW 1.

### 3.3.6 Compatibility Determinations

The Refuge Administration Act states that “the Secretary [of the Interior] is authorized, under such regulations as he [or she] may prescribe, to ... permit the use of any area within the [Refuge] System for any purpose, including but not limited to hunting, fishing, public recreation and accommodations, and access whenever he [or she] determines that such uses are compatible ... ”

A compatible use is a proposed or existing wildlife-dependent recreation use or any other use of a national wildlife refuge that, based on sound professional judgment, would not materially interfere with nor detract from the fulfillment of the Refuge System mission or the purposes for which the national wildlife refuge was established. Economic activities or uses must contribute to achieving refuge purposes and the Refuge System mission.

A refuge compatibility determination is the document that results from the analysis and public review conducted by the Service to find an activity or use compatible or not compatible with the purposes of a refuge. Compatibility determinations are not required for refuge management activities, except economic activities. They are also not required where statute directs mandatory approval of the activity, as in the case of facilities for national defense.

The Selawik refuge will follow normal administrative procedures for stopping an activity or use that is found to be incompatible. For example, the refuge manager will not issue a special use permit for any new activity or use that is found to be incompatible. In the case of an existing activity or use already under permit, the refuge manager will work with the permit holder to modify the activity or use to make it compatible or will terminate the permit.

Ending incompatible activities or uses on refuge lands that do not require a special use permit or other formal authorization, or that cannot be addressed by other Federal or State agencies, will require the refuge to go through the normal rule-making process. This will include publishing the proposed regulations in the Federal Register and providing adequate opportunity for public comment.

Compatibility determinations for existing hunting, fishing, wildlife observation and photography, and environmental education and interpretation must be re-evaluated with the preparation or revision of a comprehensive plan or at least every 15 years, whichever is earlier. Compatibility determinations for all other activities or uses on refuge lands must be re-evaluated every 10 years or earlier if conditions change or significant new information about an activity or use and its effects becomes available.

Compatibility determinations prepared concurrently with comprehensive plans or step-down management plans undergo public review and comment at the same time as the draft comprehensive plan and associated NEPA document (Service Manual 603 FW 2.11I). For compatibility determinations prepared separately from a refuge comprehensive plan, the Service will determine the appropriate level of public review and comment through a tiered approach based on the complexity and controversy of the use and the level of impact to the refuge (Service Manual 603 FW 2.12A(9)).

Draft compatibility determinations for activities or uses on the Selawik refuge are included in this comprehensive plan in Appendix D. Public comments on the draft compatibility determinations were included and addressed in the final compatibility determinations released with this final comprehensive plan for Selawik refuge.

Additional details on applying compatibility standards and completing refuge compatibility determinations are found in the compatibility regulations at 50 CFR (parts 25, 26, and 29) and in the Service Manual (603 FW 2). To review completed compatibility determinations for all refuges in Alaska, go to <http://alaska.fws.gov/nwr/planning/completed.htm>.

### **3.3.7 Mitigation**

In the interest of serving the public, it is the policy of the Service, throughout the nation, to seek to prevent, reduce, or compensate for losses of fish, wildlife, and their habitats, and uses thereof, from land and water development. To that end, the Service developed a Mitigation Policy in 1981 that includes measures ranging from avoiding an activity that results in loss of such resources to seeking compensation by replacement of or substitution for resource loss.

The Service will promulgate regulations, develop stipulations, and issue permits to reduce or eliminate potential adverse impacts resulting from compatible activities that may be authorized under this comprehensive plan. These regulations, stipulations, and permits would mitigate impacts in a variety of means, as stipulated in the Mitigation Policy guidelines (Service Manual 501 FW 2.1). The means, in order of application, are as follows:

1. Avoiding the impact altogether by not taking a certain action or parts of an action.
2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
3. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
4. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
5. Compensating for the impact by replacing or providing substitute resources or environments.

When determining whether activities or uses are compatible, projects should be designed first to avoid adverse impacts. The Service generally does not allow compensatory mitigation on Refuge System lands. Only in limited and exceptional circumstances related to existing rights-of-way could compensatory mitigation be used to find a use compatible. The Service Manual (501 FW 2 and 603 FW 2) provides more information.

Mitigation may consist of standard stipulations such as those attached to right-of-way permits; special stipulations that may be attached to leases or permits on a site-specific basis; and site- and project-specific mitigation identified through detailed step-down management plans or the environmental assessment process. In all instances, mitigation must support the mission of the Refuge System and must be compatible with the purposes of the refuges. The degree, type, and extent of mitigation undertaken would depend on the site-specific conditions present and the management goals and objectives of the action being implemented.

### **3.3.8 Coastal Zone Consistency**

Federal lands, including lands in the Refuge System, are excluded from the coastal zone (16 U.S.C., Section 1453[1]). The Coastal Zone Management Act of 1972, as amended (P.L. 92-

583), directs Federal agencies conducting activities within the coastal zone or that may affect any land or water use or natural resources of the coastal zone to conduct these activities in a manner that is consistent with approved State management plans “to the maximum extent practicable” (15 CFR, Section 930.32). A Federal agency may apply more restrictive Federal standards. Federal regulations state that “(w)hen Federal agency standards are more restrictive than standards or requirements contained in the State’s management program, the Federal agency may continue to apply its stricter standards” (15 CFR, Section 930.39[d]).

The Alaska Coastal Zone Management Act of 1977, as amended, and the subsequent Alaska Coastal Management Program, as amended, and the Final Environmental Impact Statement (1979) had established policy guidance and standards for the review of projects within or potentially affecting Alaska’s coastal zone. The State of Alaska had approved coastal management plans for most incorporated cities, municipalities, boroughs, and unincorporated areas within the coastal zone. The Alaska Coastal Management Program (ACMP) no longer exists and therefore a consistency evaluation with the State of Alaska was not necessary for the final version of the revised comprehensive plan for Selawik refuge.

### **3.3.9 Cooperation and Coordination with Others**

#### ***3.3.9.1 Federal, State, and Local Governments***

The Selawik refuge will continue to work closely with those Federal, State, and local governments and agencies whose programs affect, or are affected by, the refuges. State and local government input will be sought during the development of regulatory policies addressing management of the Refuge System (Executive Order 13083, “Federalism”). When possible, the Service will participate in interagency activities (such as joint fish and wildlife surveys and co-funded research), cooperative agreements, sharing data, and sharing equipment and/or aircraft costs to meet mutual management goals and objectives.

The refuge and the State of Alaska will maintain a cooperative relationship in managing fish and wildlife resources within the refuges. The Master Memorandum of Understanding between the Service and the Alaska Department of Fish and Game (ADF&G), dated March 13, 1982, defines the cooperative management roles of each agency (Appendix B). In this agreement, the ADF&G agreed to “recognize the Service as the agency with the responsibility to manage migratory birds, endangered species, and other species mandated by Federal law, and on Service lands in Alaska to conserve fish and wildlife and their habitats and regulate human use.” Correspondingly, the Service agreed to “recognize the right of the ADF&G as the agency with the primary responsibility to manage fish and resident wildlife within the State of Alaska.” Further discussion of intergovernmental cooperation regarding the preservation, use, and management of fish and wildlife resources is found in 43 CFR 24, “Department of the Interior Fish and Wildlife Policy: State and Federal Relationships.”

The Service does not require refuge compatibility determinations for State wildlife management activities on a national wildlife refuge pursuant to a cooperative agreement between the State and the Service where the refuge manager has made a written determination that such activities support fulfilling the refuge purposes or the Refuge System mission. When the activity proposed by the State is not part of a cooperative agreement or the State is not acting as the Service’s agent, a special use permit may be required, and a refuge compatibility determination will need to be completed before the activity may be allowed. Separate refuge compatibility determinations addressing specific proposals will be required for State management activities that propose predator management, fish and wildlife control (with the exception of emergency

removal of animals posing an immediate threat to human health and safety), reintroduction of species, non-native species management, pest management, disease prevention and control, fishery restoration, fishery enhancement, native fish introductions, non-native species introductions, construction of facilities, helicopter and off-road vehicle access, or any other unpermitted activity that could alter ecosystems on the refuges.

The Service Region 7 (Alaska) has a memorandum of understanding with the Alaska Fire Service (AFS) that articulates how the two agencies work together regarding fire protection services provided by AFS and mandated by law. The Service will cooperate with other State agencies such as the Department of Natural Resources and Department of Transportation and Public Facilities on matters of mutual interest and may enter into informal and formal management agreements.

### ***3.3.9.2 Tribes and Native American Organizations***

The Service's Native American Policy (USFWS 1994) identifies general principles that guide the Service's government-to-government relationships with tribal governments in the conservation of fish and wildlife resources. Additional guidance has been provided by Executive Order 13084, "Consultation and Coordination with Indian Tribal Governments," issued May 14, 1998. The U. S. Department of the Interior (2001) issued the "Alaska Policy on Government-to-Government Relations with Alaska Native Tribes." The Selawik refuge will maintain government-to-government relationships with tribal governments. The Selawik refuge will also work directly with regional and village corporations and respect Alaska Native cultural values when planning and implementing refuge programs.

### ***3.3.9.3 Owners of Refuge Inholdings and Adjacent Lands***

The Selawik refuge will work cooperatively with inholders and adjacent landowners, providing information on refuge management activities and policies. The refuge will consult periodically with them regarding topics of mutual interest, will respond promptly to concerns over refuge programs, and will participate in cooperative projects (e.g., water quality monitoring and fish and wildlife management).

### ***3.3.9.4 Fish and Wildlife Service Jurisdiction over Waters within the Selawik Refuge***

Where the United States holds title to submerged lands beneath waters within the refuge, the Service has jurisdiction over certain activities on the water. In 1980, under ANILCA, the United States Congress established or expanded 16 national wildlife refuges. These areas of land and water may contain both navigable and non-navigable waters. Where water bodies are non-navigable within the refuge boundaries, the Service has management authority over most activities on water where adjacent uplands are owned by the Federal government. Where State of Alaska lands exist beneath navigable water bodies or where the State, a Native corporation, or a Native allottee owns the adjacent uplands within the refuge boundaries where the withdrawal process started after statehood, the Service's management authority is more limited.

The Service's statutory authority to manage these lands and waters comes from ANILCA; the Service manages these lands pursuant to the Refuge Administration Act. Under provisions of ANILCA, the Federal Subsistence Board manages the Federal subsistence program on all inland waters with a Federal reserved water right within and adjacent to the external boundaries of the refuges (50 CFR 100.3(b)(c)).

### 3.3.9.5 Other Constituencies

The Selawik refuge will inform local communities, special interest groups, and others who have expressed an interest in or are affected by refuge programs about refuge management policies and activities. The Selawik refuge will seek input from these constituents when issues arise that may affect how the refuge is managed. When appropriate, local residents and other stakeholders will be asked to participate in refuge activities so their expertise and local knowledge can be incorporated into refuge management.

### 3.3.10 Ecosystem Management and Climate Change

Species do not function alone; they function together in the environment as part of an ecosystem. An ecosystem can be described as the intersection of natural forces, social and ecological relations, and the full range of meanings and values that people assign to the landscape (Williams and Patterson 1999). Resources on refuge lands will be managed by employing ecosystem management concepts (Appendix A, Section A.2). Individual species are viewed as integral to the diversity of those ecosystems and, as such, are indicators of the healthy functioning of the entire ecosystem. When the Service identifies species to use as indicators of the health of an ecosystem, it will do so through a rigorous peer-reviewed scientific process involving experts from other Federal agencies and the ADF&G.

Refuges should inventory, monitor, and maintain a comprehensive database of ecosystem components to help make effective management decisions and ensure proper long-term ecosystem stewardship. This includes regular and recurring monitoring of status and trends of ecosystem components such as fish, wildlife, plants, climatic conditions, soils, water bodies, and human communities. All monitoring will employ appropriate scientific disciplines, research methods, and state-of-the-art technologies whenever practicable.

Secretarial Orders 3226, signed in 2001, and 3289, signed in 2010, apply to comprehensive conservation plans for refuges. Direction in these orders requires the Department of the Interior to consider and analyze climate change impacts when planning or making decisions. These orders are especially relevant for managing the Selawik refuge because it is part of the Arctic region, which is particularly vulnerable to the effects of accelerating climate change.

There are many unknowns regarding the potential effects of accelerating climate change. In the decades to follow, Service policies will most likely evolve to accommodate the realities of accelerating climate change as these become apparent. For the near future, the Selawik refuge will continue to conduct scientific studies and will evaluate likely future scenarios for climate change effects on wildlife and ecosystems, with emphasis on species that are threatened, endangered, or important for subsistence.

One purpose and goal of the Selawik refuge is to conserve fish, wildlife, plants, and their habitats in their natural diversity. In the future, this may not be entirely possible for some species and ecosystems if the meaning of some conservation concepts and practices, such as managing for natural diversity, continues only to be understood in the context of relatively fixed historic ecosystems and species assemblages. As the implications of climate change become better understood, the Service may need to re-assess some assumptions underlying the refuge purposes. The Service may need to re-examine the meaning of fundamental concepts such as *to conserve* and *natural diversity* and revise goals and objectives accordingly.

Refuge managers will work with partners, as appropriate, to investigate and consider a full range of responses to potential climate change impacts on refuge lands. Responses could

include management actions, subject to applicable laws and policies (e.g., NEPA and compatibility, respectively). For the near future, the refuge will allow natural systems to adapt and evolve, accepting that some species may be more suited to changing climatic conditions than others.

### ***3.3.10.1 Air Quality***

The Service's authorities for air quality management are included in several laws. The most direct mandates to manage air resources are found in the Clean Air Act and the Wilderness Act.

The Service is required by the Clean Air Act to preserve, protect, and enhance air quality and the values related to air quality on Service lands, including visibility, plants, animals, soil, water quality, cultural and historical resources, and virtually all resources that are dependent upon and affected by air quality. The Wilderness Act requires the Service to protect and preserve the wilderness character of designated areas, including pristine air quality.

Class I air quality sites receive the highest level of protection. Very little deterioration is allowed in these areas, and the Federal land manager has an affirmative responsibility to protect air quality-related values on those lands. With the exception of three Class I air quality sites in designated wilderness on the Alaska Maritime National refuge, all other lands managed by the Service in Alaska are classified as Class II and receive protection through the Clean Air Act. Moderate deterioration, associated with well-managed population growth, is allowed in Class II areas.

If air quality or related resources are at risk, the refuge manager will work with the Service's Air Quality Branch; the regional air quality coordinator; the Alaska Department of Environmental Conservation and other State, local, and Federal agencies; and the public, as appropriate, in developing an air quality management plan as outlined in the Service Manual (563 FW 2.8).

### ***3.3.10.2 Water Resources Management***

Every national wildlife refuge in Alaska shares the common ANILCA purposes and mandates to ensure to the maximum extent practicable water quality and quantity and to conserve fish and wildlife populations and habitats in their natural diversity.

Although the Service has reserved water rights necessary to accomplish the purposes of the refuge, the Refuge Administration Act and the Service Manual (403 FW 1 through 3) direct the Service to obtain, to the extent practicable, water supplies of adequate quantity and quality for Service facilities and for refuge purposes and as trust resources, and to obtain the legal right to use that water through State laws, regulations, and procedures.

The Alaska Region of the Service conducted a water resources threats analysis (Harle 1994) for the purpose of guiding investigations of water resources and protecting water resources by acquiring in-stream water rights. Based on the results of the threats analysis, the Service's regional office developed a strategic plan for systematically quantifying the surface water on refuges in Alaska (Bayha et al. 1997).

Using existing data, or through the collection of hydrologic and biologic data, the Service applies to the State of Alaska for appropriative water rights, for in-stream water reservations, and for water withdrawals to meet the Service's needs. Establishing State water rights is only

part of a management strategy to protect resources on refuge lands and to understand ecosystem processes. Hydrologic data allows the Service to accomplish the following:

- Plan floodplain and riparian zone management.
- Estimate flow for streams where gauges have not been installed within the refuges.
- Supplement historical or current fisheries and wildlife studies.
- Detect and evaluate naturally occurring or human-induced future changes in the hydrologic system.
- Provide stream profile and velocity data for the design of fish weirs or other structures.
- Estimate the potential for future flooding and erosion.
- Analyze the impacts of proposed projects on stream flow and water supply.
- Provide a basis for decisions about commercial operations on some important streams.
- Provide baseline water quality information.

All facilities and activities on refuges must comply with pollution control standards set by Federal laws (e.g., the Clean Water Act 33 U.S.C. 1251 and the Safe Drinking Water Act 42 U.S.C. 300f); State laws where Federal law so provides; and the regulations, policies, and standards implementing these laws.

### ***3.3.10.3 Visual Resource Management***

Visual resource management has two primary purposes: (1) to manage the quality of the visual environment and (2) to reduce the visual impact of development activities. To accomplish these purposes, the Selawik refuge will identify and maintain scenic values and will, within the constraints imposed by this comprehensive plan, minimize the visual impacts of refuge development, activities, and uses. All activities and facilities on the refuges will be designed to blend into the landscape to the extent practical. The Service will cooperate with other Federal, State, local, tribal, and private agencies and organizations to prevent significant deterioration of visual resources.

### ***3.3.10.4 Cultural, Historical, and Paleontological Resources***

The Service has long-term responsibilities for cultural resources on refuge lands. Cultural resources on refuge lands are managed under a number of laws, Executive orders, and regulations, including the Antiquities Act; the National Historic Preservation Act, as amended; the Archaeological Resources Protection Act; the American Indian Religious Freedom Act; the Native American Graves Protection and Repatriation Act; Executive Order 11593, "Protection and Enhancement of the Cultural Environment"; Executive Order 13007, "Indian Sacred Sites"; Paleontological Resources Protection Act (Subtitle D), and 36 CFR 800.

The 1980 amendments to the National Historic Preservation Act direct the Service to inventory and evaluate cultural resources for their eligibility for inclusion on the National Register of Historic Places. Pending a complete evaluation, all cultural resources will be considered eligible for the National Register of Historic Places. All significant historic, archaeological, cultural, and paleontological resources on the Selawik refuge will be protected and managed in accordance with Federal and State laws.

It is illegal to collect archaeological materials and/or paleontological remains on the Selawik refuge without a permit. Historic aircraft and other World War II material will be managed in accordance with the policy published December 20, 1985, in the Federal Register (FR

50:51952-51953). These materials may be collected on refuge lands only as authorized by a permit issued to a qualified organization or individual. Cultural resource research permits will only be issued to qualified individuals operating under appropriate research designs and with access to appropriate curatorial facilities. The Selawik refuge will encourage archaeologists, historians, ethnologists, and paleontologists from educational institutions and other government agencies to pursue research on refuge lands as long as their research interests are compatible with refuge purposes. The Selawik refuge will encourage research that collects data from threatened sites or sites that are important to local communities; researchers will be required to minimize disturbance of intact sites.

The Service must initiate a consultation with the State Historic Preservation Officer, under Section 106 of the National Historic Preservation Act, before it plans to fund, authorize, or otherwise undertake any Federal action that has the potential to directly or indirectly affect any archaeological or historic site. If sites that may be affected are found in the project area, their significance will be evaluated to determine their eligibility for inclusion in the National Register of Historic Places. For eligible sites, consultation will result in a course of action causing the least possible impact. Impacts may be minimized in a variety of ways, including relocation or redesign of a project, site hardening, mitigation through information collection, or cancellation of the project if no alternatives are feasible. Other activities or uses may be precluded to protect archaeological and historic sites. Private interests proposing to conduct commercial activities or uses on the Selawik refuge will normally be required to fund studies necessary for consultation and for mitigation of impacts.

The refuge will implement Executive Order 13007, “Indian Sacred Sites”, allowing access to identified sacred sites and avoiding adversely affecting the physical integrity of these sites. Where appropriate, the Service will maintain the confidentiality of sacred sites.

Further information on cultural resources management can be found in the Service Manual (614 FW 1 through 5) and the Cultural Resources Management Handbook (USFWS 1992).

### **3.3.11 Fish and Wildlife Habitat Management**

#### ***3.3.11.1 Habitat Management***

Habitats are managed in keeping with the purposes, goals, and objectives of a refuge. In Alaska, this means habitats are largely managed to maintain ecological processes and biological diversity. However, in some cases, habitats on refuge lands are manipulated to maintain or improve conditions for selected fish and wildlife populations, to control invasive plant species, or to reduce risk to values warranting protection from wildland fires. Habitat management and manipulation activities will be carried out in support of the purposes, goals, and objectives of the Selawik refuge. Generally, refuges use the least intrusive management measures needed. Where practical and economically feasible, habitat management practices should maintain a natural appearance on the landscape. Habitat management practices, even those carried out for the benefit of a single species or small group of species, will—to the extent possible—maintain the diversity of native (indigenous) wildlife species and habitat types.

Habitat management and manipulation may be achieved by burning, or by mechanically, chemically, or manually treating the vegetation. Mechanical treatment could include mechanical removal, crushing, cutting, or mowing. When applicable, State and Federal guidelines for timber management will be followed. Mechanical treatment could also include the construction of fish passages, fish ladders, fish barriers, water impoundments and

structures such as fences or artificial nests, and rising or lowering of water levels to manage wildlife or waterfowl habitat. Riparian or aquatic habitat management and manipulation may be achieved by acquiring in-stream flow reservations or making beneficial water diversions.

Chemical treatment involves the use of chemicals to restore nutrient levels in a lake system (through fertilization) for fisheries restoration, to reduce hazardous fuel accumulations, or to eliminate invasive plant and animal species, normally by killing them or destroying their ability to spread or prosper. Before chemical treatment is approved for use, the Selawik refuge will analyze the need for action, the options for treatment, and the potential impacts of those options through the National Environmental Policy Act (NEPA) process.

Manual treatment could include the use of hand tools to remove, reduce, or modify plants or to modify habitats (e.g., removal of beaver dams).

Aquatic habitat modification may include activities and structures such as stream bank restoration, passage structures, and fish barriers or obstacle removal that results in physical modification of aquatic or riparian habitats to benefit fish species. These activities would be undertaken to maintain or restore native fish populations and may require appropriate NEPA compliance and refuge compatibility determinations.

### **3.3.11.2 Fire Management**

In fire management, the Service evaluates and may conduct the full range of activities necessary to protect human life, property, cultural resources, and other identified values, as well as any activities necessary to conserve, protect, and enhance habitats for the benefit of fish and wildlife. Fire management activities include preparedness, emergency suppression operations, management of wildland fires for resource benefits, fire prevention, education and outreach, monitoring, research, prescribed fire, hazardous fuels reduction, and mechanical treatments. All activities will be conducted in accordance with refuge, Service, and Department of Interior policies and approved interagency and refuge management plans. Additional guidance on fire management can be found in the 2001 Federal Fire Policy (620 DM 1 and 2), Service Manual 621 FW 1 through 3, the Service Fire Management Handbook, and the Fire Management Plan for Selawik refuge (USFWS 2005).

A refuge's Fire Management Plan (FMP) provides the basis for integrating fire as a critical process into other refuge plans and activities at a landscape scale, as well as specific information on the application and management of fire on the refuge. The Alaska Interagency Wildland Fire Management Plan (AIWFMP) specifies direction for the response to a wildland fire (Alaska Wildland Fire Coordinating Group 2010). The AIWFMP established four management options: critical, full, modified, and limited—to direct a range of initial responses to wildland fire. Refuge lands and facilities have been classified and mapped using these fire management options, which are reviewed annually and revised as needed (Map 3-2). The strategies and tactics used by the Service to manage a wildland fire will be based on objectives identified in the AIWFMP, the Selawik refuge FMP, and the refuge's comprehensive plan.

Response to wildfire, suppression, and use of prescribed fire are important prerogatives for the Service; each of these concepts and related terminology are described.

A wildland fire is any non-structure fire that occurs in refuge wildlands. Two distinct types of wildland fire have been defined: wildfire (unplanned ignition) and prescribed fire (planned ignition).

A wildfire is an unplanned ignition or escaped prescribed fire where the objective is to protect values at risk while meeting resource objectives specified in a refuge FMP.

An unplanned ignition is the start of a wildland fire by lightning, volcanoes, unauthorized human-caused fires, and escaped prescribed fires where the objective is to protect values at risk while meeting resource objectives specified in a refuge FMP.

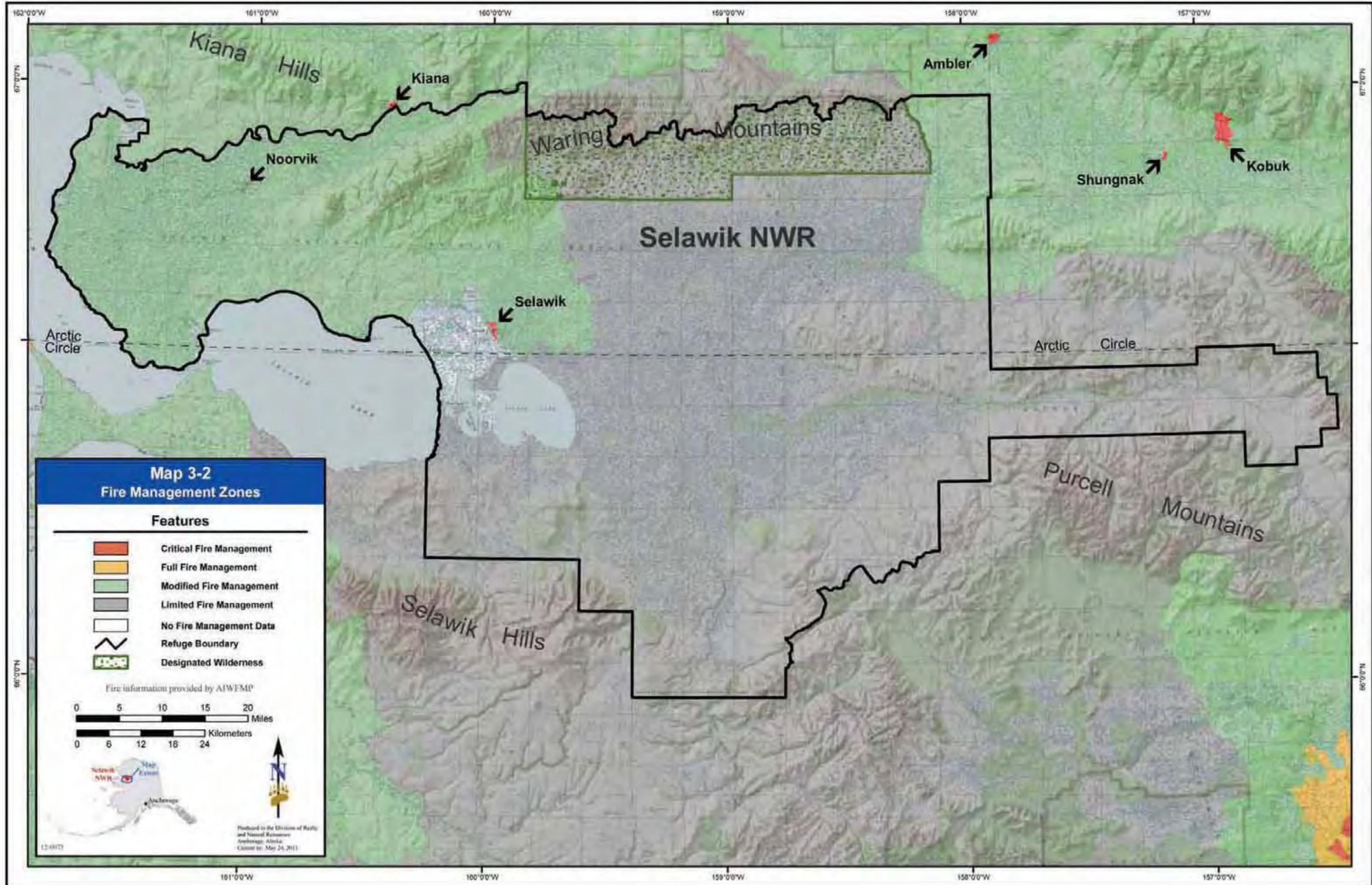
A prescribed fire is prepared in advance. A prescribed fire is started by using a hand-held, mechanical, or aerial device. For planned ignitions, the distance and timing between ignition lines (or ignition points) and the sequence of igniting them is determined by environmental conditions, firing technique, and other factors influencing fire behavior and effects.

Prescribed fire is defined as any wildland fire ignited by management actions to meet specific objectives. Prior to each ignition, a written and approved prescribed fire plan must exist, and NEPA requirements must be met. Use of prescribed fire must comply with the Alaska Enhanced Smoke Management Plan for Prescribed Fire.

Response to wildfire is defined as the mobilization of the necessary services and responders to a fire based on ecological, social, and legal consequences; the circumstances under which a fire occurs; and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and other values identified to be protected.

Wildfire suppression is the work of extinguishing or confining a fire, beginning with its discovery, or a portion of a fire to protect, prevent, or reduce the loss of identified values. During fire suppression, the Service will place the highest priority on the safety of firefighters and the public. The Bureau of Land Management—Alaska Fire Service (AFS) provides suppression services in the part of Alaska that includes the Selawik refuge, as directed by refuge managers. The Selawik refuge is located within the Galena Fire Management Zone.

Wildland fire may be used and applied to protect, maintain, and enhance resources on refuge lands. As nearly as possible, wildland fire will be allowed to function in its ecological role. Optional management is described in the FMP for the Selawik refuge.

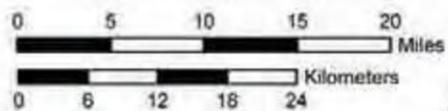


**Map 3-2**  
Fire Management Zones

**Features**

- Critical Fire Management
- Full Fire Management
- Modified Fire Management
- Limited Fire Management
- No Fire Management Data
- Refuge Boundary
- Designated Wilderness

Fire information provided by AIWEMP



Produced in the Division of Realty  
and Natural Resources  
Anchorage, Alaska  
Current to: May 24, 2011

(Back of Map 3-2)

### 3.3.12 Fish and Wildlife Population Management

The Selawik refuge was created by ANILCA with the first purpose listed in Section 302(7)(B)(i) to “conserve fish and wildlife populations and habitats in their natural diversity...”. Conservation of habitats is a key element in maintaining the “natural diversity” of fish and wildlife populations on the Selawik refuge. Management of these populations is an important component of maintaining healthy ecosystems. The Selawik refuge will work with the State of Alaska to conserve fish and wildlife populations, recognizing that populations may experience fluctuations in abundance because of environmental factors and may require management actions for conservation purposes.

The refuge will be managed in accordance with its purposes and consistent with the Service policy on maintaining biological integrity, diversity, and environmental health of the Refuge System (Service Manual 601 FW 3) to ensure that native species are managed for biological diversity and abundance. The Service has defined biological diversity to mean “the variety of life and its processes, including the variety of living organisms, the genetic differences among them, and communities and ecosystems in which they occur” (Service Manual 601 FW 3.6A).

The Selawik refuge will be managed to maintain the biological diversity of wild, native fish stocks, including the genetic differences among them.

#### 3.3.12.1 *Wildlife Inventory and Monitoring Plan*

The Selawik refuge completed a Wildlife Inventory and Monitoring Plan (I & M plan) in 2009, which serves as a guide to assess species presence, relative abundance, distribution, and trends in populations of fish, wildlife, and plants (USFWS 2009). The I & M plan describes goals, objectives, methods, implications of management, geographic scales, schedules for reporting, and database management for inventory and monitoring studies. The Selawik refuge’s I & M plan recommends monitoring to address environmental parameters (e.g., weather) and hydrology, soils, and fire history to explain potential changes in the distribution, relative abundance, and populations of fish, wildlife, and plants. The Selawik refuge will review the I & M plan every two years and update as needed, and the Service’s regional office will review each refuge’s I & M plan every 5–8 years. In fiscal year (FY) 2010, the Refuge System received funding to initiate a national inventory and monitoring program. As this program is developed, the Selawik I & M plan may be modified to allow information integration and flow at multiple scales from the refuge to the national level.

#### 3.3.12.2 *Scientific Peer Review*

Anthropologists, biologists, botanists, ecologists, social scientists, and other refuge personnel conducting scientific investigations will adhere to refuge, regional, Service, and Department of the Interior policies on scientific conduct, including the publication entitled Management of Fish and Wildlife Service Scientific Publications Recommended Outlets, Procedures, and Policies. The overall goal of scientific peer review is to ensure that information collected, analyzed, interpreted, and reported to the public, and upon which policy and management decisions are based, meets established standards of the scientific community. To achieve this goal, all study plans and reports to be disseminated outside the originating office must be peer reviewed. The region’s peer review procedure is available upon request. The type and level of review shall be commensurate with the potential significance of the scientific information and its likely influence on policy and management actions. The Service manages two peer-reviewed outlets in which Service employees and others may submit manuscripts for

publication: *North American Fauna* and *Journal of Fish and Wildlife Management*.

Information about these journals may be found at (<http://www.fws.gov/science/publicationsys.html>). Service employees may also publish reports and articles of scientific findings in non-Service peer-review journals.

### **3.3.12.3 Compliance with the Animal Welfare Act**

The Animal Welfare Act of 1996, as amended, requires research facilities and Federal agencies to establish an Institutional Animal Care and Use Committee (IACUC). The role of this committee is to prescribe methods and set standards for the design, performance, and conduct of animal care and use in research. Field studies conducted or authorized by refuge employees within the purview of the Animal Welfare Act will require review and approval of an IACUC. Any refuge study that involves an invasive procedure or that harms or materially alters the behavior of an animal under study should be reviewed and approved by an IACUC prior to implementation. Note that a scientific collection permit is also required from the ADF&G under 5 Alaska Administrative Code 92.033.

### **3.3.12.4 Marking and Banding**

The Service will place a priority on cooperating with appropriate partners, including the ADF&G, when it conducts fish and wildlife capture, marking, banding, radio-collaring, release, tracking, and other information gathering techniques involved with research on refuge lands. The Service will follow approved protocols and published guidelines during all marking, banding, and related wildlife research and monitoring activities and will draw upon current insights from appropriate scientific disciplines and technologies.

### **3.3.12.5 Threatened or Endangered Species**

The refuge will consult with the U.S. Fish and Wildlife Service Ecological Services field office regarding actions that may affect listed, proposed, or candidate species or designated or proposed critical habitat. These actions include refuge operations, public use programs, private lands and Federal assistance activities, promulgating regulations, and issuing permits (USFWS 1973; USFWS 1998).

### **3.3.12.6 Reintroductions**

A species may be introduced on a refuge only if that species is native to the refuge (i.e., a reintroduction). Non-native species may not be introduced. Definitions of native and non-native species are found in the glossary (Appendix I).

Reintroductions can be useful tools for restoring species to natural ranges and reestablishing natural levels of fish, wildlife, and habitat diversity. Reintroductions would require appropriate NEPA compliance; a review to ensure consistency with the Service's policy on maintaining biological integrity, diversity, and environmental health of the Refuge System (Service Manual 601 FW 3); an ANILCA Section 810 determination, and a refuge compatibility determination. Reintroductions also require extensive coordination with adjacent landowners and with the State of Alaska. In evaluating the project, the cause(s) of the extirpation should be evaluated and management actions taken to alleviate the cause(s) prior to reintroduction.

The environmental requirements of the species and the ecological dynamics of the area proposed for the reintroduction will be thoroughly reviewed prior to a reintroduction. Some factors to consider include behavior, diseases, general ecology of the species, habitat

requirements, inter- and intra-species competition, life history, genetics, management practices, population dynamics, and predators. The Service should consider whether there have been significant habitat changes since the species' extirpation (e.g., is the area still within the species' natural range).

### **3.3.12.7 Fish and Wildlife Control**

Fish and wildlife control activities involve the control, relocation, and/or removal of native species, including predators, to maintain natural diversity of fish, wildlife, and habitats. The Service may employ fish and wildlife control actions with species of fish and wildlife within their original range to restore other depleted native populations.

Predator management includes the relocation, removal, sterilization, and other management of native predators to accomplish management objectives. The Service considers predator management to be a legitimate conservation tool when applied in a prudent and ecologically sound manner and when other alternatives are not practical. There are two key requirements that should be met before implementing a predator control program on refuge lands: (1) the control program must be found to be ecologically sound, and (2) it must be biologically justified.

A predator management program requires appropriate NEPA compliance, an ANILCA Section 810 determination, and, if conducted by other than the Service or an agent of the Service, a refuge compatibility determination. Alternative management actions must be evaluated prior to pursuing direct predator control activities. Any proposal to allow or implement a predator management program on national wildlife refuges in Alaska will be subjected to public review and closely coordinated with the ADF&G, local communities, tribal governments, and adjacent landowners and/or land managers. The Service will monitor and evaluate predator management activities for effectiveness and resource impacts.

Normal environmental education and population management activities—such as trapper education programs and regulation changes that allow for increased harvests of predatory animals by licensed trappers and hunters—are not considered predator management. The control or elimination of non-native predators is not considered predator management (Section 3.3.12.8).

### **3.3.12.8 Management of Non-native, Invasive, and Pest Species**

In general, the presence of non-native species (including feral domestic animals) on the Selawik refuge is not compatible with refuge purposes or with Refuge System policies. When a non-native species (fish, wildlife, or plant) occurs on a refuge, the Service may control or eliminate that species. Where a population of a non-native species has already been established on a refuge and this population does not materially interfere with nor detract from the fulfillment of the mission of the Refuge System or the purposes of the Selawik refuge, the species may be managed as part of the refuge environment.

Pests are defined as those organisms (vertebrates, invertebrates, plants, and microorganisms and their vectors) that are detrimental to fish, wildlife, human health, fish and wildlife habitat, or established management goals. Pests also include noxious weeds and other organisms, which are classified as pests by law (Administrative Manual 30 AM 12).

Invasive species are non-native species that, when introduced, have the potential to cause substantial amounts of harm to the environment, human health, or economic well-being. The

Federal government is prohibited by Executive order, law, and policy from authorizing, funding, or carrying out actions that are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere (Service Manual 620 FW 1). Refuge managers conduct habitat management activities to prevent, control, or eradicate invasive species using techniques described through an integrated pest management plan or other similar management plans. Integrated pest management planning for refuge lands will address the advantages and limitations of control techniques, including chemical, biological, mechanical, and cultural. Management of invasive species on refuges is guided by the National Strategy for Invasive Species Management and conducted within the context of applicable policy (Service Manual 620 FW 1).

Invasive species can cause significant impacts to the land and water resources or to the plants and animals that use the invaded habitat. To manage invasive plants, the refuge will include weed inventories as part of all habitat inventories. The refuge will review a proposed action for its potential to introduce or spread invasive plants and will take measures to reduce the risk of spreading invasive plants (e.g., require weed-free feed for pack animals).

Introduced vertebrates (e.g., fox and rats) may also adversely affect wildlife populations, particularly in island ecosystems where species historically lived without vertebrate predators. Invasive species may interfere with the refuge's ability to meet its purposes and management goals.

Pests on refuges may also be controlled to prevent damage to private property. Routine protection against pests for refuge buildings, structures, and facilities is addressed in refuge policy (Refuge Manual 7 RM 14).

The refuge will coordinate with other landowners and agencies and use integrated pest management practices to enhance the detection, prevention, and management of invasive species and other pests. Use of chemical control measures on refuge lands in Alaska requires NEPA compliance, regional office review, and approval of a pesticide-use proposal (Administrative Manual 30 AM 12 and Refuge Manual 7 RM 14).

### ***3.3.12.9 Disease Prevention and Control***

Certain disease organisms, viruses, or vectors of disease (e.g., rabies or parasites) may threaten human health or the health and survival of native wildlife or plant species. These threats may be managed or eliminated after consideration of all reasonable options and consultation with the State of Alaska and other concerned parties. This will normally only occur when severe resource damage is likely or when public health or safety is jeopardized. Wherever possible, an integrated approach to pest management will be used in accordance with the Service's Administrative Manual (30 AM 12) and Refuge Manual (7 RM 14). Compliance with NEPA must be obtained and a pesticide-use proposal must be approved prior to the use of chemicals to control pests on refuge lands.

### ***3.3.12.10 Fishery Restoration***

Fishery restoration is any management action that increases fishery resources to allow full use of available habitat or to reach a population level based on historic biological data. It can also include restoration and protection of habitat to maintain, increase, or improve fishery resources. Although the goal of restoration is self-sustaining populations, situations may exist in which some form of fishery management or facilities could continue indefinitely.

The refuge will work with the State of Alaska, local tribes, and other partners to restore habitats and populations to appropriate, sustainable conditions in cases where the fishery resource has been substantially impacted or damaged. The Service will conduct restoration efforts using strategies that minimize ecosystem impacts and do not compromise the viability or genetic characteristics of the depleted population. This may include regulatory adjustments and/or evaluations of escapement goals. If the stocks have been reduced or are threatened, temporary restoration facilities may be allowed in designated wilderness areas or wild river corridors, as long as the facilities do not significantly impact the values for which those areas were designated.

### ***3.3.12.11 Fishery Enhancement***

Fishery enhancement is any management action or set of actions applied to a fishery stock to supplement numbers of harvestable fish to a level beyond that which could be produced based on a determination or reasonable estimate of historic levels and without the management intervention. Enhancement activities include stocking barren lakes, providing access to barren spawning areas (fish passages), constructing hatcheries, out-stocking in productive systems, or fertilizing rearing habitat.

Refuge management priorities will focus on conserving biologically diverse ecosystems. Fishery enhancement facilities for the purpose of artificially increasing fish populations normally will not occur within any land management category on refuge lands.

Proposals for fishery enhancement projects will be subject to an environmental analysis under NEPA, an ANILCA Section 810 subsistence determination, and a refuge compatibility determination. Only temporary fishery enhancement facilities may be authorized on refuge lands that are in the Minimal, Wild River, and Wilderness Management categories. A Minimum Requirement Analysis will be required for facilities proposed within designated wilderness to determine if the facility is necessary to manage the area as wilderness and, if so, to minimize the resulting impacts to wilderness character.

### **3.3.13 Subsistence Management**

Providing the opportunity for continued subsistence activities or uses by local residents is one of the purposes of the Selawik refuge, as stated in Title III of ANILCA. Title VIII of ANILCA further provides that rural Alaska residents who are engaged in a subsistence way of life be allowed to continue using resources within refuges for traditional purposes. These resources include fish and wildlife, house logs and firewood, and other plant materials (Figure 3-1). Many aspects of subsistence management are addressed outside refuge comprehensive plans. The Federal Subsistence Board, through its rule-making process, addresses seasons, harvest methods, harvest limits, and customary and traditional use determinations. The Federal Subsistence Board has established Subsistence Regional Advisory Councils to provide for meaningful public input to the rule-making process.



Figure 3-1. Dried fish is a staple food in the region. This homemade smoker helps keep flies away.

The refuge will work with its partners to monitor subsistence harvest. The refuge will supplement the State's ongoing harvest and resource monitoring programs to provide additional information on the status of fish and wildlife populations harvested for subsistence purposes. This monitoring is intended to identify potential problems before populations of fish and wildlife become depleted and to ensure preference is given to subsistence users as required by law. All information the refuge gathers through subsistence monitoring will be shared with Regional Subsistence Advisory Councils and local State fish and game advisory committees, tribes, and other entities. Refuge staff will attend various subsistence-related meetings, including those of Subsistence Regional Advisory Councils and local State fish and game advisory committees and, and provide information on the status of subsistence resources and management.

The noncommercial gathering by local rural residents of fruits, berries, mushrooms, and other plant materials for subsistence and of dead standing or down timber for firewood is allowed without a special use permit. Harvest of live standing timber for house logs, firewood, or other activities or uses is allowed, although specific requirements vary by size and location. A special use permit is required to cut live trees greater than six inches diameter at breast height (4½ feet above ground level). No more than 20 live trees between three and six inches diameter at breast height (dbh) can be cut annually without a special use permit. No cutting may be done within 50 feet of a stream, lake, or river; no more than one tree in five may be cut in any specific stand. Cutting live trees less than three inches dbh does not require a special use permit. Timber stocks subject to subsistence activities or uses will be monitored to ensure they remain available over the long term.

Under Section 816 of ANILCA, refuge lands may be closed to the taking of fish and wildlife if closure is deemed necessary for reasons of public safety, administration, or to ensure the continued viability of particular populations of fish or wildlife. Emergency closure to subsistence taking would be accomplished by the Federal Subsistence Board or its designated officials and would generally occur only after other consumptive activities or uses competing for resources were restricted or eliminated.

### ***3.3.13.1 Access for Subsistence Purposes***

Access to refuge lands by traditional means will be allowed for subsistence purposes in accordance with Section 811 of ANILCA, subject to reasonable regulation (50 CFR 36.12). Traditional means include snowmobiles, motorboats, dog teams, and other means of surface transportation traditionally used by local rural residents engaged in subsistence activities. Use of these traditional means of travel will be in compliance with State and Federal law in such a manner to prevent waste of harvested resources or damage to the refuge and to prevent herding, harassment, hazing, or driving of wildlife.

### ***3.3.13.2 Section 810 Evaluations***

The refuge will evaluate the effects of proposed activities on subsistence activities or uses to ensure compliance with Section 810 of ANILCA. The refuge will work with the Federal Subsistence Board, Subsistence Regional Advisory Councils, local fish and game advisory committees, tribes, Native corporations, the ADF&G, and other appropriate local sources to determine whether a proposed activity would “significantly restrict” subsistence activities or uses. If the refuge determines that a proposal would probably result in adverse effects to subsistence activities or uses, the refuge would follow the requirements identified in Section 810 before making a final decision on the proposal.

## **3.3.14 Public Access and Transportation Management**

### ***3.3.14.1 Snowmobiles, Motorboats, Airplanes, and Non-motorized Surface Transportation***

Section 1110(a) of ANILCA allows the use of snowmobiles (also referred to as snowmachines) during periods of adequate snow cover and frozen river conditions, motorboats, airplanes, and non-motorized surface transportation methods for traditional activities and for travel to and from villages and home sites. Such access shall be subject to reasonable regulations to protect the natural and other values of the Selawik refuge (43 CFR 36.11). Specific areas may be closed to such activities or uses in accordance with these regulations. The refuge manager is responsible for determining when snow cover is adequate to protect the underlying vegetation and soil from damage by snowmachine use.

### ***3.3.14.2 Off-Road Vehicles***

The regulations at 43 CFR 36.11(g) restrict the use of off-road vehicles within the refuge. The definition of off-road vehicles in 50 CFR 36.2 excludes snowmobiles but includes air boats and air-cushion vehicles, along with motorized wheeled vehicles. Off-road vehicles such as ATVs (e.g., three- and four-wheeled vehicles) may be authorized only on designated routes or areas within Intensive and Moderate Management or by special use permit.

### ***3.3.14.3 Helicopters***

The use of a helicopter is prohibited in any area other than at designated landing areas pursuant to the terms and conditions of a permit issued by the Service, or pursuant to a

memorandum of understanding between the Service and another party, or involved in emergency or search and rescue operations (43 CFR 36.11(f)(4)).

Helicopter landings for volcano monitoring, geologic hazards evaluations, and fisheries and wildlife management activities may be authorized under special use permit or other authorization, subject to site-specific stipulations. Helicopter landings for fire operations must comply with the fire management plan for the Selawik refuge and operational guidance in the AIWFMP. Helicopter landings by commercial operators and for public access are generally not allowed in designated wilderness areas. Where such use was established prior to wilderness designation, it may be authorized to continue.

#### **3.3.14.4 Access to Inholdings**

Section 1110(b) of ANILCA ensures adequate and feasible access, for economic or other purposes, across a refuge for any person or entity that has a valid inholding. An inholding is defined as State-owned or privately-owned land, including subsurface rights underlying public lands, valid mining claims, or other valid occupancy that is within or effectively surrounded by one or more conservation system units. The Service will review and process the application in accordance with regulations at 43 CFR 36 and 50 CFR 29 when a right-of-way permit is necessary under this provision (e.g., construction of a permanent facility). Such permits are subject to terms and conditions as specified in the regulations.

#### **3.3.14.5 Temporary Access**

Chapter 43 CFR 36.12(a)(2) defines temporary access as “limited, short-term (i.e., up to one year from issuance of the permit) access which does not require permanent facilities for access to State or private lands.” Temporary access is limited to survey, geophysical, exploratory, or other temporary activities or uses on non-Federal lands and where access is not otherwise provided in 43 CFR 36.10 or 43 CFR 36.11.

The refuge will evaluate applications for temporary access across the refuge and shall issue a permit with the necessary stipulations and conditions to ensure that the access granted is compatible with the purposes for which the refuge was established, that it complies with the provisions of Section 810 of ANILCA, and that it ensures that no permanent harm will result to resources on refuge lands.

#### **3.3.14.6 Subsistence Access**

See Access for Subsistence Purposes under Subsistence Management (Section 3.3.13.1).

#### **3.3.14.7 Transportation and Utility Systems**

Congress, through Title XI of ANILCA, determined that “Alaska’s transportation and utility network is largely undeveloped and future needs would best be addressed through a continuous decision making process....” To minimize impacts to conservation system units expanded or established by ANILCA, it was necessary to create a single and comprehensive authority for the approval or disapproval of applications for transportation or utility systems (TUS). Title XI provides a detailed definition for TUS and establishes the procedural requirements, evaluation standards, and actions for a TUS. Chapter 43 CFR 36 provides the specific regulations and procedures for application review, compliance with NEPA, decisions, and appeals.

A TUS, as defined in ANILCA, includes roads, highways, railroads, airports, pipelines, electrical transmission lines, communication systems, and related structures and facilities reasonably and minimally necessary for the construction, operation, and maintenance of such systems. Anyone seeking to acquire a right-of-way over national wildlife refuge lands for a TUS must file an application with the Division of Realty and Natural Resources in the Alaska Regional Office of the U.S. Fish and Wildlife Service.

The Service will make a determination to grant a right-of-way for that portion of a TUS that would cross refuge lands, except for those on designated wilderness. When the proposed transportation or utility system would cross a designated wilderness area, the Service tentatively approves or disapproves the application subject to the President's subsequent decision. If the President approves, a recommendation is submitted to Congress for final approval.

A right-of-way for a TUS across refuge lands will be granted if the system meets the criteria outlined in Section 1104(g)(2) of ANILCA and the regulations at 43 CFR 36.7(a)(2), which includes a determination of whether there is any economically feasible and prudent alternative to routing the system through or within a refuge. If approved, permits issued for a TUS will contain terms and conditions as required under regulations at 43 CFR 36.9(b) and 50 CFR 29.21 through 29.24. Rights-of-way that cross any area within the boundaries of a Wild and Scenic River unit will assure that the stream flow of, and transportation on, such river are not interfered with or impeded and that the facility is located and constructed in an environmentally sound manner (ANILCA, Section 1107(b); 43 CFR 36.9(c) and (d)). Additional special requirements apply to rights-of-way for pipelines issued under the Mineral Leasing Act of 1920 (30 U.S.C. 185), Section 1107(c) of ANILCA, and regulations at 43 CFR 36.9(d).

When considering an application for a TUS, the authorization process will incorporate a corresponding amendment to the refuge's comprehensive plan to update the desired management category, or categories, of the affected area if the TUS were to be approved.

### ***3.3.14.8 State Transportation Planning***

Federal transportation planning regulations require each state to develop a long-range statewide transportation plan in consultation and coordination with other government agencies and the public. In Alaska, transportation projects nominated for funding are evaluated and ranked by the Alaska Department of Transportation and Public Facilities. When appropriate, the refuge will participate in the State of Alaska transportation planning process and provide input regarding environmental considerations of proposed projects affecting refuge lands and the resources therein. See Appendix F for descriptions of potential transportation and utility systems identified by the State that cross refuge lands.

### ***3.3.14.9 RS 2477 Rights-of-Way***

The State of Alaska identifies numerous claims to roads, trails, and paths across Federal lands under Revised Statute 2477 (RS 2477), a section in the Mining Act of 1866 that states, "The right-of-way for the construction of highways over public lands, not reserved for public uses, is hereby granted." RS 2477 was repealed by the Federal Land Policy and Management Act of 1976, subject to valid existing claims.

Assertion and identification of potential rights-of-way does not establish the validity of these claims nor the public's right to use them. The validity of all RS 2477 rights-of-way will be determined on a case-by-case basis, either through the courts or by other legally binding

document. The State of Alaska has identified in Alaska Statute 19.30.400 four routes on the Selawik refuge it claims may be asserted as rights-of-way under RS 2477 (Appendix F).

#### **3.3.14.10 17(b) Easements**

Section 17(b) of the Alaska Native Claims Settlement Act of 1971 authorizes the Secretary of the Interior to reserve easements on lands conveyed to Native corporations to guarantee access to public lands and waters. Easements across Native lands include linear easements (e.g., roads and trails) and site easements. Site easements are reserved for use as temporary campsites and to change modes of transportation.

The Service is responsible for administering those public easements inside and outside refuge boundaries that provide access to refuge lands. Service authority for administering 17(b) easements is restricted to the lands within the easement. The size, type, and route of 17(b) easements were initially identified on maps filed with conveyance documents. Current maps are available on the Internet from the Bureau of Land Management. Conveyance documents also specify the terms and conditions of use, including the acceptable periods and methods of public access. See Appendix F for additional information.

#### **3.3.14.11 Navigation Aids and other Facilities**

Section 1310 of ANILCA authorizes reasonable access to and operation and maintenance of existing air and water navigation aids, communications sites, and related facilities. It authorizes existing facilities for weather, climate, and fisheries research and monitoring subject to applicable laws and regulations. Reasonable access to and operation and maintenance of facilities for national defense and related air and water navigation are provided, including within designated wilderness.

New facilities shall be authorized only after consultation with the head of the Federal department or agency undertaking the establishment, operation, or maintenance and in accordance with mutually agreed to terms and conditions.

#### **3.3.15 Recreation and Other Public Use**

Public recreation activities compatible with refuge purposes are authorized unless specifically prohibited (50 CFR 36.31). Compatible recreation activities or uses of the Selawik refuge will continue. The Refuge Administration Act identifies compatible hunting, fishing, wildlife observation and photography, and environmental education and interpretation as priority public uses. These activities or uses are encouraged and will receive emphasis in public use management.

Both consumptive (e.g., hunting, fishing, and trapping) and non-consumptive (e.g., wildlife observation and photography) recreation activities or uses are appropriate. Some recreational activities or uses are incidental to others. For example, camping and hiking may be related to hunting, fishing, wildlife photography, or other types of recreation.

There often are subtle differences between subsistence and recreational activities or uses (e.g., berry picking). Subsistence activities or uses are addressed under Subsistence Management (Section 3.3.13). When it is necessary to restrict the taking of fish and wildlife on a refuge to protect the continued viability of such populations, the taking of fish and wildlife for non-wasteful subsistence activities or uses on refuges shall be accorded priority over the taking of fish and wildlife for other purposes (i.e., recreational), in accordance with Title VIII of ANILCA.

The refuge will be managed to provide recreational experiences in generally natural wildland settings. Recreation will be managed consistent with the designated management category in each area. Intensive and Moderate Management areas will be managed for greater concentrations of visitors than will be Minimal, Wilderness, and Wild River Management areas. The Selawik refuge will manage all recreational activities or uses to avoid crowded conditions and to minimize adverse effects to cultural resources, fish and wildlife, wild character, and other special values of the Selawik refuge. “Leave No Trace” will be the standard.

The least intrusive means of management will be employed. Education will be the primary management tool for recreation management, using brochures, maps, signs, and personal contacts. However, if voluntary methods fail, other actions may be taken, including limiting commercial guiding and outfitting; regulating use and access subject to the provisions of Section 1110(a) of ANILCA; and recommending changes in State and/or Federal fishing, hunting, and/or trapping regulations. When necessary, recreation opportunities may be seasonally or otherwise restricted to minimize user conflicts and to protect the ecological or other values of the refuge.

Any restrictions on public use will follow the public participation and closure procedures at 50 CFR 36, 43 CFR 36, or other applicable regulations. State management actions available through the Master Memorandum of Understanding (Appendix B) and other State management tools will also be used where mutually desirable.

A Visitor Services Plan may be prepared for the Selawik refuge, or more specific management plans may be prepared for areas of relatively concentrated use.

### **3.3.16 Public Use Facilities**

Facilities may be provided to support certain recreation and other public uses. Recreation facilities may be located on refuge lands and at administrative sites. Visitor centers and highly developed environmental education and interpretive sites may be located off refuge lands at administrative sites or other appropriate locations. Public use facilities may include roads, trails, boat launch sites, airstrips, campgrounds, interpretive sites, environmental education sites, visitor centers, public use cabins, visitor contact facilities, and signs.

All new buildings (e.g., visitor centers, restrooms, public use cabins, and visitor contact buildings), some recreation facilities (e.g., fishing platforms), and additions and alterations to existing buildings will comply with current accessibility standards. Other non-building recreation facilities (e.g., campgrounds, trails) are not currently covered under these standards, although access for the disabled will be considered in the design of new or upgraded facilities. As funds are available, existing buildings will be updated to meet these standards.

The level of development and appearance of facilities will be appropriate for the management category of the area in which they are located. More elaborate facilities will be constructed in the Intensive Management category; more rustic and rudimentary facilities will occur in the other management categories.

#### **3.3.16.1 Cabins**

Special use permits are required for subsistence and commercial cabins. Management of existing cabins and review of proposals for construction of new cabins for traditional uses will be in accordance with the Service’s cabin regulations (50 CFR 36.33) and regional cabin policy (Region 7 Policy Manual RW-1). Private recreational use cabins will not be authorized. Public

use cabins are intended to provide the public with unique opportunities to enjoy and use the refuge. They also help ensure public health and safety in bad weather and emergencies.

### ***3.3.16.2 Temporary Facilities for the Taking of Fish and Wildlife***

Per Section 1316 of ANILCA, the refuge will allow the use of temporary campsites, tent platforms, shelters, and other temporary facilities and equipment directly and necessarily related to the taking of fish and wildlife, provided these facilities are not detrimental to refuge purposes. Special use permits may be issued for tent frames, caches, smokehouses, and other facilities. Appropriate stipulations will be included in the special use permits to ensure protection of resources on refuge lands.

The following criteria will be considered in evaluating applications for temporary facilities:

- Where feasible, they will be located in a manner to not displace or compete with existing public uses.
- They will be located away from the vicinity of existing cabins.
- They will be located on sites that are not currently popular campsites.
- They will be located to minimize displacement of wildlife.

The following conditions may be imposed on special use permits for temporary facilities:

- The time of occupancy will coincide with the State and/or Federal hunting, fishing, and/or trapping season for the species for which the temporary facility is being used.
- At the end of the specified occupancy, tents and other readily portable materials will be removed.
- To the extent feasible, temporary structures will be built with materials that blend into and are compatible with the surrounding landscape.
- To the extent feasible, temporary facilities will be screened from water and located so that they are as unobtrusive as possible when viewed from trails and other public use areas.

### **3.3.17 Outreach and Education**

Outreach is two-way communication between the Selawik refuge and the public to establish mutual understanding, promote public involvement, and influence public attitudes and actions. The refuge will continue to take advantage of partnership opportunities in providing outreach, including working with the Alaska Geographic Association; Alaska Public Lands Information Centers; Friends of Alaska National Wildlife Refuges; local, State, and other Federal agencies; local schools; tribal governments; Alaska Native organizations; and others.

Use of outreach as a management tool is a key to the success of many of the management activities outlined in this comprehensive plan. Two outreach activities—environmental education and interpretation—are included in the six priority public uses identified in the Refuge Improvement Act. Many other activities are also available for use by the refuge staff in its outreach program, which may be developed in more detail as a step-down management plan. All outreach activities must be continually evaluated to determine whether they fulfill refuge management goals and objectives. The Selawik refuge will ensure that outreach services are available to all segments of the public, including those with disabilities and those who speak languages other than English.

Refuge staff will work with the media; attend public meetings and workshops; develop informational displays, brochures, Web sites, and teaching materials; invite the public to the Selawik refuge headquarters (i.e., open houses); visit local schools and communities; and foster outreach partnerships and one-on-one communication.

### **3.3.18 Commercial Use Management**

Commercial activities or uses involve use of a refuge or its resources for a profit. Subsistence activities or uses are not included in commercial activities or uses. Refer to Section 3.3.13 for policies related to subsistence.

Except for mining on valid claims under the 1872 Mining Law, of which there are none located within the boundaries of the Selawik refuge, other activities where specific property rights are held by entities other than the Federal government, or where specifically exempted by law, all commercial activities or uses must comply with both NEPA and the compatibility requirements of the Refuge Administration Act. A written authorization (such as a special use permit) is required to conduct commercial activities on any refuge. Compliance with NEPA and a refuge compatibility determination will be required prior to deciding whether to authorize a commercial activity or use. Prior to authorizing any commercial or economic use of a natural resource, the refuge manager must determine that each activity or use, except for proposed activities authorized by ANILCA, contributes to the achievement of refuge purposes or the Refuge System mission (50 CFR 29.1). Except for commercial services described previously such as air charters and guided hunting and fishing, commercial enterprises are prohibited in designated wilderness areas.

#### **3.3.18.1 Commercial Recreation Services**

Air-taxi and water-taxi operators, wildlife-viewing guides, tour operators, wilderness guides, recreational fishing guides, big game hunting guides, and others providing recreation services are required, under 50 CFR 27.97, to obtain special use permits to operate on refuge lands. Where the number of special use permits is limited, refuge managers will award permits competitively (50 CFR 36.41). Special use permits require compliance with all applicable laws and regulations (e.g., United States Coast Guard licensing regulations). Permit stipulations ensure that camps; travel methods; storage of food, fish, and game meat; and other activities are compatible with refuge purposes and reduce the potential for impacts to resources and to other people using the refuge. If problems or conflicts arise relating to commercial recreation activities or uses—such as disturbance of active nests, conflicts with subsistence activities or uses, chronic incidence of bears getting into food, or violations of State or Federal regulations—the refuge may modify or terminate a specific activity or use under the special use permit stipulations. The refuge will monitor the number and type of guides and outfitters operating on the refuge and the number of clients and will, if necessary, further regulate these commercial recreation activities or uses.

Under Section 1307 of ANILCA, local preference is provided for all new commercial visitor services except guiding for hunting and fishing. Regulations defining local preference are at 50 CFR 36.37.

#### **3.3.18.2 Mineral Exploration and Development**

**Oil and Gas Assessment.** Geological and geophysical studies, including subsurface core sampling and seismic activities, require special use permits with site-specific stipulations that ensure compatibility with refuge purposes and consistency with the management objectives of this

comprehensive plan. Decisions to allow exploration will be made on a case-by-case basis. These activities will not be allowed in designated wilderness.

***Oil and Gas Leasing.*** Oil and gas leasing may be allowed only in Intensive Management areas. Oil and gas leasing will not be authorized until completion of the following:

- An assessment of potential.
- A national interest determination.
- A refuge compatibility determination, where applicable.
- A Comprehensive Conservation Plan amendment.

During this process, the Service will seek the views of State and local governments and other interested parties, in accordance with Section 1008(b) (2) of ANILCA.

If leasing is authorized, lease holders will be subject to Federal leasing regulations (43 CFR 3100) and appropriate State regulations. Leases will be subject to stipulations on access, seasonal use, and site restoration; operators would be required to use technology that minimizes impacts on fish, wildlife, and habitat. The Selawik refuge will work closely with lease holders to minimize adverse effects to the refuge's environment and recreation opportunities from mineral exploration and extraction.

***Sand, Gravel, and Other Common Variety (Saleable) Minerals.*** Common variety minerals—such as sand, gravel, and stone—may be sold pursuant to the Materials Act of July 31, 1947 (30 U.S.C. 601 and 602), as amended. Regulations are found at 43 CFR 3600. Disposal is also authorized under the Refuge Revenue Sharing Act (16 U.S.C. 715s). Also see 612 FW 1 of the Service Manual. Extraction may be authorized, where compatible, in Intensive and Moderate Management areas to support construction and maintenance projects on or near refuge lands if no reasonable material sites exist off refuge lands.

***Other Mineral Leasing.*** In general, mineral leasing is not allowed on refuge land. Geothermal leasing is not allowed on refuges under Section 1014(e) of the Geothermal Steam Act (30 U.S.C. 1014). Coal mining is also prohibited, subject to valid existing rights, under Section 16 of the Federal Coal Leasing Amendment Act of 1975 (30 U.S.C. 201 Notes) and the Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1272; 43 CFR 3400.2). In specific cases of national need, however, mineral exploration, development, or extraction may be permitted under Section 1502 of ANILCA. The President must determine that the national need for the mineral activity outweighs the other public values of the land. Any recommendation by the President would take effect only after enactment of a joint resolution by Congress.

### ***3.3.18.3 Commercial Fishing and Related Facilities***

Section 304(d) of ANILCA, addresses commercial fishing and related campsites, cabins, motor vehicles, and aircraft on the refuge. The Service allows individuals with valid commercial fishing rights or privileges to operate on refuges. Facilities and uses in support of commercial fishing are subject to reasonable regulation. Section 304(d) provides for restricting commercial fishing rights if the use is determined to be inconsistent with refuge purposes and to be a “significant expansion of commercial fishing activities ... beyond the level of such activities during 1979.” As there were no commercial fishing activities or facilities on Selawik refuge in 1979, any proposed facilities will be considered new, and any fishery and related facilities and equipment will be required to be compatible with the purposes of Selawik refuge.

Aquaculture and mariculture (i.e., the cultivation of marine organisms in their native environment) support facilities may be allowed in Intensive Management areas, subject to provisions of State and Federal laws. No Intensive Management areas currently exist or are proposed in this comprehensive plan for the Selawik refuge. Seafood processing plants will not be allowed.

#### ***3.3.18.4 Commercial Harvest of Timber and Firewood***

Commercial harvest of timber and firewood will only be authorized under a special use permit and when necessary to fulfill overall refuge management objectives. Within Moderate, Minimal, and Wild River Management categories, commercial harvest of timber and firewood to accomplish management objectives will only occur when an approved refuge fire management plan identifies the need to reduce fuel loads in an area. Applicable Federal and State of Alaska guidelines for timber management will be followed. Commercial harvest of timber and firewood is not allowed in designated wilderness.

#### ***3.3.18.5 Commercial Gathering of Other Resources***

Commercial gathering of other resources (e.g., antlers or mushrooms) requires a special use permit under 50 CFR 27.51 and may be authorized in Intensive and Moderate Management areas.

#### ***3.3.18.6 Commercial Filming and Recording Activities***

It is Service policy to provide refuge access and/or assistance to firms and individuals in the pursuit of commercial visual and audio recordings when they are compatible with refuge purposes or the mission of the Refuge System. Commercial films, television production, or sound tracks made within refuges for other than news purposes require a special use permit or authorization (43 CFR 5.1).

Commercial filming or recording activities such as videotaping, audio taping, and photography for the purpose of advertising products and services are subject to an A/V Production Permit (Refuge Manual 8 RM 16).

Permits are not required for still photography on refuge lands open to the public, including commercial still photography, so long as no models or props which are not a part of the site's natural or cultural resources or administrative facilities are used (16 U.S.C. 460l-6d(e)).

#### ***3.3.18.7 Other Commercial Uses***

Generally, other commercial activities or uses such as grazing, agriculture, and hydroelectric power development will not be allowed. An exception may be made for low-head or small run-of-the-river hydropower facilities. These may be authorized in Intensive and Moderate Management areas on a case-by-case basis. See Section 3.3.14.9 for transmission lines, pipelines, and other rights-of-way mentioned in Title XI of ANILCA.

### **3.3.19 Environmental Contaminants Identification and Cleanup**

One goal of the Refuge Administration Act, as amended, is to maintain the biological integrity, diversity, and environmental health of the Refuge System. In support of this goal, the Service studies environmental contaminants that may threaten trust species (i.e., those species for which the Service has primary jurisdiction) and other resources of the Selawik refuge. This work will continue as new concerns are identified and as funding allows.

An assessment of known or suspected contaminants threats is normally completed for each refuge as part of the national Contaminants Assessment Process. During the revision process for comprehensive conservation plans, existing information will be reviewed, and an assessment of potential contaminants threats will be entered into an electronic database. A contaminant assessment report will also be prepared.

When contaminants are identified on refuge lands, the Service will initiate discussions with the responsible party or parties to remedy the situation. If the Service caused the contamination, funds will be sought to define the extent and type of the contamination and to remedy it. Appropriate environmental regulations—including the Resource Conservation Recovery Act, Comprehensive Environmental Response and Compensation Liability Act, Oil Pollution Act of 1990, and State of Alaska regulations (e.g., 18 AAC 75)—will be followed during any remediation work that is conducted.

All spills of petroleum products and hazardous materials must be reported to the Alaska Department of Environmental Conservation and to the National Response Center. Incidents also need to be reported to the U.S. Fish and Wildlife Service Regional Spill Response Coordinator. The refuge will refer to the U.S. Fish and Wildlife Service Region 7 Spill Response Contingency Plan and other relevant plans when responding to spills.

### **3.3.20 Management of Designated Wilderness**

Under the Wilderness Management category, designated wilderness lands (e.g., the Selawik Wilderness Area) are primarily managed to preserve their wilderness character.

Management of designated wilderness areas is directed by the specific purposes of a refuge, the mission of the National Wildlife Refuge System, the purposes and provisions of the Wilderness Act of 1964, the provisions of ANILCA, the Service's Wilderness Stewardship Policy (Service Manual 610 FW 1-5), and regional policy (Region 7 Policy Manual RW-29).

In accordance with national and regional policies (Region 7 Policy Manual RW-29), a Minimum Requirement Analysis will be conducted for administrative activities proposed in the Selawik Wilderness Area. This two-step decision process involves determining if a proposed administrative activity is necessary to administer the area as wilderness, and, if so, determining the minimum tool, which is the tool, equipment, device, force, regulation, or practice deemed the minimum necessary to achieve the management objective (Arthur Carhart National Wilderness Training Center 2009; Minimum Requirements Working Group for Alaska 2006; USFWS 2006).

Certain activities are legislatively prohibited in designated wilderness, including oil, gas, and other mineral leasing and most surface-disturbing activities. Section 4(c) of the Wilderness Act generally prohibits roads, commercial enterprises, motor vehicles, motorboats, other forms of mechanical transport, motorized equipment, the landing of aircraft, and structures and installations in designated wilderness areas. Provisions of ANILCA, however, provide exceptions to some of these prohibitions for specific purposes, such as allowing motorized public access for traditional activities, and for the continuation of pre-existing commercial and private use cabins. Some of the ANILCA provisions affecting public use of designated wilderness areas in Alaska include:

- Use of Federal lands for campsites, cabins, motorized vehicles, and aircraft landings directly incident to the exercise of valid commercial fishing rights (Section 304(d)).

- The use for subsistence purposes of snowmachines, motorboats, and other means of surface transportation traditionally employed for such purposes by local residents (Section 811).
- The use of snowmachines, motorboats, airplanes, and non-motorized surface transportation methods for traditional activities and for travel to and from villages and home sites (Section 1110(a)).
- Such rights as necessary for access to State- or privately-owned lands (including subsurface rights), valid mining claims, or other valid occupancy (Section 1110(b)).
- Use of cabins for traditional and customary uses (Section 1303).
- Use of temporary campsites, tent platforms, shelters, and other temporary facilities, and equipment directly and necessarily related to the taking of fish and wildlife (Section 1316).

Other provisions of ANILCA affect the administrative uses of designated wilderness areas, including the following:

- Access for mineral assessment purposes, as part of the Alaska Mineral Resources Assessment Program (Section 1010).
- Construction and maintenance of navigation aids and other facilities (Section 1310).
- Continuation of existing, and construction of new, public use cabins (Sections 1315(c) and (d)).

Under regional policy, the use of chainsaws by rural residents engaged in subsistence activities is allowed. However, motorized generators and water pumps are not allowed (Region 7 Policy Manual RW-4).

Granting rights-of-way for transportation or utility systems through designated wilderness areas requires Presidential and congressional approval (Section 1106(b) of ANILCA; Sections 3.3.14.7 and 3.3.14.9 of this chapter).

The refuge intends to develop a step-down Wilderness Stewardship plan for the Selawik Wilderness Area to address in greater detail its resources, public uses, and management (Goal 5, Objective 10). Specific details would be included on how the broad management direction provided in this comprehensive plan would be applied to the Selawik Wilderness Area to preserve its wilderness character and values. This step-down plan would be prepared in cooperation with the State of Alaska and other partners. Public involvement would be an essential part of the preparation of this step-down plan.

### **3.3.21 Administration of the Selawik National Wildlife Refuge**

#### ***3.3.21.1 Administrative Sites and Visitor Facilities***

Administrative sites include temporary and permanent field camps, residences, offices, administrative cabins, and associated storage, communication, and transportation facilities. The type of administrative site and level of development will be consistent with the management intent of the management category in which it is constructed. Administrative field camps or other administrative facilities within Minimal, Wild River, and Wilderness Management categories will only be allowed when required to meet management objectives, when no reasonable alternative sites exist, and when the facilities are essential to protect the health and safety of employees. New facilities would only be the minimum required to meet long-term needs.

Fuel storage or other hazardous-material storage in conjunction with administrative sites will meet all Federal and State requirements for spill containment and storage. Hazardous materials stored within the Wild River and Wilderness Management categories will be in small (55-gallon or less) containers.

Under Section 1306 of ANILCA, the Secretary of the Interior may establish administrative sites and visitor facilities, either within or outside the boundaries of a conservation system unit, in accordance with the unit's management plan and for the purposes of ensuring the preservation, protection, and proper management of the unit. Section 1306 (a) (2) further states, "to the extent practicable and desirable, the Secretary shall attempt to locate such sites and facilities on Native lands in the vicinity of the unit."

Department of Interior guidelines, developed in 1995 and implementing Section 1306, require that prior to initiating a search for an administrative site or visitor facility, site-selection criteria be developed, with public input, and all proposals be evaluated according to the site-selection criteria. If it is determined that Native lands satisfy the site-selection criteria and are desirable and practicable for the intended administrative site or visitor facility, the highest-ranked Native lands shall be selected as the preferred site, subject to a specific site evaluation. If no Native lands satisfy the site-selection criteria, the highest-ranked parcel will become the preferred site. Public comments will be considered prior to making a final decision.

***Applicability of Refuge Regulations to Off-Refuge Administrative and Visitor Facility Sites.*** Under 50 CFR 36.1(c) the Service is authorized to enforce regulations concerning public safety and protection of government property, and State of Alaska fish and wildlife regulations, on administrative and visitor facility sites that may be held in fee or less-than-fee title and are either inside or outside the approved boundaries of the Selawik refuge. Administrative sites and facilities for the Selawik refuge are located in the villages of Kotzebue and Selawik. There is one administrative cabin on the Selawik refuge (Figure 3-2).



Figure 3-2. The Selawik refuge maintains an administrative cabin for field projects near the mouth of the Kugarak River.

### **3.3.21.2 Refuge Management Plans**

Some management programs are addressed in sufficient detail in the Comprehensive Conservation Plan to be integrated directly into the budgetary process. For other programs,

it may be necessary to prepare step-down management plans to implement the general strategies identified in this comprehensive plan. Information on the step-down planning process can be found in 602 FW 3 of the Service Manual.

A list of step-down management plans for Selawik refuge is found in Chapter 5 of this comprehensive plan.

### 3.3.22 Alaska Mineral Resource Assessment Program

Section 1010 of ANILCA requires that all Federal lands be assessed for their oil, gas, and other mineral potential, although Section 304(c) prohibits new hardrock mining on refuges. Mineral assessment techniques that do not have lasting impacts—such as side-scanning radar, trenching, and core drilling—may be allowed throughout the refuge. Special use permits issued to other government agencies or their contractors for assessment work would include stipulations to ensure that the assessment program is compatible with refuge purposes. For example, stipulations may limit access during nesting, calving, spawning, or other times when fish and wildlife may be especially vulnerable to disturbance.

## 3.4 Management Categories Table

### 3.4.1 Introduction

Table 3-1 summarizes activities, public uses, commercial activities or uses, and facilities by management category. In some cases, it provides very specific guidance such as for highway vehicles. In other cases, such as for research and management facilities, the direction is general. While facilities may be allowed in all management categories, the types of facilities and how they would be constructed and operated vary by management category. The descriptions of the management categories reflect a clear distinction in the level of action and constraints that may be placed on activities or development within the management categories. The descriptions of the management categories should be used to reflect the desired future condition of the area when site-specific proposals are being evaluated. Activities allowed or authorized within the different categories will be managed differently depending on the management category in which they occur.

Management categories, activities, public uses, commercial activities or uses, and facilities that generally do not apply to the Selawik refuge are shaded in gray.

#### ***3.4.1.1 Definitions for Management Categories Table***

The following are definitions for terms used in Table 3-1.

**Allowed**—Activity, use, or facility is allowed under existing NEPA analysis, appropriate use findings, refuge compatibility determinations, and applicable laws and regulations of the Service, other Federal agencies, and the State of Alaska.

**May be allowed**—Activity, use, or facility may be allowed subject to site-specific NEPA analysis, an appropriate use finding (when required), a specific refuge compatibility determination (when required), and compliance with all applicable laws and regulations of the Service, other Federal agencies, and the State of Alaska.

**May be authorized**—Activity, use, or facility may only be allowed with a required special use permit or other authorization.

**Not allowed**—Activity, use, or facility is not allowed.

The following terms are used in the table and throughout this chapter.

**NEPA analysis**—All activities, uses, and facilities proposed for a refuge that have the potential to result in significant impacts on the environment require an analysis of potential environmental impacts under the National Environmental Policy Act. This analysis may be documented as a categorical exclusion (CE), an environmental assessment (EA), or an environmental impact statement (EIS), depending on the nature of the proposed project.

**Appropriate Use**—All activities, uses, and facilities over which the Service has jurisdiction must be determined to be appropriate following direction in Service Manual 630 FW 1.11. Hunting, fishing, wildlife observation and photography, and environmental education and interpretation are considered appropriate by national policy with no further analysis required. See Section 3.3.5 for a description of the guidelines used to determine if other activities, uses, or facilities are appropriate.

**Compatibility**—All activities, uses, and facilities allowed on the refuge, except management actions undertaken by the Service, must be found to be compatible with the purposes of the refuge and the mission of the Refuge System (Section 3.3.6). Management activities undertaken by volunteers, cooperators, or contractors working for the Service, with limited exception, are exempt from compatibility review (part 603 of the Service Manual).

**Regulations**—All activities, uses, and facilities allowed on a refuge must comply with any applicable regulations, as published in the Code of Federal Regulations. Regulations are developed by the Service through a public process to implement the legal authorities under which the Service manages the Refuge System. For more information on these regulations, see the Management Policies and Guidelines section of this chapter. For some activities, other Federal agency and/or State regulations may also apply.

**Temporary**—The term “temporary” means a continuous period of time not to exceed 12 months, except as specifically provided otherwise. Special use permits or other authorizations may prescribe a longer period of time, but the structures or other human-made improvements need to be readily and completely dismantled and removed from the site when the period of authorized use terminates.

The following guidelines apply to all activities, uses, and facilities on a refuge.

**Area or time restrictions**—All activities, uses, and facilities allowed on a refuge may be restricted in certain areas or at certain times, at the discretion of the refuge manager and with the appropriate level of public involvement, by emergency (short-term) or permanent regulation, if necessary to protect resources on refuge lands or human health and safety.

**Management emergencies**—Activities, uses, and facilities not allowed on a refuge or in specific management categories may be allowed to address naturally occurring or human-caused actions that adversely affect, or damage, natural resources or pose an immediate threat to human health and safety.

Table 3-1. Activities, public uses, commercial activities or uses, and facilities by management category.

Note: Those management categories that do not apply to the Selawik refuge are shaded gray.

ACTIVITY or USE	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
<b>ECOSYSTEM, HABITAT, FISH, AND WILDLIFE MANAGEMENT</b> (See Sections 3.3.10, 3.3.11, and 3.3.12)					
<b>Ecosystem and Landscape Management</b>					
<b>Collecting Information on and Monitoring Ecosystem Components</b>  Data gathering, monitoring, and maintaining a comprehensive database of selected ecosystem components (e.g., plants, animals, fish, water, air).  (See Sections 3.3.12 and 3.3.12.1)	Allowed*; see Section 3.3.20	Allowed	Allowed	Allowed	Allowed
<b>Research and Management</b>  Access and collection of data necessary for management decisions or to further science by the Service. (See Section 3.3.12)	Allowed*; see Section 3.3.20	Allowed	Allowed	Allowed	Allowed
Access and collection of data necessary for management decisions or to further science by ADF&G.	Allowed*; see Section 3.3.20	Allowed	Allowed	Allowed	Allowed
Access and collection of data necessary for management decisions or to further science by other researchers.	May be authorized*; see Section 3.3.20	May be authorized	May be authorized	May be authorized	May be authorized

\* Subject to minimum requirements analysis

<b>ACTIVITY or USE</b>	<b>MANAGEMENT of WILDERNESS</b>	<b>MANAGEMENT of WILD RIVERS</b>	<b>MINIMAL MANAGEMENT</b>	<b>MODERATE MANAGEMENT</b>	<b>INTENSIVE MANAGEMENT</b>
<p><b>Research and Management Facilities</b></p> <p>May be permanent or temporary structures or camps, including weirs, counting towers, and sonar counters. (See Section 3.3.21.1)</p>	May be allowed*; consistent with Section 3.2.4	May be allowed	May be allowed	May be allowed	May be allowed
<b>Fish and Wildlife Habitat Management</b>					
<p><b>Describing, Locating, and Mapping Habitats</b></p> <p>Development of quantitative, written, and graphic descriptions of fish and wildlife habitat, including water, food, and shelter components. (See Section 3.3.11.1)</p>	Allowed*; see Section 3.3.20	Allowed	Allowed	Allowed	Allowed
<p><b>Habitat Management (See Section 3.3.11.1)</b></p> <p><i>Mechanical Treatment:</i> Activities such as cutting, crushing, or mowing of vegetation; water control structures; fencing; artificial nest structures.</p>	Not allowed; with exceptions consistent with Sections 3.2.4.* See also Section 3.3.20	Not allowed; with exceptions consistent with Section 3.2.5	Not allowed; with exceptions consistent with Section 3.2.3	May be allowed	May be allowed
<p><i>Chemical Treatment:</i> Use of chemicals to remove or control non-native species. (See Section 3.3.12.8)</p>	May be allowed*; see Section 3.3.20	May be allowed	May be allowed	May be allowed	May be allowed
<p><i>Manual Treatment:</i> Use of hand tools to remove, reduce, or modify hazardous plant fuels or exotic plant species, or to modify habitats (e.g., remove beaver dams).</p>	May be allowed*; see Section 3.3.20	May be allowed	May be allowed	May be allowed	May be allowed

\* Subject to minimum requirements analysis

ACTIVITY or USE	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
<p><b>Aquatic Habitat Modifications</b></p> <p>Activities such as stream bank restoration, passage structures, fish barriers, or removal of obstacles that result in physical modification of aquatic habitats to maintain or restore native fish species. (See Section 3.3.11.1)</p>	<p>May be allowed*; consistent with Section 3.2.4.</p> <p>See also Section 3.3.20</p>	<p>May be allowed; consistent with Section 3.2.5</p>	<p>May be allowed</p>	<p>May be allowed</p>	<p>May be allowed</p>
<p><b>Fire Management— Prescribed Fires</b></p> <p>Fire ignited by management actions to meet specific management objectives. (See Section 3.3.11.2)</p>	<p>May be allowed*; see Section 3.2.4</p>	<p>May be allowed</p>	<p>May be allowed</p>	<p>May be allowed</p>	<p>May be allowed</p>
<p><b>Fire Management— Wildland Fire Use</b></p> <p>The planned use of any wildland fire to meet management objectives. (See Section 3.3.11.2)</p>	<p>May be allowed*</p>	<p>May be allowed</p>	<p>May be allowed</p>	<p>May be allowed</p>	<p>May be allowed</p>
<p><b>Fire Management— Fire Suppression</b></p> <p>Management actions intended to protect identified values from a fire, extinguish a fire, or confine a fire. (See Section 3.3.11.2)</p>	<p>Allowed</p>	<p>Allowed</p>	<p>Allowed</p>	<p>Allowed</p>	<p>Allowed</p>
<p><b>Non-native and Pest Plant Control</b></p> <p>Monitoring, extirpation, control, removal and/or relocation, and other management practices for pest and non-native plant species. (See Section 3.3.12.8)</p>	<p>May be allowed*; see Section 3.3.20</p>	<p>May be allowed</p>	<p>May be allowed</p>	<p>May be allowed</p>	<p>May be allowed</p>

\* Subject to minimum requirements analysis

<b>ACTIVITY or USE</b>	<b>MANAGEMENT of WILDERNESS</b>	<b>MANAGEMENT of WILD RIVERS</b>	<b>MINIMAL MANAGEMENT</b>	<b>MODERATE MANAGEMENT</b>	<b>INTENSIVE MANAGEMENT</b>
<p><b>Water Quality and Quantity Management</b></p> <p>Monitoring of water quality and quantity to identify baseline data and for management purposes; includes installation of gauging stations. (See Section 3.3.10.2)</p>	Allowed*; see Section 3.3.20	Allowed	Allowed	Allowed	Allowed
<b>Fish and Wildlife Population Management</b>					
<p><b>Reintroduction of Species</b></p> <p>The reintroduction of native species to restore diversity of native fish, wildlife, and habitats. (See Section 3.3.12.6)</p>	May be allowed*; see Section 3.3.20	May be allowed	May be allowed	May be allowed	May be allowed
<p><b>Fish and Wildlife Control</b></p> <p>The control, relocation, sterilization, removal, or other management of native species, including predators, to maintain diversity of native fish, wildlife, and habitats; favor other fish or wildlife populations; protect reintroduced, threatened, or endangered species or to restore depleted native populations. (See Section 3.3.12.7)</p>	May be allowed*; see Section 3.3.20	May be allowed	May be allowed	May be allowed	May be allowed
<p><b>Non-native Species Management</b></p> <p>The removal or control of non-native species (including predators). (See Section 3.3.12.8)</p>	May be allowed*; see Section 3.3.20	May be allowed	May be allowed	May be allowed	May be allowed

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ACTIVITY or USE	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
<p><b>Pest Management and Disease Prevention and Control</b></p> <p>Relocation or removal of organisms that threaten human health or survival of native fish, wildlife, or plant species. Management practices directed at controlling pathogens that threaten fish, wildlife, and people, such as rabies and parasite control. (See Section 3.3.12.9)</p>	May be allowed*; see Section 3.3.20	May be allowed	May be allowed	May be allowed	May be allowed
<p><b>Fishery Restoration</b></p> <p>Actions taken to restore fish access to spawning and rearing habitat, or actions taken to restore populations to historic levels. Includes harvest management, escapement goals, habitat restoration, stocking, egg incubation boxes, and lake fertilization. (See Section 3.3.12.10)</p>	May be allowed*	May be allowed	May be allowed	May be allowed	May be allowed
<p><b>Fishery Restoration Facilities</b></p> <p>Fisheries facilities may be permanent or temporary and may include hatcheries, fish ladders, fish passages, fish barriers, and associated structures. (See Sections 3.3.12.10 and 3.3.12.11)</p>	May be authorized*	May be authorized	May be authorized	May be authorized	May be authorized

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<p><b>Fishery Enhancement</b></p> <p>Activities applied to a fish stock to supplement numbers of harvestable fish to a level beyond what could be naturally produced based upon a determination or reasonable estimate of historic levels. (See Section 3.3.12.11)</p>	May be allowed*; consistent with Section 3.3.20	May be allowed	May be allowed	May be allowed	May be allowed
<p><b>Fishery Enhancement Facilities</b></p> <p>May be permanent or temporary and may include hatcheries, egg incubation boxes, fish ladders, fish passages, fish barriers, and associated structures. (See Sections 3.3.12.11 and 3.3.21.1)</p>	May be authorized*	May be authorized	May be authorized	May be authorized	May be authorized
<p><b>Native Fish Introductions</b></p> <p>Movement of native fish species within a drainage on the refuge to areas where they have not historically existed. (See Section 3.3.12.6)</p>	May be allowed*	May be allowed	May be allowed	May be allowed	May be allowed
<p><b>Non-native Species Introductions</b></p> <p>Introduction of species not naturally occurring within the refuge. (See Section 3.3.12.6)</p>	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed

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ACTIVITY or USE	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
<b>SUBSISTENCE</b> (See Section 3.3.13)					
<b>Subsistence Activities</b>					
<b>Fishing, Hunting, Trapping, and Berry Picking</b> The taking of fish and wildlife and other natural resources for personal consumption, as provided by law.	Allowed	Allowed	Allowed	Allowed	Allowed
<b>Collection of House Logs and Firewood</b> Harvesting live standing timber greater than 6 inches diameter at breast height for personal or extended family use.	May be authorized				
<b>Collection of House Logs and Firewood</b> Harvesting live standing timber between 3 and 6 inches diameter at breast height for personal or extended family use.	20 trees or less per year allowed; more than 20 trees per year may be authorized; consistent with Section 3.3.13	20 trees or less per year allowed; more than 20 trees per year may be authorized; consistent with Section 3.3.13	20 trees or less per year allowed; more than 20 trees per year may be authorized; consistent with Section 3.3.13	20 trees or less per year allowed; more than 20 trees per year may be authorized; consistent with Section 3.3.13	20 trees or less per year allowed; more than 20 trees per year may be authorized; consistent with Section 3.3.13
<b>Collection of Plant Materials</b> Harvesting trees less than 3 inches diameter at breast height, dead standing or downed timber, grass, bark, and other plant materials used for subsistence purposes.	Allowed	Allowed	Allowed	Allowed	Allowed

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<b>Temporary Facilities</b> Establishment and use of tent platforms, shelters, and other temporary facilities and equipment directly related to the taking of fish and wildlife. (See Section 3.3.16.2)	Tent platforms may be authorized; all others may be allowed	Tent platforms may be authorized; all others may be allowed	Tent platforms may be authorized; all others may be allowed	Allowed	Allowed
<b>Subsistence Cabins – See Cabins</b> (See also Section 3.3.16.1)					
<b>Subsistence Access – subject to reasonable regulations under provisions of Section 811 of ANILCA (See Section 3.3.13.1)</b>					
Use of snowmobiles, motorboats, and other means of surface transportation traditionally employed for subsistence purposes.	Allowed	Allowed	Allowed	Allowed	Allowed
<b>PUBLIC ACCESS</b> (See Sections 3.3.13.1 and 3.3.14) Restrictions subject to provisions of Section 1110 of ANILCA as applicable; see also Subsistence Access section above.					
<b>Foot</b>	Allowed	Allowed	Allowed	Allowed	Allowed
<b>Dogs and Dog Teams</b>	Allowed	Allowed	Allowed	Allowed	Allowed
<b>Other Domestic Animals</b> Includes horses, mules, llamas, etc. (certified weed-free feed required)	Allowed	Allowed	Allowed	Allowed	Allowed
<b>Non-motorized Boats</b> Includes canoes, kayaks, rafts, etc.	Allowed	Allowed	Allowed	Allowed	Allowed

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ACTIVITY or USE	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
<b>Motorized</b>					
Use of snowmobiles, motorboats, airplanes, and non-motorized surface transportation methods for traditional activities and for travel to and from villages and home sites.	Allowed	Allowed	Allowed	Allowed	Allowed
<b>Highway Vehicles</b>	Not allowed	Not allowed	Not allowed	May be allowed on designated roads	Allowed on all-weather roads
<b>Off-Road Vehicles (All-Terrain Vehicles)</b> Includes air boats and air-cushion vehicles. (See Sections 3.3.13.1 and 3.3.14.2)	Not allowed; with exceptions consistent with Section 3.3.13.1	Not allowed; with exceptions consistent with Section 3.3.13.1	Not allowed; with exceptions consistent with Section 3.3.13.1	May be authorized	May be authorized
<b>Helicopters</b> Includes all rotary-wing aircraft. (See Section 3.3.14.3)	Not allowed; with exceptions consistent with Section 3.3.14.3	May be authorized	May be authorized	May be authorized	May be authorized
<b>PUBLIC USE, RECREATION, and OUTREACH ACTIVITIES</b> Also see ACCESS and Commercial Recreation sections.					
<b>Hunting, Fishing, Wildlife Observation, Wildlife Photography, Interpretation and Environmental Education</b> Note: All activities listed are priority public uses. (See Section 3.3.15)	Allowed	Allowed	Allowed	Allowed	Allowed
<b>Trapping, Walking, Hiking, Camping at Undeveloped Sites, and Dog Sledding</b> (See Section 3.3.15)	Allowed	Allowed	Allowed	Allowed	Allowed

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<b>General Photography</b> See also COMMERCIAL USES. (See Section 3.3.15)	Allowed	Allowed	Allowed	Allowed	Allowed
<b>Outreach Activities</b> (See Section 3.3.17)	Allowed	Allowed	Allowed	Allowed	Allowed
<b>Public Use and Recreation Facilities – level of development is consistent with management intent of the category (See Section 3.3.16)</b>					
<b>All Weather Roads</b> And associated developments, including bridges.	Not allowed	Not allowed	Not allowed	May be allowed	May be allowed
<b>Unimproved Roads</b> Note: While unimproved roads are not allowed in Minimal, Wilderness, and Wild River Management categories, roads may exist. In these management categories, the roads would not be designated for use or maintained.	Not allowed	Not allowed	Not allowed	May be allowed	May be allowed
<b>Designated Off-Road Vehicle (All-Terrain Vehicle) Routes and Areas</b>	Not allowed	Not allowed	Not allowed	May be authorized	May be authorized
<b>Roadside Exhibits and Waysides</b>	Not applicable	Not applicable	Not applicable	May be allowed	May be allowed
<b>Constructed and Maintained Airstrips</b>	Not allowed	Not allowed	Not allowed	May be allowed	May be allowed

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ACTIVITY or USE	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
<p><b>Cleared Landing Strips and Areas</b></p> <p>Includes unimproved areas where airplanes land. Minor brush cutting or rock removal by hand is allowed for maintenance.</p>	Existing strips allowed to remain*; new strips not allowed; see Section 3.3.20	May be allowed	May be allowed	May be allowed	May be allowed
<p><b>Constructed Hiking Trails</b></p> <p>Includes bridges, boardwalks, trailheads, and related facilities.</p>	May be allowed*	May be allowed	May be allowed	May be allowed	May be allowed
<p><b>Designated Hiking Routes</b></p> <p>Unimproved and unmaintained trails; may be designated by signs, cairns, and/or on maps.</p>	Allowed	Allowed	Allowed	Allowed	Allowed
<p><b>Boat Launches and Docks</b></p> <p>Designated sites for launching and storing watercraft or tying up a float plane.</p>	May be allowed*	May be allowed	May be allowed	May be allowed	May be allowed
<p><b>Visitor Contact Facilities</b></p> <p>A variety of staffed and unstaffed facilities providing information on the refuge and its resources to the public; facilities range from visitor centers to kiosks and signs. (See Section 3.3.16)</p>	Generally not allowed*; see Sections 3.2.4 and 3.3.20	May be allowed	May be allowed	May be allowed	May be allowed
<p><b>Campgrounds</b></p> <p>Developed sites accessible by highway vehicles.</p>	Not applicable	Not applicable	Not applicable	May be allowed	May be allowed

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<b>ACTIVITY or USE</b>	<b>MANAGEMENT of WILDERNESS</b>	<b>MANAGEMENT of WILD RIVERS</b>	<b>MINIMAL MANAGEMENT</b>	<b>MODERATE MANAGEMENT</b>	<b>INTENSIVE MANAGEMENT</b>
<p><b>Hardened Campsites</b> Areas where people can camp that are accessible by vehicle or on foot but where the only facilities provided are for public health and safety and/or resource protection; may include gravel pads for tents, hardened trails, and/or primitive toilets. (See Section 3.3.16)</p>	Allowed*; consistent with Section 3.3.20	Allowed	Allowed	Allowed	Allowed
<p><b>Temporary Facilities</b> Includes tent frames and platforms, caches, and other similar or related facilities; does not include cabins. See also SUBSISTENCE, COMMERCIAL USES, and Administrative Facilities. (See Section 3.3.16.2)</p>	Tent platforms may be authorized; all others may be allowed	Tent platforms may be authorized; all others may be allowed	Tent platforms may be authorized; all others may be allowed	Tent platforms may be authorized; all others may be allowed	Tent platforms may be authorized; all others may be allowed
<p><b>Cabins – also other related structures such as outdoor toilets, food caches, storage sheds, and fish drying racks (See Section 3.3.16.1)</b></p>					
<p><b>Public Use Cabin</b> A cabin administered by the Service and available for use by the public; intended only for short-term public recreational use and occupancy.</p>	Existing cabins allowed to remain*; new cabins may be allowed; consistent with Section 3.3.20	Existing cabins allowed to remain; new cabins may be allowed	Existing cabins allowed to remain; new cabins may be allowed	Existing cabins allowed to remain; new cabins may be allowed	Existing cabins allowed to remain; new cabins may be allowed
<p><b>Administrative Cabin</b> Any cabin primarily used by refuge staff or other authorized personnel for the administration of the refuge. (See Section 3.3.21.1)</p>	May be allowed*; consistent with Section 3.3.20	May be allowed	May be allowed	May be allowed	May be allowed

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<p><b>Subsistence Cabin</b></p> <p>Any cabin necessary for health and safety and to provide for the continuation of ongoing subsistence activities; not for recreational use.</p>	Existing cabins allowed to remain; new cabins may be authorized; consistent with Section 3.3.20	Existing cabins allowed to remain; new cabins may be authorized	Existing cabins allowed to remain; new cabins may be authorized	Existing cabins allowed to remain; new cabins may be authorized	Existing cabins allowed to remain; new cabins may be authorized
<p><b>Commercial Cabin</b></p> <p>Any cabin that is used in association with a commercial operation, including but not limited to commercial fishing activities and recreational guiding services.</p>	Existing cabins allowed to remain; new cabins not allowed consistent with Section 3.3.20	Existing cabins allowed to remain; new cabins may be authorized	Existing cabins allowed to remain; new cabins may be authorized	Existing cabins allowed to remain; new cabins may be authorized	Existing cabins allowed to remain; new cabins may be authorized
<p><b>Other Cabins</b></p> <p>Cabins associated with authorized activities or uses by other government agencies.</p>	May be authorized; consistent with Section 3.3.20	May be authorized	May be authorized	May be authorized	May be authorized
<b>Administrative Facilities (See Section 3.3.21.1)</b>					
<p><b>Administrative Field Camps</b></p> <p>Temporary facilities used by refuge staff and other authorized personnel to support individual (generally) field projects; may include, but not limited to, tent frames and temporary/portable outhouses, shower facilities, storage/maintenance facilities, and caches.</p>	May be allowed*	May be allowed	May be allowed	May be allowed	May be allowed

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<p><b>Administrative Field Sites</b></p> <p>Permanent facilities used by refuge staff or other authorized personnel for the administration of the refuge. Includes administrative cabins and related structures (See Cabins) and larger multi-facility administrative sites necessary to support ongoing field projects, research, and other management activities. Temporary facilities, to meet short-term needs, may supplement the permanent facilities at these sites.</p>	Use of existing sites allowed, including replacement of existing facilities as necessary; new sites may be allowed*; consistent with Sections 3.2.4 and 3.3.20	Use of existing sites allowed including replacement of existing facilities as necessary; new sites may be allowed	Use of existing sites allowed including replacement of existing facilities as necessary; new sites may be allowed	Use of existing sites allowed including replacement of existing facilities as necessary; new sites may be allowed	Use of existing sites allowed including replacement of existing facilities as necessary; new sites may be allowed
<p><b>Refuge Administrative Office Complex</b></p> <p>Facilities necessary to house refuge operations, outreach, and maintenance activities, and associated infrastructure; includes staff offices, storage, maintenance, parking lots, and other similar facilities.</p>	Not allowed	Not allowed	Not allowed	Not allowed	May be allowed

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<p><b>Hazardous Materials Storage</b></p> <p>Sites, including appropriate structures and equipment, necessary for the storage and transfer of fuels and other hazardous materials necessary for administrative purposes; must be in compliance with all Federal and State requirements.</p>	May be allowed*	May be allowed	May be allowed	May be allowed	May be allowed
<p><b>Residences</b></p> <p>Residential housing for refuge staff and their families; includes single and multi-family dwellings.</p>	Not allowed	Not allowed	Not allowed	Not allowed	May be allowed
<p><b>Bunkhouses</b></p> <p>Quarters to house temporary and similar employees, volunteers, visitors, and other agency personnel.</p>	Not allowed	Not allowed	Not allowed	May be allowed	May be allowed
<p><b>Aircraft Hangars and Facilities for Storage of Aircraft</b></p>	Not allowed	Not allowed	Not allowed	Not allowed	May be allowed
<p><b>Boat Launches and Docks</b></p> <p>Designated sites for launching and storing watercraft or tying up a float plane.</p>	May be allowed*	May be allowed	May be allowed	May be allowed	May be allowed
<p><b>Radio Repeater Sites</b></p> <p>Sites used to maintain radio communications equipment; may include a location for helicopter access.</p>	May be allowed*	May be allowed	May be allowed	May be allowed	May be allowed

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<b>COMMERCIAL ACTIVITIES OR USES</b>					
<b>Except as noted, a special use permit or other authorization is required for economic use of a refuge.</b>					
<b>Commercial Recreation – includes all forms of guiding, including those operated by nonprofit, educational, and other noncommercial groups (See Section 3.3.18.1)</b>					
<b>Guiding and Outfitting</b>	May be authorized	May be authorized	May be authorized	May be authorized	May be authorized
<b>Transporting</b>	May be authorized	May be authorized	May be authorized	May be authorized	May be authorized
<b>Fixed-Wing Air-Taxis</b>	May be authorized	May be authorized	May be authorized	May be authorized	May be authorized
<b>Helicopter Air-Taxis</b>	Not allowed; with exceptions consistent with Section 3.3.14.3	May be authorized	May be authorized	May be authorized	May be authorized
<b>Bus and Auto Tours</b>	Not applicable	Not applicable	Not applicable	May be authorized	May be authorized
<b>Mineral Exploration (See Section 3.3.18.2)</b>					
<b>See Section 3.3.22 for information on the Alaska Mineral Resource Assessment Program.</b>					
<b>Surface Geological Studies</b>  Includes surface rock collecting and geological mapping activities (includes helicopter or fixed-wing access).	Not allowed	May be authorized	May be authorized	May be authorized	May be authorized
<b>Geophysical Exploration and Seismic Studies</b>  Examination of subsurface rock formations through devices that set off and record vibrations in the earth. Usually involves mechanized surface transportation but may be helicopter supported; includes studies conducted for the Department of the Interior.	Not allowed	May be authorized	May be authorized	May be authorized	May be authorized

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<p><b>Core Sampling</b></p> <p>Using helicopter transported motorized drill rig to extract subsurface rock samples; does not include exploratory wells; includes sampling conducted for Department of the Interior.</p>	Not allowed	May be authorized	May be authorized	May be authorized	May be authorized
<p><b>Other Geophysical Studies</b></p> <p>Helicopter-supported gravity and magnetic surveys and other minimal impact activities that do not require mechanized surface transportation.</p>	Not allowed	May be authorized	May be authorized	May be authorized	May be authorized
<b>Mineral Development (see Section 3.3.18.2)</b>					
<p><b>Oil and Gas Leasing</b></p> <p>Leasing, drilling, and extraction of oil and gas for commercial purposes. Includes all associated above and below ground facilities.</p>	Not allowed	Not allowed	Not allowed	Not allowed	May be authorized
<p><b>Sale of Sand, Gravel, and Other Common Variety Minerals</b></p> <p>Extraction of sand, gravel, and other saleable minerals for commercial purposes; includes commercial use by Federal, State, and local agencies.</p>	Not allowed	Not allowed	Not allowed	May be authorized	May be authorized

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<p><b>Other Mineral Leasing</b></p> <p>Includes the extraction of coal, geothermal resources, potassium, sodium, phosphate, sulfur, or other leasable minerals for commercial purposes. For cases of national need, see Section 3.3.18.2.</p>	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
<p><b>Mining of Hardrock Minerals</b></p> <p>Development of valid (pre-ANILCA) mining claims (lode, placer, and mill sites) on refuge lands for the purpose of extracting hardrock minerals. There are no valid claims on the refuge.</p>	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
<b>Other Commercial Activities</b>					
<p><b>Commercial Filming, Videotaping, and Audio taping (See Section 3.3.18.6)</b></p>	May be authorized	May be authorized	May be authorized	May be authorized	May be authorized
<p><b>Grazing</b> (See Section 3.3.18.7)</p>	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
<p><b>Agriculture (Commercial)</b> (See Section 3.3.18.7)</p>	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
<p><b>Commercial Fishery Support Facilities</b></p> <p>At or below 1979 levels. (See Section 3.3.18.3)</p>	Allowed	Allowed	Allowed	Allowed	Allowed
<p><b>Commercial Fishery Support Facilities</b></p> <p>Above 1979 levels. (See Section 3.3.18.3)</p>	Not allowed	May be authorized	May be authorized	May be authorized	May be authorized

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<b>Seafood Processing</b> (See Section 3.3.18.3)	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
<b>Aquaculture and Mariculture Support Facilities</b> (See Section 3.3.18.3)	Not allowed	Not allowed	Not allowed	Not allowed	May be authorized
<b>Commercial Timber and Firewood Harvest</b> (See Section 3.3.18.4)	Not allowed	May be authorized	May be authorized	May be authorized	May be authorized
<b>Commercial Gathering of Other Resources (See Section 3.3.18.5)</b>	Not allowed	Not allowed	Not allowed	May be authorized	May be authorized
<b>Transportation and Utility Systems</b> Includes transmission lines, pipelines, telephone and electrical power lines, oil and gas pipelines, communication systems, roads, airstrips, and other necessary related facilities. Does not include facilities associated with on-refuge oil and gas development. (See Section 3.3.14.7)	May be authorized by Congress	May be authorized	May be authorized; would require a plan amendment	May be authorized	May be authorized

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<p><b>Navigation Aids and Other Facilities</b></p> <p>Includes air and water navigation aids and related facilities, communication sites and related facilities, facilities for national defense purposes and related air/water navigation aids, and facilities for weather, climate, and fisheries research and monitoring; includes both private and government facilities. (See Section 3.3.14.11)</p>	May be authorized*	May be authorized	May be authorized	May be authorized	May be authorized
<p><b>Major Hydroelectric Power Development</b></p> <p>Hydroelectric dams creating a change in stream flow with an elevation change and reservoir behind the dam. (See Section 3.3.18.7)</p>	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
<p><b>Small Hydroelectric Power Development</b></p> <p>Hydroelectric generation by low-head or in-stream structures that do not change the flow of the river. (See Section 3.3.18.7)</p>	Not allowed	Not allowed	Not Allowed	May be authorized	May be authorized

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### 3.5 References

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## 4. Refuge Environments

Established in 1980 by the Alaska National Interests Lands Conservation Act (ANILCA), Section 302(7)(B), the Selawik refuge was primarily created to protect fish and wildlife populations and their habitats and provide continued opportunities for subsistence uses by local residents.

Chapter 1 of this Revised Comprehensive Conservation Plan (comprehensive plan) describes the legislative purposes of the Selawik refuge in detail. This chapter describes the physical, biological, social, cultural, and economic environments of the Selawik refuge. This chapter also describes the wilderness values, river values, and infrastructure and administration for the refuge. Scientific names of all plants and animals are provided in Appendix H.

### 4.1 Geographic Setting

#### 4.1.1 Land Status

The Alaska Native Claims Settlement Act of 1971 (ANCSA) and ANILCA determined the current land ownership patterns within and surrounding the Selawik refuge. ANCSA authorized the formation of Alaska Native village and regional corporations that enabled northwest Alaska’s Native Iñupiat to select and gain title to Federal lands that were originally their ancestral homelands.

The exterior boundary of the Selawik refuge encompasses approximately 3,220,019 acres. Refuge boundaries were drawn roughly along or near major ecological features, such as rivers or watersheds, regardless of existing land ownership. Consequently, the refuge surrounds non-refuge land in a variety of ownerships, both private and public, that include Alaska Native allotments, Alaska Native corporation lands, the town sites of Selawik and Noorvik, State lands, and a private homesite (Table 4-1; Map 1-1).

Table 4-1. Surface land status of the Selawik refuge as of May 24, 2011.

Land Status	Selawik Refuge (acres) a, b	
	Selected	Conveyed <sup>c</sup>
<b>Federal (USFWS)</b>	2,460,691	
<b>State of Alaska</b>	3,563	0
<b>NANA Regional Corporation</b>	86,494 <sup>d</sup>	424,992 <sup>e</sup>
<b>Kikiktagruk Inupiat Corporation (Village of Kotzebue)</b>	0	30,806
<b>Native Allotments</b>	98	41,490
<b>Other Private (including town sites)</b>	0	224 <sup>f</sup>

<sup>a</sup> Acreage figures do not include submerged beds of meandering water bodies (rivers of 198 feet or more in width and lakes of 50 acres or more). Ownership of the submerged lands beneath these water bodies depends on the navigability status and is yet to be determined for many of the water bodies. No ownership of the land beneath these water bodies is implied in this table.

<sup>b</sup> All acreages are GIS-calculated approximations and may differ from official acreage figures reported elsewhere. All data are from Master Title Plats maintained by the Bureau of Land Management.

<sup>c</sup> Includes patented and Interim Conveyed (IC) lands. Only land claims within the refuge boundary are reported.

<sup>d</sup> Includes the villages that merged with NANA Regional Corporation.

<sup>e</sup> Excludes Native Village of Kotzebue lands.

<sup>f</sup> Includes the townsites of Selawik and Noorvik, Selawik School land conveyed to the State of Alaska, BIA land conveyed to QCD, and one private homesite.

Table 4-1 shows, by general ownership, the approximate area of non-refuge lands within the refuge boundary. Complete conveyances of Native corporation land selections, and thus changes in land ownership, were largely finished in 2009 under the provisions of the Alaska Land Transfer Acceleration Act of 2004 (P.L. 108-452). The remaining changes in land ownership will continue as selected lands are conveyed, relinquished, or rejected, and land conveyed by interim conveyances is surveyed prior to patent until all land entitlements are met.

### ***4.1.1.1 Native Village Corporation Land***

Section 8 of ANCSA provided that the Native residents of each Native village entitled to receive lands under ANCSA “shall organize as a business for profit or nonprofit corporation under the laws of the State of Alaska ....” Section 11 of ANCSA created the framework and withdrew certain public lands for selection by Village Corporations from all forms of appropriation under public land laws. Section (B) (b) (1) lists the villages subject to ANCSA, including those within the NANA Region as follows:

- Ambler
- Buckland
- Deering
- Kiana
- Kivalina
- Kobuk
- Kotzebue
- Noatak
- Noorvik
- Selawik
- Shungnak

With the exception of Kotzebue, the villages listed here merged their land selections with those of the NANA Regional Corporation.

### ***4.1.1.2 NANA Regional Corporation Lands***

The Nana Regional Corporation is the largest private landowner within the Selawik refuge (Table 4-1; Map 1-1).

### ***4.1.1.3 Native Allotments***

Until its repeal in 1971, the Native Allotment Act of 1906 authorized Alaska Natives to claim up to 160 acres of land. In addition, a 1998 amendment to ANCSA (Section 432 of P.L. 105-276 [43 U.S.C. 1629g]) authorized qualified Alaska Native Vietnam veterans to apply for an allotment if they had not previously done so. The 1998 law addressed the concern that military service may have prevented some Native veterans from applying for an allotment under the 1906 Act. The application period for these new allotments closed on January 31, 2002. To date, approximately 300 allotments have been patented in the Selawik refuge.

### ***4.1.1.4 Other Private Lands***

Congress extended the nation’s principal land laws to Alaska in 1884. Many of these laws were designed to encourage private settlement and improvement of public lands. There are two private patents within the boundaries of the Selawik refuge. One patent was issued under the

Trade and Manufacturing Act of 1898, totaling about 12 acres. There also is one private homestead that totals 4.99 acres.

#### **4.1.1.5 Town Sites**

Three Federal laws created the opportunity for Alaska Native villages to establish town sites and convey title to Alaska Native adults.

- The Act of March 3, 1891 (26 Stat. 1095), opened Federal land in Alaska for the establishment of town sites.
- The Alaska Native Town Site Act of May 25, 1926 (44 Stat. 629), created the opportunity for Native villages to establish town sites, to survey lots and streets, and to convey lots by restricted deed to Alaska Natives.
- The Act of February 26, 1948 (62 Stat. 35), included a provision that allowed the conveyance of town site lots to Alaska Natives by unrestricted deeds.

Both Noorvik, in 1975 (93.21 acres), and Selawik, in 1984 (120.4 acres), received patent to Federal land for the establishment of town sites.

#### **4.1.1.6 State of Alaska**

The Alaska Statehood Act (P.L. 85-508) entitled the State to select 102,550,000 acres of vacant or unreserved lands, or lands not appropriated under the general grant, and to select an additional 400,000 acres to promote development and expansion of communities. The State was also granted title to most of the existing roads, airfields, and associated facilities under the Alaska Omnibus Act (P.L. 86-70). The State of Alaska selected 3,563 acres within the future exterior boundary of the Selawik refuge (Table 4-1).

#### **4.1.1.7 Submerged Lands**

In general, the lands beneath tidelands and inland navigable waters were granted to the State of Alaska by the Equal Footing Doctrine, the Submerged Lands Act of 1953, and the Statehood Act of 1958. Lands beneath water bodies that were reserved or withdrawn by the Federal government prior to statehood on January 3, 1959, may have been retained by the United States. If the United States did not reserve or withdraw submerged lands, the ownership of submerged lands is determined on the basis of navigability. If a water body is navigable, the underlying bed of the river or lake belongs to the State; if non-navigable, the bed belongs to the adjacent landowner(s). The Selawik refuge contains both navigable and non-navigable waters. However, the status of many water bodies has not yet been determined. Any disagreements between the State and the Federal government over what waters are navigable or non-navigable are generally resolved through the Federal courts.

## **4.2 Physical Environment**

### **4.2.1 Climate**

The region has a generally maritime climate during the ice-free periods of the year (late May to early October) and long cold periods during the winter months (Figure 4-1). The large seasonal temperature variations are illustrated by annual extremes that range from 90 °F to below -60 °F. Temperatures during the summer season are usually moderate, with an average of about 60 °F. Total average annual precipitation is 7.5 inches, approximately half of which falls as rain in the wet summer months of July and August (Table 4-2). Since 1991, a Remote Automated Weather Station (RAWS) has been collecting basic weather data at Upingivik near the confluence of the

## Chapter 4: Refuge Environments

Selawik and Kugarak rivers. The climate data in Table 4-2 are taken from this station. A second RAWS was installed in 2010 near the radio repeater in the Tagagawik Hills.

One of the major climatic factors in the region is strong persistent winds, prevailing from the northeast in winter and the west in summer. Winter winds scour the landscape and result in hard-packed snow. During the summer months, wind creates large waves in the shallow waters of Hotham Inlet (locally known as Kobuk Lake) and Selawik Lake.

The regional climate is characterized by severe winters, primarily associated with wind chill rather than low temperatures. Lows of -60 °F to -70 °F are reached only for a few days at a time, but temperatures from -30 °F to +20 °F produce extreme chill factors when accompanied by strong persistent winds.

Summers are warm, lasting from mid-June until as late as early September. June and early July are usually characterized by clear skies. Overcast and rainy weather dominates from August to the first freeze. Several weeks of clear weather often follow freeze-up. Regardless of the time of year, inclement weather from the Bering and Chukchi seas may affect Selawik refuge.

Table 4-2. Temperature and precipitation data from Selawik River Remote Automated Weather Station (RAWS) 1991–2008 (Source: Western Regional Climate Center, <http://www.raws.dri.edu/cgi-bin/rawMAIN.pl?akASEL>).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
<b>Avg. (°F)</b>	-4.7	-0.9	-0.7	16.8	38.4	55.0	58.1	51.9	40.1	21.2	6.0	-1.8	16.9
<b>Avg. High (°F)</b>	24.8	27.9	27.0	34.9	53.6	68.7	70.6	64.9	50.8	36.9	26.1	21.3	42.3
<b>Avg. Low (°F)</b>	-36.2	-28.9	-22.5	-4.9	21.2	40.3	42.9	39.6	26.6	1.6	-17.8	-29.2	2.8
<b>Total Precip (in.)</b>	0.14	0.05	0.06	0.21	0.53	0.71	1.81	2.24	1.22	0.40	0.08	0.06	7.51



Figure 4-1. The waterways of the refuge are typically ice covered from October to May; this photo of the Selawik River was taken during the break-up season in late May 2006.

## 4.2.2 Climate Change

Human populations and activities such as agriculture, industry, and commerce have substantially transformed most ecosystems on Earth, increasing carbon dioxide in the atmosphere and altering biochemical cycles (Vitousek et al. 1997). Scientific evidence confirms that this planet is undergoing a change in climate (USFWS and USGS 2007). In 2007, the Intergovernmental Panel on Climate Change (IPCC), an international consortium of researchers and scientists, asserted that “warming of the climate is unequivocal” (IPCC 2007). Numerous other reports support this finding, and many underscore that the impacts of accelerating climate change are expected to be particularly dramatic in high-latitude areas such as Alaska and the Arctic.

Over the past 50 years, Alaska has warmed at more than twice the average rate of the rest of the United States. Since the 1950s, Alaska has warmed an average of 3.4 °F (Karl et al. 2009). The warming has been even more pronounced in winter. In Kotzebue, the mean annual temperature has increased 3.1 °F from 1949–2008, while the average winter temperature has increased by 6.6 °F. Spring, summer, and fall temperatures in Kotzebue have increased 1.6 °F to 2.5 °F (Walsh 2010).

The higher temperatures in Alaska are already causing earlier spring snowmelt, reduced sea ice, widespread glacier retreat, insect outbreaks, and permafrost warming. For example, the frost-free season in Fairbanks has gone from 80 to 120 days since 1904 (Karl et al. 2009), while the Tanana River break-up at Nenana has advanced by about one week since 1920 (Walsh 2010).

The minimum extent of sea ice in the Arctic Ocean has decreased by 9.2 percent per decade from 1979–2005 with a record low extent of polar ice in 2007 (Walsh 2010). The present retreat of sea ice is so dramatic that it is outside the range of model projections. Reduced sea ice alters the timing and location of plankton blooms and critically threatens ice-dwelling animals such as walrus, polar bears, and certain seals. Some marine species are shifting northward.

Lakes are shrinking or disappearing as a result of a longer warm season and thawing permafrost in their beds. These surface waters and wetlands provide breeding habitat for millions of waterfowl and shorebirds. Large parts of the Seward Peninsula’s permafrost are expected to be thawing by the end of the century (Walsh 2010). Coastal communities, especially in northern and western Alaska, have witnessed increased storminess and erosion since the 1950s (Walsh 2010). Climate models predict increased precipitation, but the longer summers and higher temperatures are expected to cause drier conditions, leading to reduced soil moisture, which can stress spruce forests and increase wildfires (Karl et al. 2009).

Observations by Alaska Native elders confirm many of these changes, particularly in patterns of wind, temperature, ice, and currents in northern Alaska, which have reduced hunters’ access to marine mammals. Fall storms have become more destructive to the coastline, accelerating erosion. Precipitation patterns have changed with little snow in fall and early winter. Bird migrations are early, unfamiliar insects appear in summer, and willows are growing taller and denser (Pungowiyi 2000). The Iñupiat of Kotzebue have observed increased variability and unpredictability in weather since the 1970s (Whiting 2008). In roadless northwest Alaska, environmental conditions critically influence hunters’ ability to travel and access migratory animal resources. Unfamiliar new patterns of wind, weather, ice, snow, and other factors seriously impede local residents’ ability to move about safely and to harvest, process, and store wild foods productively (Whiting 2008).

Climate change data specific to Selawik refuge are generally not available. A major permafrost failure or “thaw slump,” the largest in Alaska, occurred on the upper Selawik River in 2004 and continues to erode, depositing fine silt into the river (see Section 4.5.4.1). Several studies are underway to document this and examine its effects. Temperatures at the Selawik refuge are projected to rise as much as 10 °F by 2080, bringing the average annual temperature from below the freezing point (about 22 °F) to just above the freezing point (about 32 °F) (The Wilderness Society and SNAP 2009).

These environmental changes alter ecosystems upon which the resources we have become accustomed to depend. Caribou, fish, birds, marine mammals, vegetation, and cultural resources are likely to be changed in significant ways not completely foreseeable at this time. Although not all environmental change will be negative, the potential magnitude and scope of these changes will profoundly affect human communities in Alaska, including subsistence activities, transportation, health, community infrastructure, and economic pursuits. Alaska Native communities are among the most critically situated in the nation today to prepare for and respond to climate change.

### 4.2.3 Landforms

Selawik refuge stretches from Hotham Inlet (Kobuk Lake) on the west to the headwaters of the Selawik River on the east, from the Waring Mountains in the north to the north side of the Selawik Hills (or about 45 miles south of the Arctic Circle) on the south. Major land features of the area include the Selawik River, which runs the length of the refuge, and the Waring Mountain divide, which provides a spine of low ridges (1,200–1,300 feet) arcing across the northern boundary of the refuge (Figure 4-2). The Continental Divide lies southwest of the Purcell Mountains and forms the common boundary of the Selawik and Koyukuk refuges.



Figure 4-2. The upland area of the Waring Mountains lies along the refuge’s northern boundary and separates the Selawik valley from the Kobuk valley.

The physiographic divisions (Wahraftig 1965) of the refuge are fairly simple, and only one province is involved, namely the Northern Plateaus Province. The vast majority of the refuge lies within the Kobuk-Selawik Lowland Section, with small parts of the southern, southeastern, and eastern borders lying within the Selawik Hills, Nulato Hills, and Pah River Sections, respectively.

With uplands on three sides, the Kobuk-Selawik Lowland is a basin. The lowland, which includes the Baldwin Peninsula, Waring Mountains, and the Kobuk and Selawik rivers, is characterized by broad river floodplains and delta/lowlands with numerous thaw lakes (Figure 4-3). Major drainages of the

lowland are the Selawik and Kobuk rivers, draining into Selawik Lake and Hotham Inlet (locally know as Kobuk Lake). Most of the land is underlain by permafrost. Structurally, the west end of the lowland is considered a sedimentary basin as well, because coal-bearing sediments occur on the north side of the Selawik Hills and Waring Mountains.



Figure 4-3. Much of the refuge is characterized by extensive low-lying areas of river channels, sloughs, and thaw lakes, as shown in this photo near Kigaaq.

Highland areas in the refuge include the Waring Mountains and their southwest extension, the Hockley Hills. These low, rounded hills are composed of mafic volcanic rock and are normally less than 2,000 feet in elevation. On the south side of the refuge, the Selawik Hills have rounded to flat summits, are composed of granitic rock, and have elevations of 2,000–3,000 feet. The east side of the refuge includes parts of the Sheklukshuk Range (locally referred to as the Rabbit Mountains), Kiliovilik Range, and Purcell Mountains.

## 4.2.4 Geology

### 4.2.4.1 Surface Geology

Although the steepest slopes within the refuge are bedrock surfaced, most slopes are covered by loose deposits of talus and erosion-related cliff debris. In upland valleys, the talus and cliff debris are mixed with alluvium and silt/clay materials.

In the interior lowland of the refuge, most of the surface deposits are glacial, alluvium, and wind-blown material. The bulk of the material is till and outwash gravel. The surface of the till and outwash is covered with fine sand and silt. The glacial drift is early to mid-Pleistocene age, over 200,000 years old, and is much eroded and flattened. Although it has been worn, the morainal topography can still be recognized north and south of Selawik Lake. The southward limit of the last glaciation that advanced from the Brooks Range extended approximately to the southern boundary of Selawik refuge and the Baldwin Peninsula. The ice, apparently thinning, flowed around the granite hills south of Inland Lake; as a result, drift occurs on the flanks of those hills as high as 800 feet in elevation.

In the northeast part of the refuge is an area of sand dunes, composed of water-related fine sand and silt. Floodplain deposits line the larger rivers, including alluvial fan and terrace gravel in upland tributaries. The Kobuk and Selawik deltas are surfaced with tidal flat deposits (Map 4-1).

**4.2.4.2 Bedrock Geology**

The Selawik refuge lies in the northwest corner of the Yukon/Koyukuk volcanic province. The north side of the province, including parts of the refuge, is metamorphic rock lining the southern margin of the Brooks Range. The Yukon/Koyukuk province, formed by plate tectonics, was a fragment of oceanic crust entrapped within continental borderlands. As a result, the terrane has a bedrock cover of Cretaceous and Tertiary volcanic and volcanogenic sediments. Underneath, ultramafic and associated igneous rocks form the floor of the terrane, cropping out near the edges of the province. The two mafic rock outcrops near the refuge are in the vicinity of Kiana.

Mafic and ultramafic rocks are thought to have formed before the collision with the North American continent. Roughly half of the known surface bedrock on the refuge is andesite volcanics, such as tuff, breccia, and conglomerate; these can be found in the refuge portion of the Sheklukshuk and Kiliovilik ranges, Zane Hills, Purcell Mountains, and the upper Huslia River divide. Over these deposits are porphyrite, andesite, and basalt. They comprise most of the Hockley Hills and Waring Mountains. These rocks are marine greywacke and mudstone. In the eastern portion of those mountains, calcareous greywacke, calcarenite, and limestone conglomerate predominate.

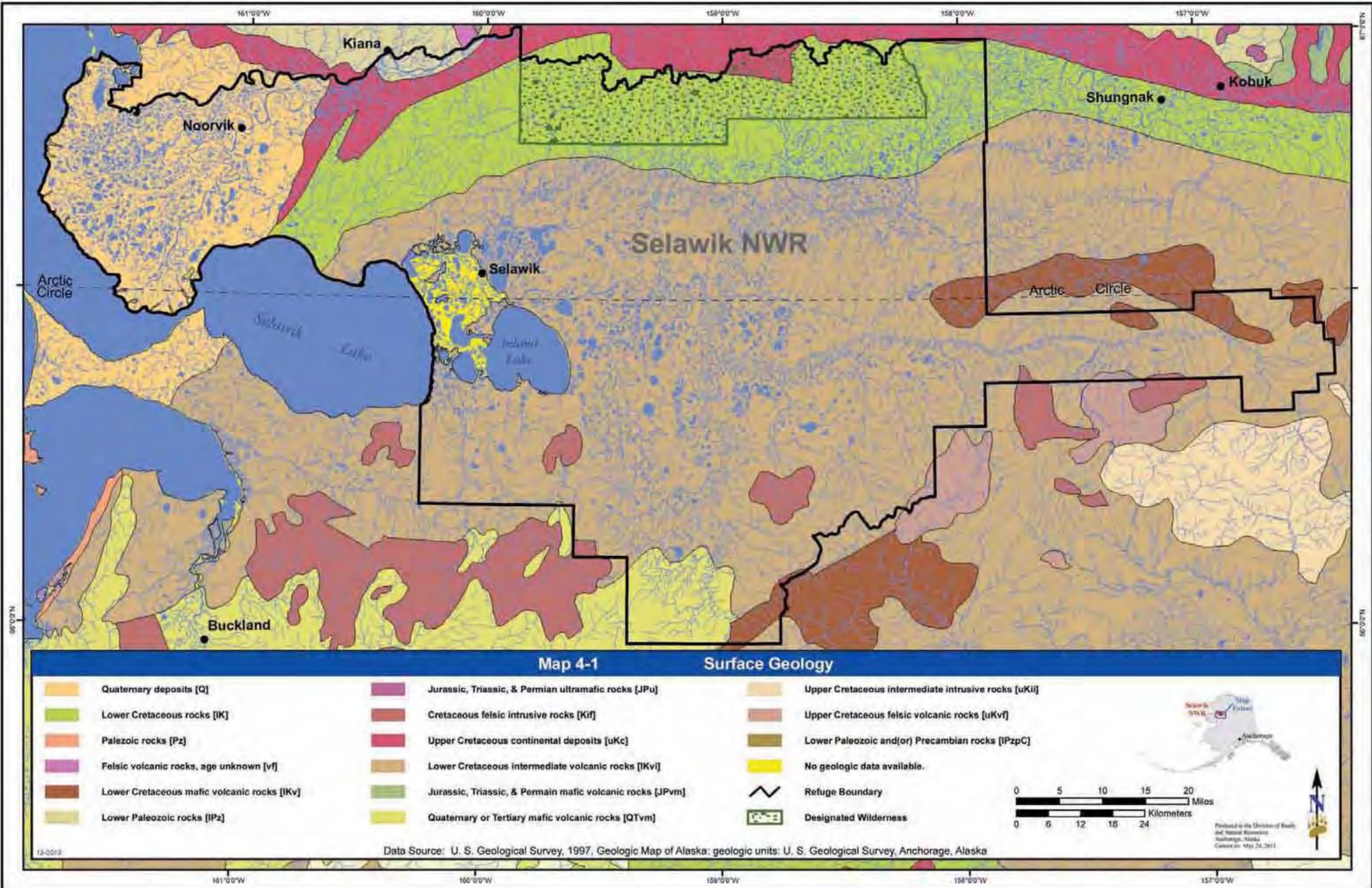
On the western side of the refuge, the rocks are derived from continental sediments, including conglomerate, sandstone, mudstone, and coal. The conglomerate is composed of quartzite, schist, chert, and limestone.

A large belt of granitic rocks extends across the south side of Selawik refuge. These rocks form the core of the Purcell Mountains, Zane Hills, and Selawik Hills and have unusually high concentrations of uranium and thorium. Granitic outcrops, which are highly mineralized, are located south of Inland Lake and east of the Tagagawik River (Map 4-1).

The youngest known bedrock in the region, a series of late Tertiary lava flows, occurs on the refuge east of the Selawik Hills. This rock is dark red to gray basalt, and it is found along the Tagagawik River to the south boundary of the refuge and west to the Selawik Hills (Miller and Anderson 1969).

**4.2.5 Soils and Permafrost**

The Selawik refuge is located in a discontinuous permafrost zone in the Selawik River and Kobuk River watersheds. Permafrost overlain by subarctic tundra vegetation or taiga occupies the majority of the area. On some south-facing slopes, permafrost is absent and bedrock is visible. The village of Ambler is one such location. In stable lowland regions, thick peat deposits cover coarse alluvial (river) deposits. In other portions of the lowlands, peat is absent and gravel deposits from the actively meandering Selawik River are found immediately below the tundra vegetation. Above the lowlands of the Selawik River valley, a broad fill terrace of uniform elevation exists above the channel. The terrace surface, which is approximately 230 feet (70 meters) above the channel, is underlain by proglacial alluvial sediments with grain sizes between sand and cobble. In some locations, compressive deformation suggests that glacial ice overrode this surface, forming a push moraine. The well-drained terrace tops have thin organic soils overlain by tundra vegetation. Map 4-2 shows the soils for Selawik refuge.



13-0078

Data Source: U. S. Geological Survey, 1997, Geologic Map of Alaska: geologic units: U. S. Geological Survey, Anchorage, Alaska

Produced in the Division of Realty and Natural Resources, Anchorage, Alaska. Current as of May 24, 2011.

(Back of Map 4-1.)

The Continental Divide runs along the southern edge of the Selawik River watershed, dividing it from the Yukon River drainage at a maximum elevation of about 3,380 feet. The Purcell Mountains in the Selawik River headwaters have several thermal springs used for healing and relaxation by residents of Huslia, Selawik, and upper Kobuk River villages. Thermal springs carry high heat flows and, as a result, less permafrost is found in this area (Figure 4-4). In most of the refuge, the permafrost layer is 330 to 980 feet thick (100 to 300 meters) with temperatures from 27–32 °F (-3 °C to 0 °C). For example, permafrost temperatures at 10 to 13 feet (3–4 meters) below the ground are 30 °F (-1 °C) at Selawik and Noorvik, 31.6 °F (-0.2 °C) at Kiana, 32 °F (0 °C) at Ambler, and 31.2 °F (-0.4 °C) at Shungnak.



Figure 4-4. Thermal springs at the far eastern end of the refuge create an ice-free stream and thawed ground year round.

Although the refuge was covered in glaciers during ancient periods of glaciation, most of the region was glacier free during the Last Glacial Maximum or Late Wisconsinan period about 25,000 years ago. During this period, the climate was very cold and permafrost became well-established on exposed surfaces. Although the contemporary climate is cold enough for periglacial processes such as solifluction lobes and ice wedge polygons to develop, most of the permafrost-related geomorphology found in the region today started during the Last Glacial Maximum. Most wedge ice developed long ago and became buried beneath river deposits, but newly developed ice wedge polygons continue to be observed today (Figure 4-5). Some ice degraded to form thermokarsts, especially in south-facing lowlands. Pingos are not abundant on the refuge, although some hydrostatic (closed-system) pingos are found near the village of Selawik and on the Kobuk River delta.

A retrogressive thaw slump (a progressive slope failure resulting from thawing of ice-rich permafrost) occurred on the upper Selawik River in 2004 (Section 4.5.4.1). Since then, a volume of approximately 18 million cubic feet (500,000 cubic meters) of mixed sediment and ice have been eroded and deposited in a stream-side fan or delivered to the Selawik River. The addition of coarse bedload sediment and fine-grain suspended sediment affects both river form and ecological function. This retrogressive thaw slump continues to grow because of the continued exposure of massive ice to solar radiation. Although the origin of the massive ice is unknown, it

## Chapter 4: Refuge Environments

is likely to be old buried glacier ice exposed by the Selawik River's lateral erosion. Many permafrost areas contain ice-rich conditions near the surface. The majority of massive buried ice is due to frost-contraction cracking that forms ice wedges, groundwater intrusions that form pingos, or buried glacier ice. With predictions for a warming climate and the implications of permafrost degradation on the physical and biological stability of the landscape, it will be important to monitor the thermal state of permafrost on refuge lands in the future.

Currently, the refuge is collaborating with researchers of various expertise and affiliations to study the slump and its impacts on terrestrial and aquatic resources. The refuge and its partners are also studying the potential of similar future events and their consequences.

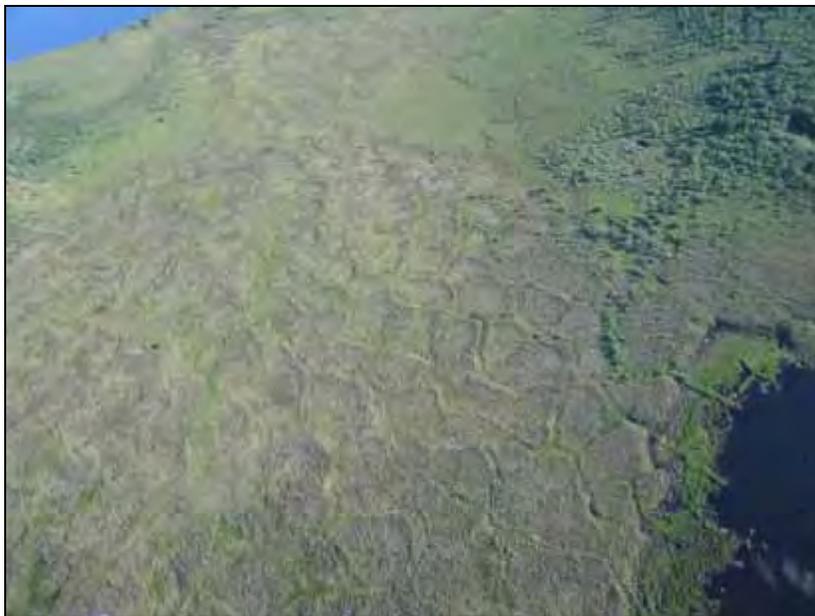
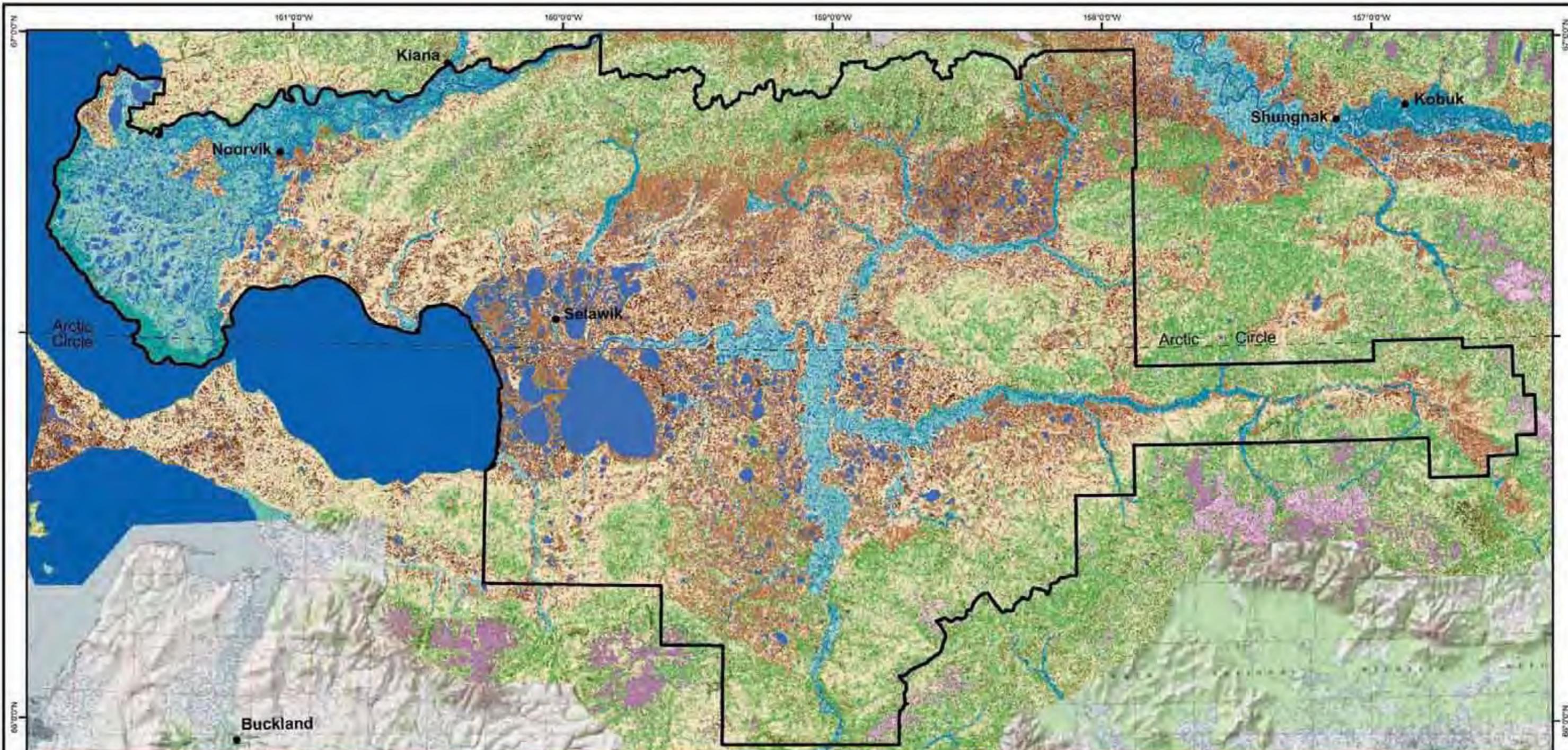
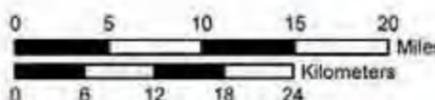


Figure 4-5. Ice wedge polygons formed by ice segregation and the drying and shrinking of sediments.



**Map 4-2 Soil Landscapes**

- |  |   |  |
|--|---|--|
|  Alpine Rocky Alkaline Barrens and Shrublands                 |  Upland Sandy Barrens                        |  Coastal Loamy Barrens, Meadows, and Shrublands |
|  Alpine Rocky Acidic Barrens and Shrublands                   |  Upland Sandy Forests                        |  Coastal Sandy Barrens, Meadows, and Shrublands |
|  Alpine Rocky Wet Meadows                                     |  Lowland Bogs and Fens                       |  Fresh Water                                    |
|  Upland Loamy Wet Tussock Shrublands                          |  Lowland Organic-rich Shrublands and Forests |  Coastal Water                                  |
|  Upland Rocky-Loamy Acidic Low Shrublands                     |  Riverine Gravelly Barrens and Shrublands    |  Refuge Boundary                                |
|  Upland Rocky-Loamy Circumacidic Tall Shrublands and Forests  |  Riverine Gravelly-Loamy Forests             |  |
|  Upland Rocky-Loamy Circumalkaline Low Shrublands and Forests |  Riverine Loamy Meadows and Shrublands       |  |
|  Upland Rocky Barrens   |  Riverine Loamy Wet Meadows and Marshes      |  |



Produced in the Division of State and Natural Resources, Anchorage, Alaska. Contact for: May 24, 2011

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(Back of Map 4-2)

### 4.2.6 Energy Resources

The Selawik oil and gas province lies to the west of the refuge, overlapping the Kobuk delta and Selawik delta and lowlands. The Selawik oil and gas basin extends roughly east-west through the central part of Kotzebue Sound and continues west offshore (Map 4-3). Isolated outcrop exposures and marine geophysical investigations suggest as much as 1.87 miles (3 kilometers) of moderately deformed sediments of possible Cenozoic age in the basin under Kotzebue Sound and the adjoining Chukchi Sea. A small outcrop of nonmarine sediments of probable Tertiary age is located south of Selawik Lake (Selkregg 1975). These areas have sedimentary rocks of sufficient types and thickness to have possibly accumulated and trapped petroleum.

Most of the Selawik Province sediments are located offshore, with shallow Quaternary and Tertiary sediments underlying the basin and a metamorphic/granitic rock basement. The Selawik Province appears to have low potential for petroleum production, although there may be limited natural gas deposits. In the past, an exploratory well was drilled by Standard Oil Corporation on the Baldwin Peninsula at Nimiuk Point, just west of the refuge and southwest of Kotzebue; no discovery of oil or gas was made, and the well was plugged and abandoned (Ehm 1983). In 2010, an independent company expressed interest in drilling exploratory wells for oil and gas near Melville Channel at the northwest corner of the refuge. The drilling site is on NANA Regional Corporation lands.

### 4.2.7 Mineral Occurrences

The NANA Region and Selawik refuge area have considerable mineral potential. Earliest mining activity in the region was in 1898 around Shungnak on the upper Kobuk River; only a small amount of gold was produced. A second small gold discovery was made in 1909 north of Kiana in the Squirrel River drainage. Both areas are considered valuable for base metals and cobalt. Mineral exploration and development in the Squirrel River and upper Kobuk areas have occurred intermittently for most of the past century, rising and fading with market conditions. The most significant of these past efforts included gold at Klery Creek in the Squirrel River, copper at Bornite north of Kobuk, and jade in the Jade Mountains near Ambler. Exploration continues today with occasional spurts of activity in the Squirrel River, Dahl Creek area, Shungnak River, upper Beaver River, and elsewhere in the Kobuk River tributaries. In 2010, NovaGold purchased Kennecott Exploration Company's interest in the 45-mile-long Ambler copper-zinc property, the richest portion of which is the Arctic deposit. NovaGold plans to continue its baseline studies, exploration, and community engagement, including discussion of transportation alternatives supporting mine development (Lasley 2010).

The Selawik mineral district includes the Baldwin Peninsula and the areas drained by streams flowing into Selawik Lake and Eschscholtz Bay. The only gold placer mining that operated in this area was on Shovel Creek, a small tributary of the upper Selawik River. This placer mine had a small amount of gold production in the past but is presently inactive, as there are no longer any mining claims located along the creek. Uranium has been discovered in the Kauk River drainage, and coal has been identified in small areas along beach bluffs. An area about 30 miles south of Selawik is thought to contain lignitic coal. Within the refuge, there are no valid mining claims or major mineral occurrences.

A probable uranium deposit has been reported by the U.S. Bureau of Mines (Barker 1985). The likely source rock is nepheline syenite, contained in granite rock complexes. These deposits are expected to be found in the outcrops north of and in the Selawik Hills, west of the Tagagawik River, and south of Inland Lake.

On the east flank of the Selawik Hills, there are also outcrops of lignite coal and carbonaceous sandstone. Further north, coal is also reported in the Hockley Hills and in beds 3–6 feet thick along the Singauruk (*Sinjaġruk*) River (Clough et al. 1982).

Gravel, though not a mineral, is a resource in high demand for construction projects in the region's communities. Because the low-lying delta areas near Selawik and Noorvik do not have ready supplies of gravel, these communities have had to search for sources further afield. Noorvik constructed a road to the uplands of Hotham Peak, where gravel is available. The community of Selawik obtains gravel at times from a site known as "Spud" in the Waring Mountains, although a seasonal ice road is the only means at this time for transporting the gravel to the community. NANA Regional Corporation has expressed interest in developing Spud into a regional source of gravel with a year-round road linking the site to a major river system.

### 4.2.8 Water Resources

Map 4-4 shows the primary watersheds for the Selawik refuge area. The Kobuk-Selawik Lowland consists mainly of broad river floodplains and lake-dotted lowlands that pass at their seaward margins into deltas. The lowlands are drained primarily by the Kobuk in the northwest and by the Selawik River in the central and eastern portions of the refuge. Most of the streams in the area are sluggish, meandering, of moderately low gradient, and with numerous side sloughs. Lands around the Selawik River, in particular, have numerous large thaw lakes. The waters of Hotham Inlet are a variable mix of fresh and saltwater, depending on the season, winds, water levels, and volume of outflow from the Kobuk, Selawik, and Noatak rivers.

Both the Selawik and Kobuk rivers have extensive deltas, underlain by continuous permafrost and characterized by thaw lakes and branching channels. The Selawik flats begin where the river leaves a well-defined floodplain at the junction of the Kugarak River. The Selawik River flows sluggishly and forms back waters and sloughs in the Selawik Flats. The Kobuk delta is larger, beginning at the mouth of the Squirrel River where channels fan outward. The Kobuk flows into Hotham Inlet through more than a dozen separate channels (Figure 4-6). The southernmost Nazuruk-Oksik channel is the largest and enters Hotham Inlet near the west end of Selawik Lake. Another large channel is the Riley channel, which flows from Noorvik and reaches the inlet opposite Nimiuk Point. The many other channels form a well-used navigation network throughout the entire delta. The Kobuk delta is approximately 35 miles long and 25 miles wide, the largest river delta emptying to the Chukchi Sea.

Spring break-up for the Selawik River near Selawik and the lower Kobuk River near Noorvik is between the middle of May and early June. Generally, break-up occurs earlier upriver and later downriver. The Selawik and Kobuk rivers normally freeze up by the middle of October.



Figure 4-6. Two of the many mouths of the Kobuk River where it empties into Hotham Inlet, known locally as Kobuk Lake.

#### 4.2.9 Wildland Fire

Wildland fire in the Selawik refuge is associated with the uplands, including the Waring Mountains, Sheklukshuk Range, Purcell Mountains, and Selawik Hills. Wild fires in the refuge tend to be large and relatively frequent due to the influence of the dry continental climate, the flammability of the natural fuels, and the continuous fuel bed. A continental climate regime is characteristic of the interior of a landmass of continental size, marked by large annual, daily, and day-to-day temperature ranges; low relative humidity; and a moderate or small irregular rainfall. Annual extremes of temperature occur soon after the solstices. The boreal forest (dominated by black spruce) is the most common feature of the uplands. Large contiguous blocks of tussock-tundra and shrub fields are intermixed with the boreal forest. Feather mosses and low shrubs dominate the understory, forming a large, horizontally continuous, and well-aerated fuel bed.

Most upland fires are either intense ground fires or a combination of ground and crown fires of sufficient intensity to kill the black spruce and the above-ground portion of the understory vegetation. Wildland fires often leave inclusions of unburned to moderately burned areas that result in residual seed sources, a mosaic of different aged vegetation, and an irregular fire perimeter. Where there is a deep duff or peat layer, wildfires can smolder and hold over through long periods of high relative humidity and moderate rainfall.

Wildland fires also occur in the lowlands, which include the Kobuk and Selawik river deltas and the low-lying areas southeast, east, and northeast of Inland Lake (Figure 4-7). Fires in these lowlands usually do not attain substantial size because they are often extinguished by accompanying rain showers. The lowlands are dominated by tussock-tundra and/or shrub vegetation. Fires occurring here can vary in size from less than one acre to several thousand acres. They tend to burn quickly and intensely because the light flashy fuels are very responsive to changes in relative humidity and precipitation. With a little moisture, a fire in this fuel type can go out quickly. Wildfire in the tussock-tundra can skip over and around standing water between the tussocks. While wildland fire tends to be less common in tundra habitats than in boreal forests, the tundra is capable of burning more frequently (Joly et al. 2009). The presence of wind contributes to high rates of spread and some spotting. Moderate intensity wildland fires usually kill only the above-ground portion of plants. Most plants have adapted to fire, and new sprouts

grow quickly. During dry conditions, wildfires can have a high rate of spread and sufficient intensity to carry fire into adjacent trees.



Figure 4-7. Fire in Tagagawik River area, 2009. Note the patchy mix of burned and unburned areas and the large amount of smoke created by a relatively small lowland fire.

### 4.2.9.1 Fire Occurrence and Frequency

The past 57 years of fire records (fires greater than 100 acres only) document 25 fires occurring in the uplands, three fires in the lowlands, and six fires affecting both the uplands and the lowlands. Map 4-5 shows the locations of past wildfires in and near the refuge. Historically, fire has strongly influenced the distribution and diversity of plant and animal communities in both the uplands and lowlands. Anthropogenic or human-caused fires are commonly associated with village landfills and well-used travel corridors and are becoming more common in the region. There is no evidence of anthropogenic fire in the refuge.

It is difficult to draw conclusions about refuge fire return intervals (i.e., average number of years between occurrence of fire at a given point) or fire cycle (i.e., length of time needed for an area equal to the entire area of interest to burn; some sites may burn repeatedly during this period while others remain unburned). Large fires in the boreal forest are caused by lightning that occurs during persistent high-pressure systems that dry fuels, and fire frequency is driven by climate rather than stand age-dependent probability of burning (Johnson et al. 2001; Duffy et al. 2005). The best source of information about fire occurrence is the Alaska Fire Service large fire database, which includes perimeters for fires greater than 100 acres and goes back to 1942.

It is useful to examine known patterns in fire history, keeping in mind the effects of periodic large scale climate processes (e.g., Pacific Decadal Oscillation) and climate change. Relatively little empirical information is available about average forest stand age in interior Alaska, although there have been some studies that use tree rings to reconstruct fire history. Even less information is available for tundra fires. Fires in Alaskan spruce forests are typically stand-replacing, making it difficult to find fire-scarred trees for aging purposes. Fastie et al. (2002) estimated fire intervals of 100 to 250 years for upland forests in interior Alaska. Fire Regime Condition Class data indicate a mean fire interval of 25 to 130 years for interior black spruce and 50 to 612 years for tussock-tundra (Murphy and Witten 2006a; Murphy and Witten 2006b). Joly et al. (2009) used the Alaska Fire Service large fire database to estimate fire cycles within the range of the Western Arctic Caribou Herd (63-71 degrees N latitude and 148-166 degrees W longitude; Dau 2007a), an area of 363,000 km<sup>2</sup> (140,155 mi<sup>2</sup>). For the entire study area, fire cycles were 240 years for forested areas

and 630 years for tundra. In Selawik refuge, they estimated a fire cycle of 207 years. They also found that the number of wildfires in northwestern Alaska significantly increased from 1950 to 2007, but this trend disappeared when the analysis only focused on 1988 to 2007.

Wildfires occurred on Selawik refuge during 21 of the 57 years during 1950 to 2007, averaging 42,980 acres burned per fire year. The 57-year average is 15,835 acres burned per year. Joly et al. (2009) calculated that 28 percent of the refuge burned during this period, and almost 16 percent burned more than once. Much is yet to be understood regarding the fire ecology of this part of Alaska.

Wildland fire is an important force that shapes the ecosystems of Alaska. Climate change is predicted to result in substantial increases in landscape flammability. The next 20 to 30 years are expected to experience the most rapid change in fire activity and associated changes in vegetation dynamics, a shift from conifer dominance to deciduous dominance across interior Alaska, more frequent large fire seasons, and a decrease in the magnitude and periodicity of small fire seasons (Rupp 2008; Rupp and Springsteen 2008).

#### ***4.2.9.2 Fire Size***

Wildland fires in this region range in size from as small as one-quarter acre to as large as 200,000 acres. Fires occurring in black spruce forests tend to be 125,000 acres or larger (Murphy and Witten 2006a), while fires in the tussock-tundra/shrub fuel type vary in size from less than one acre to several thousand acres.

Fire size is determined by a variety of factors: (1) the earlier in the season a fire starts, the more time it has to spread, (2) current weather not only affects initial spread, but also eventual fire growth, (3) fires can hold over in organic soils during long periods of moist weather and become active again after a drying period, (4) wind can cause a fire to quickly grow, (5) fuel continuity determines whether a wildfire can and will continue to grow, (6) large wetlands and rocky areas tend to form barriers to spread that can only be breached by spotting, and (7) recent burns serve as barriers because the reduced fuel loading can limit fire behavior and slow fire spread. Consequently, some fires may burn only a few hundred square feet, while others continue to burn throughout the summer, affecting thousands or hundreds of thousands of acres.

#### ***4.2.9.3 Fire Season***

The fire season typically begins in mid-June and ends by the last week of August. Most fire activity occurs during July when fuels have matured and are at their lowest live fuel moisture levels.

#### ***4.2.9.4 Impacted Communities***

The villages of Noorvik and Selawik lie within the refuge boundary. The villages of Ambler, Kiana, and Shungnak are located outside but near the boundaries of the Selawik refuge. Under certain conditions, wildland fires on or adjacent to the refuge may threaten these communities. Smoke from wild fires can shut down air travel in and out of these communities for extended periods.

## **4.3 Biological Environment**

### **4.3.1 Vegetation**

The juxtaposition of coastal tundra systems and interior tundra and taiga systems has produced numerous ecotones throughout the refuge. The combination of climate and topography of Selawik refuge allows for diverse and abundant flora. There are about 60 families of plants and

more than 500 known vascular plant species occurring on the refuge. There are over 80 species of lichens, 50 species of liverworts, and 200 species of mosses known to inhabit the area. The refuge's complex vegetation results from a myriad of interworking factors, including growing season, soil type, slope, aspect, water, presence or absence of permafrost, and frequency and occurrence of wildland fire.

Vegetation plays a role in determining the distribution of wildlife species, but the activities of wildlife—from moose to insects—can also profoundly affect patterns of vegetation. Abiotic factors such as wildland fire, flooding, and physical alteration from ice also contribute to the complex vegetation patterns in the Selawik area. A list of plant species found on the refuge is presented in Appendix H, Table H-1.

### 4.3.1.1 Habitats

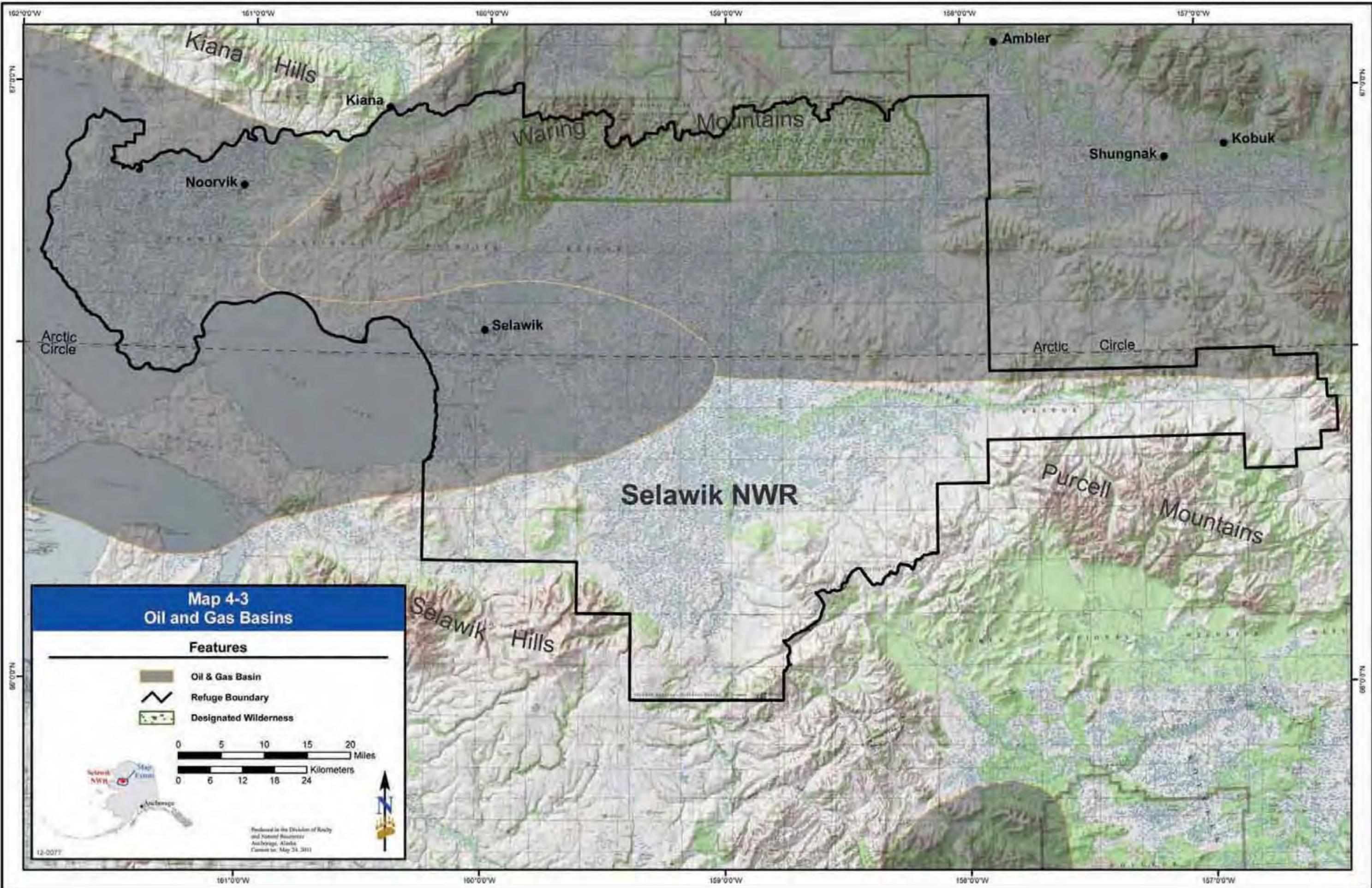
The refuge is situated in a transitional zone from boreal forest to coastal wetlands. Three tundra communities are extensively distributed on the northern half of the Seward Peninsula and immediately east of Kotzebue Sound: moist, wet, and alpine tundra (Appendix H, Table H-2). Tundra communities produce highly complex mosaics of vegetation types because they are physical expressions of topography, slope, aspect, and substrate.

Much of the Kobuk delta between Melvin and Nazuruk channels, the area surrounding and east of Inland Lake, the Selawik River drainage, and the Kugarak River drainage can be classified as aquatic environments (Figure 4-8). These habitats are particularly important to nesting and brooding waterfowl that frequent the refuge in the summer months.



Figure 4-8. This area on the Kobuk River delta exemplifies the aquatic environment and the mosaic of vegetation typical of much of the refuge.

Despite several localized studies of vegetation classes within refuge boundaries, considerable variation exists in definitions of the plant communities, exact boundaries of these communities, and transitional zones between them. Talbot and Solomeschch (2006) identified 36 community types and six vegetation types on the refuge (Appendix H, Table H-2).



**Map 4-3  
Oil and Gas Basins**

**Features**

-  Oil & Gas Basin
-  Refuge Boundary
-  Designated Wilderness

0 5 10 15 20 Miles

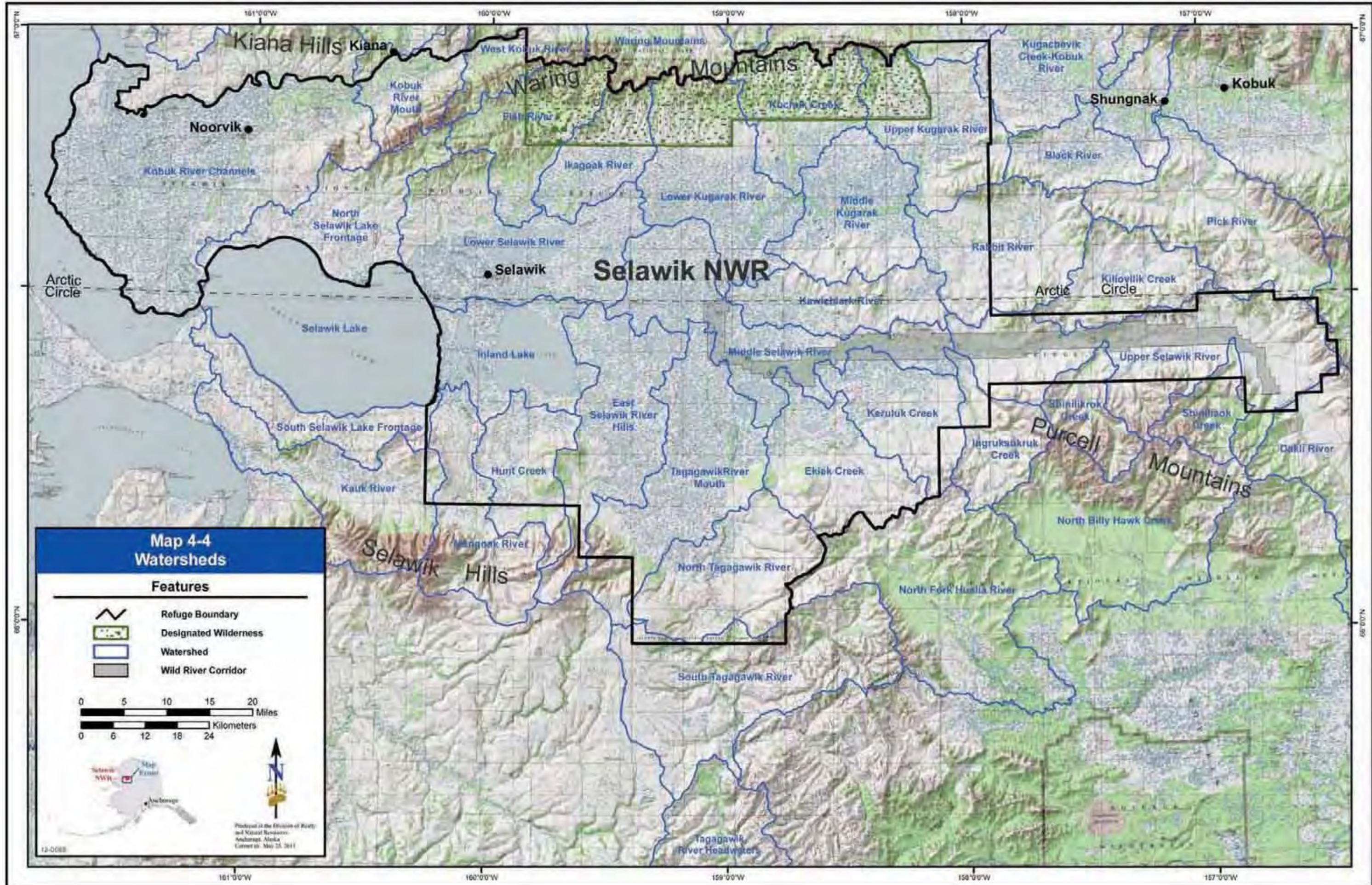
0 6 12 18 24 Kilometers



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and Natural Resources  
Anchorage, Alaska  
Current to: May 24, 2011

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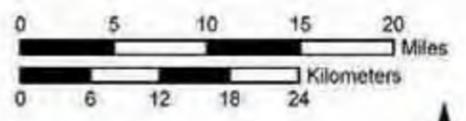
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**Map 4-4  
Watersheds**

**Features**

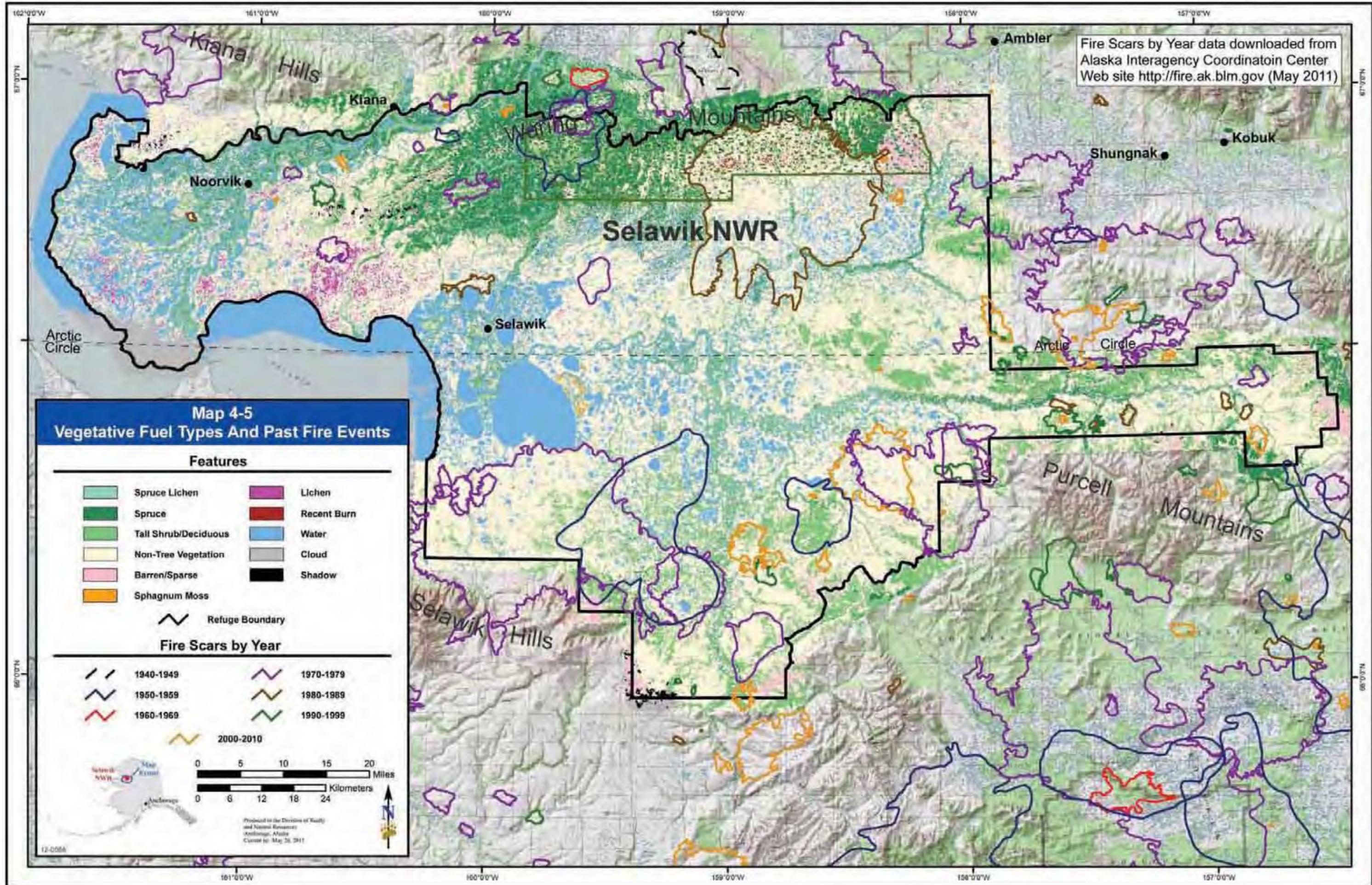
-  Refuge Boundary
-  Designated Wilderness
-  Watershed
-  Wild River Corridor



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(Back of Map 4-4.)



Fire Scars by Year data downloaded from Alaska Interagency Coordinatoin Center Web site <http://fire.ak.blm.gov> (May 2011)

**Map 4-5**  
**Vegetative Fuel Types And Past Fire Events**

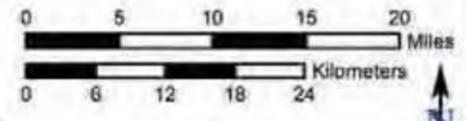
**Features**

- |  |   |
|--|---|
|  Spruce Lichen        |  Lichen      |
|  Spruce               |  Recent Burn |
|  Tall Shrub/Deciduous |  Water       |
|  Non-Tree Vegetation  |  Cloud       |
|  Barren/Sparse        |  Shadow      |
|  Sphagnum Moss        |   |

 Refuge Boundary

**Fire Scars by Year**

- |   |   |
|---|---|
|  1940-1949 |  1970-1979 |
|  1950-1959 |  1980-1989 |
|  1960-1969 |  1990-1999 |
|  2000-2010 |   |



Produced for the Division of Quality and Natural Resources  
 Anchorage, Alaska  
 Current to: May 26, 2011

(Back of Map 4-5.)

Documents that classify habitats on the refuge quickly become outdated as new wildland fires occur or as plant communities develop through different post-fire stages of succession. Landcover mapping using satellite imagery is a way to get a snapshot in time across large areas. The term “landcover map” is preferred to “vegetation map” because non-vegetative components such as rock, water, and developed areas can also be identified on the imagery. The satellite image only distinguishes ground features by the way they reflect light; fieldwork, aerial photos, and knowledge of the area are required to identify and confirm those features. Two landcover maps have been developed for the refuge. The first was completed in 1986 from a cooperative effort by the Service and the U.S. Geological Survey (Kirk and Markon 1989) using 1981 Landsat 3 imagery. The second is a cooperative effort with the Service and Alaska Biological Research, Inc. (ABR), using Landsat Thematic Mapper satellite imagery (Jorgenson et al. 2009; Map 4-6).

The first landcover mapping effort for Selawik refuge defined 6 classes with a total of 19 subclasses (Table 4-3). Definitions of the classes and subclasses resulting from these mapping efforts are found in Appendix H, Table H-3).

Table 4-3. Landcover classes and subclasses derived from 1981 Landsat 3 imagery (Kirk and Markon 1989).

Class	Subclass	Area (acres)	Percent of Total
<b>Barren</b>	Scarcely Vegetated Floodplain	15,151	0.5
	Scarcely Vegetated Scree	12,285	0.4
	Dunes	2,558	0.1
	Open Forested Dunes	2,444	0.1
<b>Forest</b>	Closed Needleleaf	6,700	0.2
	Open Needleleaf	196,460	6.1
	Needleleaf Woodland	62,213	1.9
	Deciduous Forest/Tall Shrub	96,532	3.0
<b>Herbaceous (Graminoid)</b>	Wet Graminoid	232,151	7.2
	Wet/Moist Graminoid Tundra	58,006	1.8
	Mosiac: Wet Graminoid – Dwarf Shrub	72,841	2.3
<b>Shrub</b>	Dry Prostrate	5,321	0.2
	Low Shrub	340,128	10.6
	Medium Shrub	31,231	1.0
	Tall Shrub	167,290	5.2
<b>Dwarf Scrub</b>	Dwarf Shrub Graminoid Tussock	807,316	25.1
	Erect Dwarf Shrub-Lichen	676,602	21.0
<b>Water</b>	Offshore	7,465	0.2
	Clear	398,746	12.4
<b>Other</b>	Shadow	30,174	0.9
<b>Total</b>		3,221,614	100.2

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Table 4-4. Areal extent of vegetation classes within Selawik National Wildlife Refuge (Jorgenson et al. 2009).

Vegetation Class	Area (hectares)	Percent of Total
Alder Tall Shrub	65,777.2	5.1
Alder-Willow Tall Shrub	56,803.6	4.4
Balsam Poplar Forest	5,201.1	0.4
Black Spruce Forest	13,593.4	1.0
Brackish Sedge-Grass Wet Meadow	9,253.1	0.7
Cassiope Dwarf Shrub	456.8	0.0
Coastal Water	2,749.8	0.2
Dryas Dwarf Shrub	3,979.5	0.3
Dwarf Birch-Ericaceous Low Shrub	137,341.8	10.5
Dwarf Birch-Tussock Shrub	370,320.5	28.4
Dwarf Birch-Willow Low Shrub	201,368.7	15.5
Ericaceous Shrub Bog	12,436.1	1.0
Ericaceous-Dryas Dwarf Shrub	570.6	0.0
Fresh Water	111,103.9	8.5
Paper Birch Forest	7,641.9	0.6
Partially Vegetated	4,407.3	0.3
Sedge Fen	47,059.7	3.6
Sedge Wet Meadow	52,905.9	4.1
Sedge-Dryas Meadow	6,541.2	0.5
Snow	1.5	0.0
Spruce-Paper Birch Forest	10,388.4	0.8
White Spruce Forest	106,738.4	8.2
White Spruce-Balsam Poplar Forest	1,595.7	0.1
White Spruce-Lichen Woodland	2,178.7	0.2
Willow Low Shrub	49,258.2	3.8
Willow Tall Shrub	22,329.7	1.7
<b>Total</b>	<b>1,302,002.7</b>	<b>99.9</b>

Table 4-5. Areal extent of ecotype classes within Selawik National Wildlife Refuge (Jorgenson et al. 2009).

Ecotype Class	Area (hectares)	Percent of Total
Alpine Acidic Barrens	674.6	0.1
Alpine Acidic Dryas Dwarf Shrub	3,248.2	0.2
Alpine Alkaline Barrens	1,811.2	0.1
Alpine Alkaline Dryas Dwarf Shrub	412.8	0.0
Alpine Cassiope Dwarf Shrub	456.8	0.0
Alpine Ericaceous-Dryas Dwarf Shrub	570.6	0.0
Alpine Lake	0.1	0.0
Alpine Wet Sedge Meadow	642.6	0.0
Coastal Barrens	3.0	0.0
Coastal Brackish Sedge–Grass Meadow	9,253.1	0.7
Coastal Water	2,749.8	0.2
Lowland Alder Tall Shrub	51,977.8	4.0
Lowland Birch-Ericaceous Low Shrub	95,066.9	7.3
Lowland Birch-Willow Low Shrub	92,918.9	7.1
Lowland Black Spruce Forest	13,593.4	1.0
Lowland Ericaceous Shrub Bog	12,436.1	1.0
Lowland Lake	74,389.0	5.7
Lowland Sedge Fen	47,059.7	3.6
Lowland Willow Low Shrub	16,869.2	1.3
Riverine Alder Tall Shrub	13,799.4	1.1
Riverine Barrens	1,508.5	0.1
Riverine Birch-Willow Low Shrub	42,587.0	3.3
Riverine Dryas Dwarf Shrub	318.6	0.0
Riverine Moist Willow Tall Shrub	22,329.7	1.7
Riverine Poplar Forest	5,201.1	0.4
Riverine Water	36,714.8	2.8
Riverine Wet Sedge Meadow	52,263.3	4.0
Riverine White Spruce-Poplar Forest	1,595.7	0.1
Riverine White Spruce-Willow Forest	20,580.2	1.6
Riverine Willow Low Shrub	7,362.6	0.6
Snow	1.5	0.0
Upland Alder-Willow Tall Shrub	56,803.6	4.4
Upland Birch Forest	7,641.9	0.6
Upland Birch-Ericaceous Low Shrub	42,274.9	3.2
Upland Birch-Willow Low Shrub	65,862.8	5.1
Upland Dwarf Birch-Tussock Shrub	370,320.5	28.4
Upland Sandy Barrens	409.9	0.0

<b>Ecotype Class</b>	<b>Area (hectares)</b>	<b>Percent of Total</b>
<b>Upland Sedge-Dryas Meadow</b>	6,541.2	0.5
<b>Upland Spruce-Birch Forest</b>	10,388.4	0.8
<b>Upland White Spruce-Ericaceous Forest</b>	62,663.4	4.8
<b>Upland White Spruce-Lichen Woodland</b>	2,178.7	0.2
<b>Upland White Spruce-Willow Forest</b>	23,494.8	1.8
<b>Upland Willow Low Shrub</b>	25,026.3	1.9
<b>Total</b>	<b>1,302,002.6</b>	<b>99.7</b>

ABR, Inc. produced three landcover maps, including vegetation structure (Map 4-6), ecotype class (Map 4-7), and soil landscapes (Map 4-2). This mapping effort defined 28 vegetation classes (Table 4-4) and 43 ecotype classes (Table 4-5). Definitions of classes are presented in Appendix J.

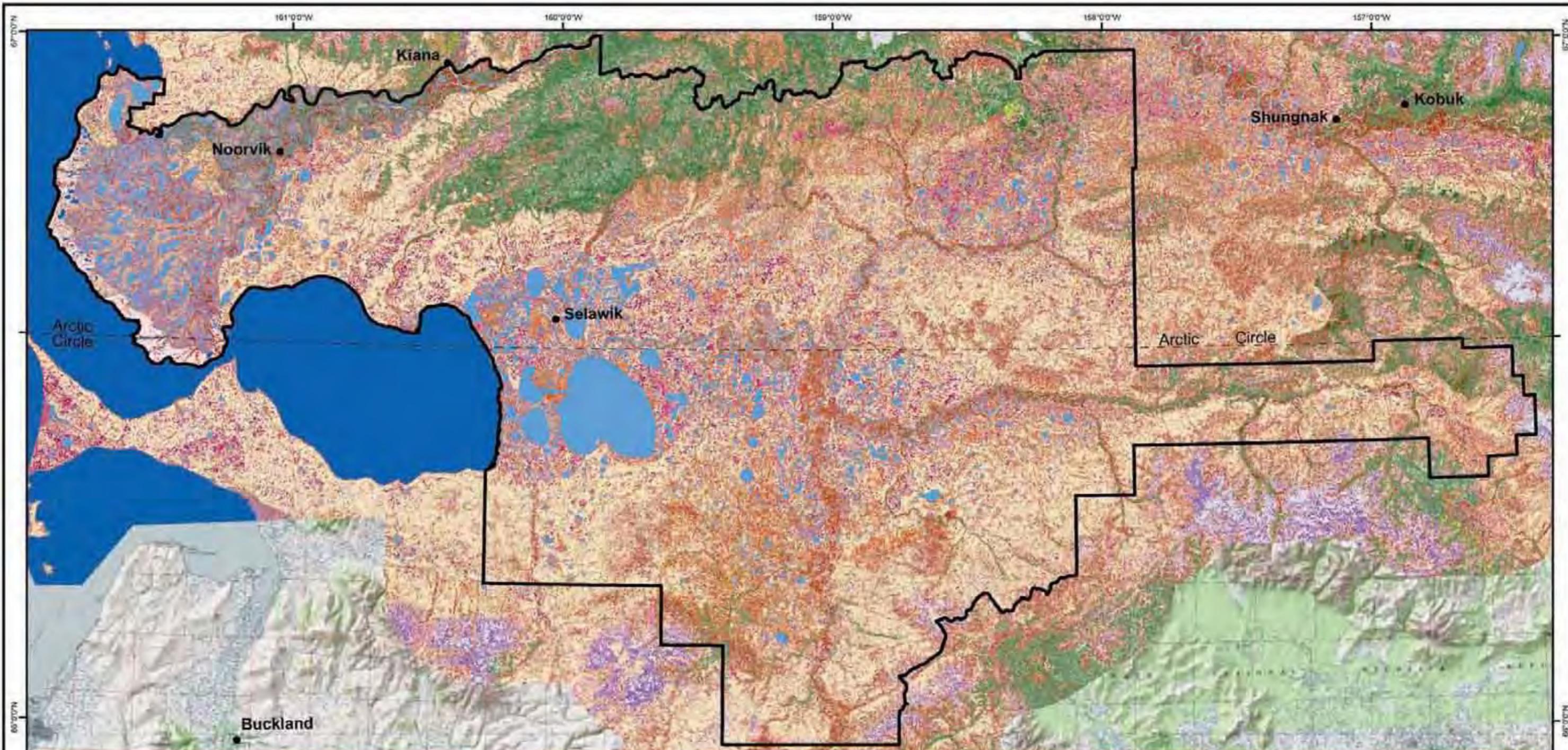
When compared, the landcover class definitions from Kirk and Markon (1989) and Jorgenson et al. (2009) show differences and similarities between the classification systems. Overall, there was reasonable overlap between the two mapping projects regarding the percentages of vegetation classes found on the refuge (Table 4-6).

Table 4-6. Comparison of vegetation class totals between two landcover mapping efforts on the Selawik National Wildlife Refuge.

	<b>Kirk and Markon (1989)</b>	<b>Jorgenson et al. (2009)</b>
<b>Class</b>	<b>Percent of Total</b>	<b>Percent of Total</b>
<b>Barren</b>	1.1	0.3
<b>Forest</b>	11.2	11.3
<b>Herbaceous (Graminoid)</b>	11.3	8.9
<b>Shrub</b>	17.0	16.0
<b>Dwarf Shrub</b>	46.1	54.7
<b>Water</b>	12.6	8.7
<b>Total</b>	<b>99.3</b>	<b>99.9</b>

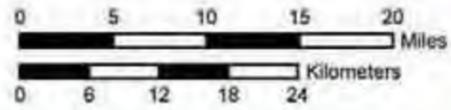
Shrub communities include low and dwarf shrub subclasses and account for up to 70.4 percent of the vegetation on the refuge. Low shrub communities are composed predominantly of deciduous shrubs ranging from 1.5 to 15 feet. On Selawik refuge, shrub occurs primarily along water courses, in poorly drained sites, in graminoid zones, and as early-stage plant communities in disturbed or burned areas. Shrub stands on well-drained sites are typically dominated by willow and alder, which are important forage species for animals such as moose and snowshoe hare. Shrubs return quickly in burned areas and provide forage and cover for wildlife and important soil nutrients such as nitrogen. Dwarf shrub communities are composed predominately of ericaceous shrubs and members of the heath and crowberry families less than 1.5 feet in height. Mosses and lichens are commonly found within these communities.

Common shrubs include willow, alder, dwarf and shrub birch, blueberry, lingonberry, and Labrador tea. Dense willow thickets are often found adjacent to rivers and lakes; willows are also common in the forest understory.



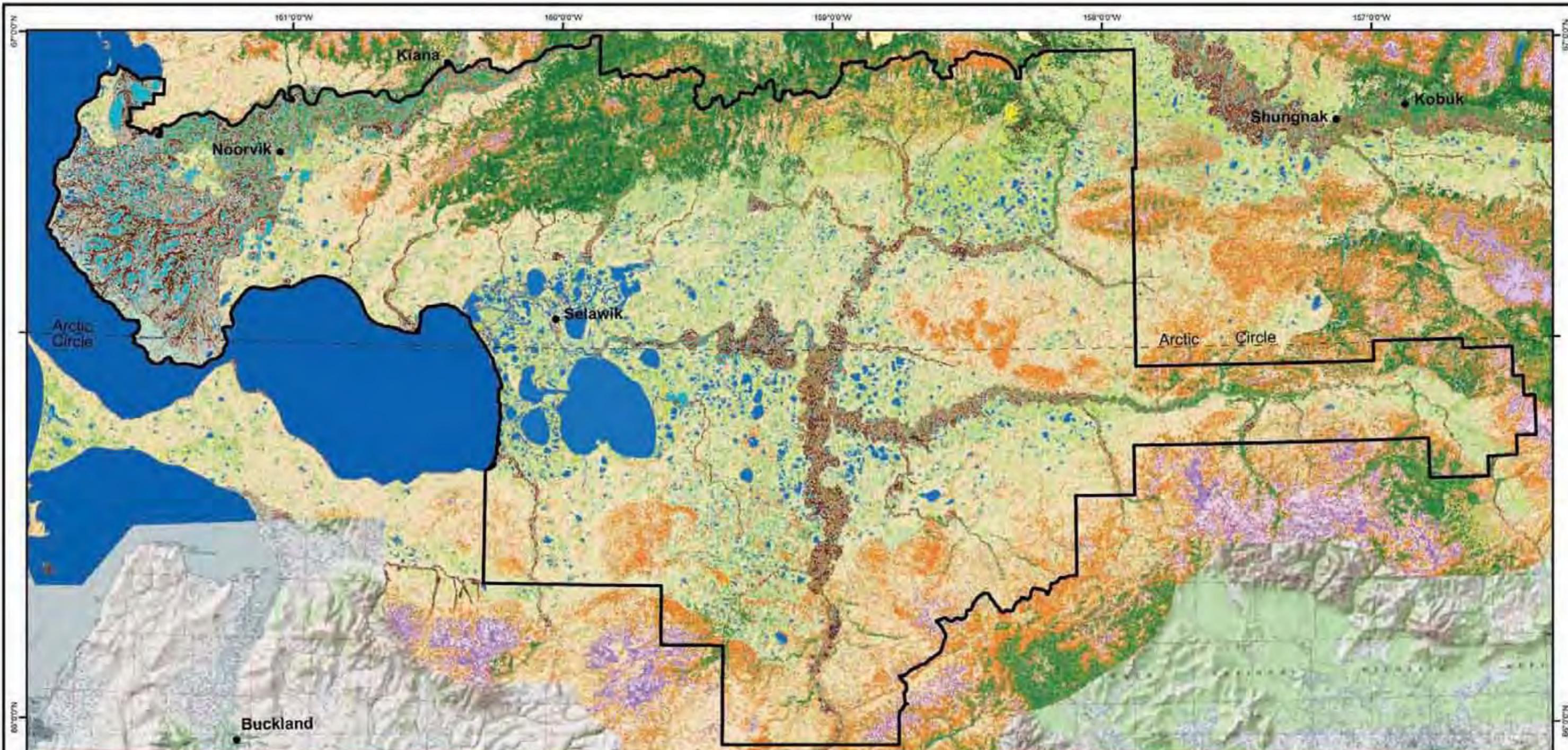
**Map 4-6 Vegetation Structure**

	Partially Vegetated		Ericaceous Shrub Bog		Balsam Poplar Forest		Coastal Water
	Sedge-Dryas Meadow		Dwarf Birch-Ericaceous Low Shrub		Paper Birch Forest		Refuge Boundary
	Sedge Wet Meadow		Dwarf Birch-Tussock Shrub		White Spruce-Balsam Poplar Forest		
	Sedge Fen		Dwarf Birch-Willow Low Shrub		Spruce-Paper Birch Forest		
	Brackish Sedge-Grass Wet Meadow		Willow Low Shrub		White Spruce-Lichen Woodland		
	Dryas Dwarf Shrub		Willow Tall Shrub		White Spruce Forest		
	Ericaceous-Dryas Dwarf Shrub		Alder-Willow Tall Shrub		Black Spruce Forest		
	Cassiope Dwarf Shrub		Alder Tall Shrub		Fresh Water		



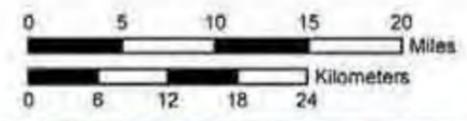
Produced in the Division of Realty and Natural Resources, Anchorage, Alaska. Current as of May 31, 2011.

(Back of Map 4-6.)



**Map 4-7 Ecotype Classes**

Alpine Alkaline Barrens	Upland Willow Low Shrub	Upland White Spruce-Lichen Woodland	Riverine Dryas Dwarf Shrub	Coastal Barrens
Alpine Alkaline Dryas Dwarf Shrub	Upland Birch-Willow Low Shrub	Lowland Sedge Fen	Riverine Willow Low Shrub	Coastal Dunegrass Meadow
Alpine Mafic Barrens	Upland Birch-Ericaceous Low Shrub	Lowland Ericaceous Shrub Bog	Riverine Birch-Willow Low Shrub	Coastal Crowberry Dwarf Shrub
Alpine Acidic Barrens	Upland Dwarf Birch-Tussock Shrub	Lowland Birch-Ericaceous Low Shrub	Riverine Moist Willow Tall Shrub	Coastal Brackish Sedge-Grass Meadow
Alpine Acidic Dryas Dwarf Shrub	Upland Alder-Willow Tall Shrub	Lowland Birch-Willow Low Shrub	Riverine Poplar Forest	Coastal Water
Alpine Ericaceous-Dryas Dwarf Shrub	Upland Birch Forest	Lowland Willow Low Shrub	Riverine White Spruce-Poplar Forest	Refuge Boundary
Alpine Cassiope Dwarf Shrub	Upland Spruce-Birch Forest	Lowland Alder Tall Shrub	Riverine White Spruce-Willow Forest	
Alpine Wet Sedge Meadows	Upland White Spruce-Willow Forest	Lowland Black Spruce Forest	Riverine Wet Sedge Meadow	
Alpine Lake	Upland White Spruce-Ericaceous Forest	Lowland Lake	Riverine Alder Tall Shrub	
Upland Sedge-Dryas Meadow	Upland Sandy Barrens	Riverine Barrens	Riverine Water	



Produced by the Division of Biology and Natural Resources, Anchorage, Alaska. Current to: May 24, 2011.

(Back of Map 4-7.)

The herbaceous landcover class comprises roughly 8.2 percent of the refuge and includes graminoid marshes of grasses and sedges. These wetlands are periodically inundated with standing or slowly moving water and are typically found along lake shores and in alluvial sites on the refuge. Graminoids can dominate communities such as tussock tundra, which is largely comprised of tussock cottongrass. Grasslands are moderately abundant within the refuge and are primarily restricted to the coastal seashores, estuaries, inland sand dunes, and recent burn areas and drained lake basins. Herbaceous plants are typically mixed with other plants or are in the understory of forests, but fireweed can form extensive stands following fire, turning the landscape pink in July.

Forests account for 11 percent of the vegetation on the refuge. These forested areas are characterized by trees 15 feet or taller or in intermediate stages of succession less than 15 feet tall but growing. Depending upon soils and topography, climax forest communities are dominated by an overstory of either black or white spruce.

The majority of forests on Selawik refuge are dominated by white spruce commonly found on warmer well-drained sites such as alluvial deposits. On lowland sites, paper birch and balsam poplar may be components of the over story, with quaking aspen a component on upland sites. The understory may include tall shrub willow, alder, prickly rose, and a shallow carpet of feather mosses (Figure 4-9).



Figure 4-9. This mixed spruce forest along the Tagagawik River typifies forested areas along the refuge's rivers.

Forest communities are more extensive in the interior portions of the region such as along the Kobuk and lower Noatak rivers and their tributaries and in the southeastern part of the Seward Peninsula. Boreal forest is less abundant within the refuge than tundra and grassland communities. Larger forest systems flank the refuge on the north, east, and south. Some of the commonly recognized forest and related types of the area include closed spruce-hardwood forest, treeless bogs, open dwarf spruce forests, and shrub thickets.

The barren landcover class is characterized by sites that are scarcely vegetated and dominated by exposed soil or rocks. The barren class comprised less than 0.4 percent in both mapping projects completed for Selawik refuge.

### 4.3.2 Fish and Wildlife

#### 4.3.2.1 Fish

The Selawik refuge supports major fisheries of local, regional, and statewide importance (USFWS 1993). The major drainages and tributaries of the Selawik and Kobuk rivers support large populations of anadromous and resident fishes. Northern pike, sheefish, and other whitefish are the primary fish species harvested for subsistence by residents of Selawik. In Noorvik and other Kobuk River communities, salmon and Dolly Varden are also key subsistence foods, along with pike and whitefish species. The Selawik River is unusual in the region in that it does not have a substantial salmon run.

Sheefish, whitefish, and northern pike were commercially harvested by residents of Selawik in the early 1980s (Johnson 1986b). No fish are currently harvested on a commercial basis in the Selawik River drainage. Chum salmon from the Kobuk and Noatak river drainages are harvested in a commercial fishery in the Kotzebue area (USFWS 1993; Georgette and Shiedt 2005).

The refuge provides habitat for many species of fish. A list of fish present on the refuge is included in Appendix H, Table H-4. Species of particular importance to the refuge and neighboring communities are briefly described below.

***Sheefish (Inconnu).*** Sheefish are large, long-lived, piscivorous whitefish found in many Arctic and subarctic waters of Asia and North America (Alt 1969; Scott and Crossman 1973; Morrow 1980b; see Figure 4-10). They are one of the most important food fishes in the Kotzebue Sound region, where an estimated 20,000 sheefish or more are harvested each year, primarily in subsistence fisheries (Georgette and Loon 1990; Taube 1997; Savereide 2002; Georgette and Koster 2005; Georgette and Shiedt 2005). Two spawning locations have been identified in the region: one in the upper Kobuk River (Alt 1969) and the other in the upper Selawik River (Alt 1977; Alt 1987). Each spawning area consists of a discrete sheefish population, with little or no genetic exchange between the two (Miller et al. 1998; Underwood et al. 1998; Hander et al. 2008). No other spawning populations are thought to exist in the region. Sheefish are a trust species, and the refuge is mandated in Section 302(4)(b) of ANILCA to maintain sheefish in their natural diversity and to maintain continued opportunities for subsistence harvest of this species. The spawning area of the Selawik River sheefish population lies entirely within refuge lands (Map 4-10), which makes sheefish a population of special interest for refuge staff and their partners.

Sheefish populations in northwest Alaska live their entire life cycle in the Kobuk and Selawik rivers and associated estuary systems. They overwinter in Selawik Lake, Hotham Inlet, the Noatak River mouth, and other associated waterways (Alt 1969; Alt 1973a). Tagged fish from both the Selawik and Kobuk rivers have been recaptured as far seaward as the village of Kotzebue, where the brackish water of Hotham Inlet begins to mix with the marine waters of Kotzebue Sound (Taube 1996; Taube 1997; Underwood et al. 1998; Underwood 2000). In summer, local residents report catching sheefish as far west as Krusenstern Lagoon and as far south as the Arctic Circle lagoon system. Sheefish tolerate brackish environments but cannot survive the cold temperatures of full marine water in the winter (Black 1957; DeVries and Cheng 2005). Both populations are thus confined to habitats on the freshwater side of the brackish-marine divide in inner Kotzebue Sound. The location of this divide shifts seasonally in

response to wind, weather, and the volume of fresh water from the river systems. Most sheefish mature between the ages of 7 and 12 years and are capable of living for 30 years or more (Howland 1997; Brown 2000; Howland et al. 2004).

With ice break-up, mature sheefish begin a slow spawning migration up either the Kobuk or Selawik rivers, initially feeding with non-spawning fish early in the summer (Alt 1969). They arrive at spawning areas in the upper reaches of the river from mid-summer through fall. Non-spawning adults and immature sheefish remain in the lower reaches of the river and estuary systems. By early September, sheefish complete their migration upstream, where they remain until spawning takes place in late September or early October. Eggs are broadcast over gravel and cobble substrate. The fertilized eggs settle into the interstitial spaces in the substrate and develop through the winter. Post-spawning sheefish leave the area immediately, returning to the large lake systems and estuaries for overwintering (Underwood 2000). Eggs are thought to hatch in the late winter or spring, and larvae are carried downstream with the high waters of spring (Shestakov 1991; Bogdanov et al. 1992; Naesje et al. 1995).

It was once thought that mature sheefish needed one or more years following a spawning event to accumulate sufficient energy reserves to spawn again, resulting in skip-year spawning behavior (Alt 1969; Reist and Bond 1988; Lambert and Dodson 1990). Underwood (2000), however, suspected that some sequential-year spawning might occur in the populations of the Kobuk and Selawik rivers based on sequential-year captures of fish on spawning reaches. Using long-term radio tags, Hander et al. (2008) verified that a substantial fraction of mature sheefish spawned during two sequential years.

The relationship between population size of spawning adults and the production of young fish is of great interest, particularly given the substantial harvests in the Kotzebue region. In the mid-1990s, population estimates for spawning fish suggested that 30,000 to 40,000 fish spawned in the Kobuk River (Taube 1996; Taube 1997; Taube and Wuttig 1998) and about 6,000 fish in the Selawik River (Underwood et al. 1998). A decade later, estimates for the Selawik River spawning population were approximately 24,000 sheefish in 2004 and 46,000 in 2005 (Hander et al. 2008). The estimated abundance of spawning sheefish in the Selawik River expanded significantly during this 10-year interval. This population expansion is thought to be the result of an episodic recruitment event of young sheefish into the spawning population. It is not known whether the Kobuk River population experienced similar growth because no estimates were collected for this period.



Figure 4-10. Sheefish winter in Hotham Inlet and nearby waters where they are harvested by local residents with under-ice gillnets and jigging gear.

**Broad Whitefish.** Broad whitefish are large, long-lived, benthic feeding whitefish found in many Arctic and subarctic waters of Asia and North America (McPhail and Lindsey 1970; Brown 2007). Some stocks are anadromous, venturing at least into brackish water (McPhail and Lindsey 1970; Craig 1984). Broad whitefish are a primary species harvested in the local Selawik fishery (Johnson 1986a; Brown 2004). Brown (2004) conducted a study of the local fishery in the Selawik River delta and found both mature and immature broad whitefish in the Selawik River drainage. Based on otolith examination, fish were found to be as old as 27 years, with a median age of 11 years; body lengths were as large as 22 inches (560 millimeters), with a median of 18.7 inches (475 millimeters); and weights were as great as five pounds and one ounce (2,300 grams), with a median of two pounds and 10 ounces (1,201 grams). Microchemical examinations of a sample of otoliths indicate that a large proportion of broad whitefish frequented marine waters during their lives. Examination of stomach samples showed that broad whitefish use the Selawik River delta as feeding habitat.

Sexual maturity is generally attained between the ages of five and eight years (Chudobiak 1995; Van Gerwen-Toyne 2001), with age eight being common in populations from the Selawik River (Brown 2004). Broad whitefish spawn in the late fall. Spawning may be annual or intermittent (Tallman et al. 2002; Brown 2004). Ripening fish generally move out of feeding areas in late summer and begin a slow migration to spawn in upstream river sections or tributaries with shallow, fast flowing waters and clean gravel (Hale 1981; Chang-Kue and Jessop 1992). Eggs are broadcast over substrates of varied texture from sand to cobble. Spawning is followed by a downstream migration to wintering areas. Eggs hatch the following spring, and fry appear to move passively downstream during high flow events to feeding areas in the lower river. Spawning fish do not feed during their upstream migration.

Spawning areas for broad whitefish are less clearly defined than for sheefish or humpback whitefish. Broad whitefish tend to spawn shortly after river freeze-up (Reist and Bond 1988).

Subsistence fishermen from the upper Kobuk River report that broad whitefish spawn later than the other whitefish species, typically at the end of the first week of November (Georgette and Shiedt 2005).

The upper Kobuk River has been identified by local residents as a major spawning area for broad whitefish, where they are caught in under-ice nets in early winter (Georgette and Shiedt 2005). Capture and radio telemetry data (Brown 2004; Brown 2006) indicate that broad whitefish in the Selawik River delta may be spawning in local gravel or sand bottom habitats, such as the northern mouth of the Selawik River where a large spit of sand arcs into the wetland, or in other areas of Selawik Lake. However, the precise locations of these areas have not been documented.

**Humpback Whitefish.** Humpback whitefish are medium-sized to large, long-lived benthic-feeding whitefish that are found in many Arctic and subarctic waters of Asia and North America (McPhail and Lindsey 1970; Brown 2007). They are commonly found in the Kobuk and Selawik river drainages, as well as Selawik Lake and Hotham Inlet. Age at sexual maturity for humpback whitefish in the Kotzebue Sound and Hotham Inlet areas has not been established using otolith data (examination of otoliths may be a more accurate technique for ageing this species than examining scales; see Power 1978). Using otoliths, Harper and colleagues (2007) found that humpback whitefish in the Kuskokwim River attained sexual maturity as early as age 4, while Moulton and colleagues (1997) found the youngest incidence of maturity at age 11 north of the Brooks Range, suggesting variation in age at sexual maturity in this species depending on region.

Kobuk River stocks that winter in Hotham Inlet move into feeding areas of the lower Kobuk River soon after break-up. The spawning segment of the population continues to move upstream throughout the summer until reaching spawning areas 25–37 miles (40–60 kilometers) upstream from the village of Kobuk. Johnson (1986b) documented humpback whitefish in the upper Selawik River near Ingruksukruk Creek in early September, and Brown (2006) observed humpback whitefish migrating to the upper Selawik and Fish rivers during late September and early October, most likely travelling to spawning locations in these rivers. Subsistence fishermen in Selawik identified the upper Fish River, upper Selawik River, and Singauruk (*Sijiagruk*) River as humpback whitefish spawning areas (Georgette and Shiedt 2005).

Humpback whitefish tend to be one of the most abundant species harvested in the local Selawik fishery (Johnson 1986a; Brown 2004). Studying the Selawik River delta, Brown (2004) found that otolith-based ages of humpback whitefish ranged from 4 to 27 years, with a median of 13 years; body lengths were as great as 19.5 inches (495 millimeters), with a median of 15.5 inches (395 millimeters); and weights as great as two pounds and 11 ounces (1,210 grams), with a median of one pound and eight ounces (680 grams). Using microchemical examinations of otoliths, Brown (2004) found that a substantial proportion of the humpback whitefish frequent marine waters throughout their lives. By sampling stomachs, Brown (2004) determined that humpback whitefish use the Selawik River delta as feeding habitat.

**Least Cisco.** Least cisco are a relatively small whitefish that feeds on aquatic invertebrates and has a near circumpolar distribution in Arctic and subarctic waters (McPhail and Lindsey 1970; Morrow 1980b). Sympatric populations of dwarf and normal-sized fish have been found in several lake systems of the northern Yukon Territory (Mann 1974; Mann and McCart 1981). In Alaska, dwarf populations have been reported in lakes (McPhail and Lindsey 1970; Alt 1980); however, little research has been directed toward confirming the observation. Normal-sized populations have been documented in both rivers and lakes from various locations in Alaska (Kepler 1973; Alt 1980).

Least cisco were found to be abundant in the Selawik River delta, although they were not targeted in the local fishery (Johnson 1986a; Brown 2004). Studying the local fishery in the Selawik River delta, Brown (2004) found that otolith-based ages ranged from 2 to 16 years, with a median of 6 years; body lengths were as great as 16 inches (410 millimeters), with median of 11.8 inches (300 millimeters); and weights were as great as one pound and 13 ounces (830 grams), with a median of 12.3 ounces (350 grams). Using microchemical examinations of otoliths, Brown (2004) showed that only a small proportion of the population had been in marine waters. Those that did enter marine waters had much lower concentrations of strontium than broad or humpback whitefish, suggesting that they remained in a lower salinity environment than these other species. Least cisco appear to remain in the local area more than other whitefish species.

Fisheries researchers have determined that least cisco spawn from late September to early October (Kepler 1973; Mann 1974; Alt 1980). In the Selawik region, these fish attain sexual maturity at age five, compared to age three in interior Alaska (Brown and Fleener 2001; Brown 2009) and the Kuskokwim drainage (Harper et al. 2007), and age seven in Arctic Alaska (Moulton et al. 1997). Survey data suggest that least cisco in the Selawik region spawn annually (Brown 2004).

Specific spawning locations remain undocumented by scientists for least cisco populations in the Kobuk and Selawik river drainages. Residents of the upper Kobuk area have reported that least cisco spawn near their communities at about the same time as humpback whitefish, usually in late September (Georgette and Shiedt 2005). Alt (1980) observed least cisco in spawning condition over a large section of the Kobuk River, from 21 miles downstream of the community of Ambler to 35 miles upstream of the community of Kobuk, but specific spawning sites were not documented in this study. Harvest data suggest that least cisco make spawning migrations up the Kobuk River, but no similar data exist for the Selawik River (Georgette and Shiedt 2005). Hander and colleagues (2008) conducted a beach seining effort in the upper Selawik River during fall but captured no least cisco. Brown (2006) collected radio telemetry data on least cisco that had been tagged in the Selawik River delta, and he relocated all tagged fish in the delta or Selawik Lake during spawning season rather than in the Selawik River or other local drainages. This evidence indicates that these fish were likely spawning in Selawik Lake and that they were not a part of the Kobuk River spawning population.

***Other Whitefish.*** Round whitefish are a smaller member of the whitefish family with a near circumpolar distribution and are most commonly found in shallows of lakes and in clear water streams (McPhail and Lindsey 1970). They reach sexual maturity by the age of eight years and have been found up to 32 years of age and 16 inches in length (405 millimeters) in eastern Russia (Gudkov 1999). Round whitefish have been captured by refuge staff in the upper Selawik River but have not been observed in great numbers (USFWS, unpublished data). They are familiar to local residents of the upper Kobuk River, and have been described as a “fish of gravel-bottomed streams,” potentially explaining their absence from the area near Selawik and Noorvik (Georgette and Shiedt 2005).

Bering cisco have been documented in northwest Alaska (McPhail and Lindsey 1970; Alt 1973b; Morrow 1980b) but have not been documented in the Kobuk or Selawik river drainages. Scientists currently believe that there are three spawning populations of Bering cisco in Alaska: one in the Yukon River (Alt 1973b), one in the Kuskokwim River (Alt 1973b), and one in the Susitna River (ADF&G 1983). Immature fish are thought to go to sea then spread along the near-shore environment by marine currents to feed and grow before maturing and returning to rivers to spawn (Craig 1989; Bickham et al. 1997; USFWS, unpublished data). Local residents describe

Bering cisco as a “saltwater fish,” with its range generally limited to coastal areas in Kotzebue Sound and the north edge of Hotham Inlet (Georgette and Shiedt 2005).

**Salmon.** Five species of Pacific salmon are found in the drainages of Kotzebue Sound, including Chinook, sockeye, pink, chum, and coho salmon (USFWS 1993). Chum salmon, however, comprise the overwhelming majority of salmon in the region, with stable and sizeable runs occurring in both the Kobuk and Noatak rivers (Lean et al. 1986). The Selawik River drainage is generally devoid of salmon populations. Occasionally chum salmon are caught in subsistence nets near Selawik, but this is not common. During fishery investigations on the refuge, two chum salmon were caught near Keruluk Creek in August 1985 (Johnson 1986a), a single chum was captured by researchers in the upper Selawik River in 2005 (USFWS, unpublished data 2010), and a pink salmon was captured by researchers during a sheefish mark-recapture project in 2004 (USFWS, unpublished data). Chum salmon are targeted by Kobuk River and Kotzebue Sound residents for subsistence use. A commercial fishery for chum salmon takes place each summer in the Kotzebue area. The Alaska Department of Fish and Game (ADF&G) conducts annual surveys and escapement counts for salmon in the region.

Chum salmon return to Kotzebue Sound streams to spawn from early July through September (Lean et al. 1986). The chum salmon run peaks in Kotzebue Sound from July 25–31 for fish bound for the Kobuk River and August 5–15 for fish bound for the Noatak River (McClean et al. 1977). Most of the spawning activity for chum salmon happens outside the Selawik refuge. The portion of the Kobuk River within the refuge boundary is primarily used by chum salmon as a travel corridor to spawning areas upriver and as a rearing area for fry (Menard and Kent 2007). Returning chum salmon deposit their eggs in small depressions in the stream bottom, where eggs hatch the following spring. Fry begin their seaward migration within days of emerging from the gravel. Chum salmon forage in the ocean for three to five years before returning as adults to spawn (Quinn 2005). A small proportion of chum salmon from the Kotzebue region have been found to return from sea at age six (Lean et al. 1986).

**Northern Pike.** Northern pike are large, carnivorous, ambush predators with a circumpolar distribution (McPhail and Lindsey 1970). Adult northern pike feed mainly on fish, but their diet also includes waterfowl, frogs, and small mammals. They overwinter in deeper areas of lakes or river systems and move to weedy shallow spawning areas in early spring just after ice break-up (Cheney 1971). Northern pike begin spawning during the spring of their third year. Fry emerge up to four weeks after spawning, depending on water temperature, and become active feeders soon after emergence. After spawning, northern pike spend the summer feeding in lakes, sloughs, and rivers.

Northern pike are abundant in the refuge, inhabiting nearly all of the slower-moving waters of the Selawik and Kobuk rivers, most tributaries, and lakes of suitable depth. Northern pike are an important year-round subsistence food for residents of Selawik (Johnson 1986a). Northern pike of the lower Selawik River were captured by Johnson (1986a) at the rate of 0.25 fish per net hour using 125-foot (38-meter) experimental gillnets and were found to be as old as 19 years (using the common pike aging structure called a cliethra), up to 39.5 inches (1,003 millimeters) in length, and 16 pounds and eight ounces (7.5 kilograms) in weight. Pike were commonly captured by researchers during a sheefish mark-recapture project in 2004 and 2005 in the lower Selawik River (USFWS, unpublished data).

**Burbot.** Burbot have a circumpolar distribution in the northern hemisphere and are the only freshwater member of the cod family, Gadidae (Chen 1969; Morrow 1980b). This species normally carries out its life cycle in fresh water; however, in some areas, such as the Mackenzie delta in

northern Canada and parts of northern Europe, burbot occur in brackish lagoons and estuaries (Percy 1975; Pulliainen et al. 1992). Burbot occur through most of Alaska except for the southeast portion of the State (Mecklenburg et al. 2002). They are usually found in the deep waters of major river systems but can be found in shallows when feeding or spawning (Chen 1969). Young burbot feed mainly on invertebrates, while adults are largely piscivorous. No research on this species has been conducted in waters of the Selawik refuge. Incidental catch of burbot during other research has been reported (e.g., Brown 2004; Hander et al. 2008; unpublished data, USFWS). It was noted that burbot were caught during a commercial fishery, which targeted whitefish species, northern pike, and burbot (Johnson 1986a). Burbot are targeted by the residents of Selawik village during the winter subsistence fishery.

***Dolly Varden.*** Dolly Varden occur from the Arctic coast of Alaska to southern British Columbia and the adjacent waters of the Chukchi Peninsula of Russia south to Japan and Korea (Morrow 1980b). They reach sexual maturity between the ages of two and six; however, they can vary significantly in size at maturity (5.7 to 20.6 inches) over their range (DeCicco 1992; Jonsson et al. 1984). They can exist as anadromous populations, going to sea to feed, or as resident populations that are commonly dwarfed in size (Morrow 1980a). Dolly Varden closely resemble other stream dwelling char species, and in Alaska, all populations were until recently considered Arctic char (McPhail 1961; Morrow 1980a). They were thought to be bull trout in the southern portions of their range (Haas and McPhail 1991).

No fisheries studies on Dolly Varden populations have been conducted in waters of the Selawik refuge. It is thought that they occur in the Selawik River drainage in low numbers and small populations of resident dwarf-sized fish likely occur in most headwater streams. Long-time residents of Selawik village have reported Dolly Varden in the Selawik River drainage when they occasionally catch them in nets. They were also captured as by-catch during a sheefish mark-recapture project in the upper Selawik River in 2004 (USFWS, unpublished data).

The Kobuk River primarily supports anadromous Dolly Varden populations that spawn upstream of the refuge. These fish are thought to spawn in two major tributaries of the Kobuk River, the Ambler and Squirrel rivers, and in the mainstem Kobuk River above the village of Kobuk (DeCicco 1982). The number of anadromous Dolly Varden using the Kobuk River is considered to be relatively small compared to other northwest Alaska rivers, such as the Noatak, Kivalina, and Wulik.

***Arctic Grayling.*** Arctic grayling occur from the west coast of Hudson Bay west through Alaska to central Russia (McPhail and Lindsey 1970; Stamford and Taylor 2004). In Alaska, they have been found to attain ages up to 29 years (DeCicco and Brown 2006) and reach sexual maturity at the age of four years (DeCicco and Gryska 2007). Migration from the mainstem areas of large rivers to smaller headwater streams begins shortly after break-up. Spawning takes place between the months of April and June, after which the adults migrate to pool habitats for the remainder of the summer (McPhail and Lindsey 1970; Bishop 1971; Vascotto and Morrow 1973). Fry emerge in 11 to 23 days, depending on water temperature (Bishop 1971).

Arctic grayling are found in clear and cold tributary streams in major river drainages of the Selawik refuge. Specific spawning and wintering locations on the refuge have not been identified. Arctic grayling are sometimes caught in the fall for a fresh meal by hunters camped along the Tagagawik and upper Selawik rivers. Grayling are generally not targeted within the subsistence fishery.

**Other Resident Freshwater Fishes.** During research targeting one species of fish, other species are occasionally captured as by-catch and recorded before being released. During a major mark-recapture project aimed at determining population size of sheefish in the Selawik River (Hander et al. 2008), there were capture records for longnose sucker, slimy sculpin, and nine-spine stickleback (USFWS, unpublished data). None of these species are targeted in commercial, recreational, or subsistence fisheries.

#### **4.3.2.2 Amphibians**

The wood frog is the only amphibian known to inhabit the Selawik refuge. Despite their presence in the Kobuk River and Selawik river drainages, little is known about the distribution and ecology of wood frogs in the area.

#### **4.3.2.3 Birds**

Selawik refuge provides habitat for about 160 species of birds, of which 129 species have been documented as nesting on refuge lands. Much of the refuge is an extensive system of estuaries, lakes, and innumerable ponds, marshes, and streams lying in a broad valley between the Waring Mountains and Selawik Hills. The Selawik refuge is one of the more productive tundra waterfowl breeding areas in Alaska. Refuge habitats provide vital breeding and staging areas for large numbers of migratory waterfowl and shorebirds from Asia, Africa, Australia, and North and South America. Appendix H, Table H-5 lists the birds found on and adjacent to the refuge.

The Migratory Bird Treaty Act was amended in 1996 to legalize subsistence hunting and taking of eggs of migratory birds in Alaska during spring and summer. This amendment led to the establishment of the Alaska Migratory Bird Co-management Council (AMBCC). The Selawik refuge works with the AMBCC and other partners to collect accurate and extensive baseline data on species densities and abundance; data are also intermittently collected on subsistence harvests. This work ensures that healthy populations are maintained, subsistence opportunities are provided, and the Service complies with the Migratory Bird Treaty Act.

**Waterfowl.** Wetlands and lakes on the refuge are one of the last stopping areas for hundreds of thousands of shorebirds and waterfowl awaiting spring break-up in the Arctic. The Selawik lowlands and river deltas host a fall migration of over 100,000 waterfowl. The international significance of the refuge's waterfowl production has been recognized since the early 1960s and, as a result, the refuge is annually surveyed by air as part of the Continental Waterfowl Breeding Ground Survey. Annual production varies considerably depending on spring weather conditions such as the amount of flooding.

Seventeen species of ducks have been observed to use the extensive wetlands of Selawik refuge. The most common breeding dabbling ducks include green-winged teal, mallard, northern pintail, northern shoveler, and American wigeon (Mallek and Groves 2008); diving duck and sea duck species include canvasback, greater and lesser scaup, long-tailed duck, and surf and black scoter (Stehn et al. 2006). Red-breasted mergansers are also found along the major river systems of the refuge.

Breeding and summering waterfowl populations within the refuge show a significant dependence on adjacent coastal and estuarine areas of the Kobuk and Noatak river deltas. Duck numbers on refuge lands peak during the nesting period in June, while coastal migration and staging numbers peak in late May and again in early September (Moran 2007) (Map 4-8).

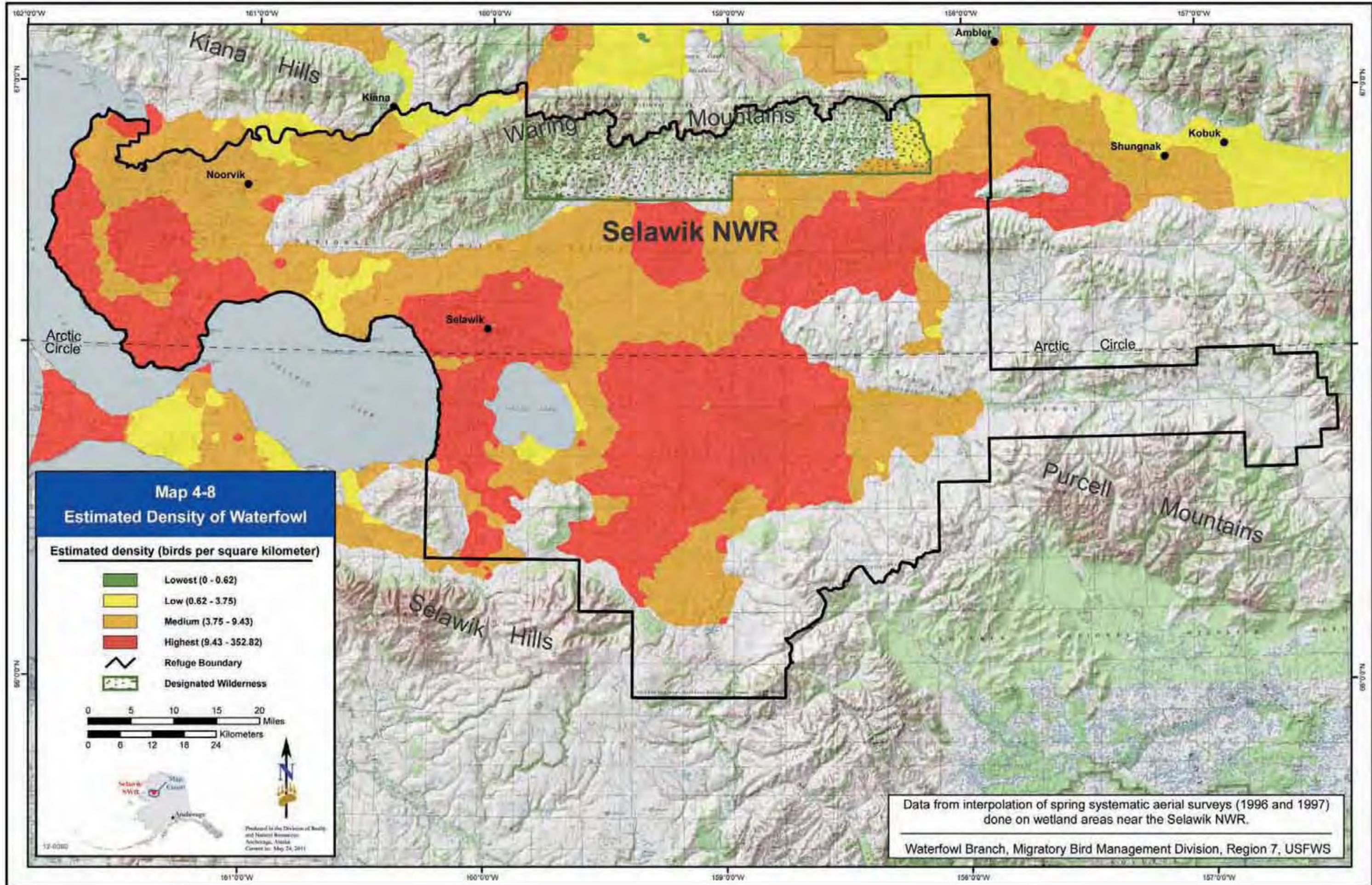
Large numbers of geese also use the refuge in the spring, summer, and fall for staging and nesting. Both greater white-fronted and Canada geese breed on refuge lands. Large numbers of geese use the Kobuk and Selawik deltas during the late summer molting season. The lesser Canada geese are from the Pacific Flyway, while white-fronted geese belong to the mid-continental population. Brant and emperor geese have been documented in migration near the refuge but have not been confirmed as breeding on the refuge. A portion of the Pacific Flyway snow goose population migrates through the refuge to and from their nesting grounds on Wrangel Island in Russia and their wintering grounds in Washington, Oregon, and California.

From 2005 through 2008, the refuge conducted aerial breeding pair surveys for greater white-fronted and Canada geese. These surveys will continue every three years as directed by the refuge's Inventory and Monitoring Plan (USFWS 2009). Annual molting surveys were conducted for greater white-fronted and Canada geese from 2001 through 2004. The molting survey was replaced by the breeding pair survey to provide better breeding population information on the refuge (Fischer 2007). The most recent breeding population estimate for greater white-fronted geese is 41 percent lower than the 1996 estimate; however, the timing of these surveys was different. Annual growth rate of breeding pairs is two percent from 1996 to 2007 (Fischer 2007). The adjusted total population was 7,366 (plus or minus 1,415) greater white-fronted geese and 6,217 (plus or minus 1,369) Canada geese (Fischer 2007). White-fronted geese have been captured and banded on the refuge for survival rate analysis since the mid-1980s. Banding efforts on the refuge have been suspended since 2006 in favor of banding on the Southern Unit Innoko Refuge where geese can be captured in a more cost-effective manner.

Tundra swans nest in large numbers on the refuge, with approximately 7,178 breeding birds each year (Spindler 1989; Platte 1999; Fischer 2007). The total population estimate was 10,188 (plus or minus 1,750) tundra swans (Fischer 2007). Swans extensively use the refuge region for fall staging in numbers estimated at 7,000 to 9,000 birds (USFWS, unpublished data); staging swans using Selawik refuge include non-breeders, failed breeders, and breeders from other areas, possibly the Noatak and upper Kobuk valleys. Similarly, peak numbers of tundra swans and cygnets on inland tundra habitats occur in late August and early September. In coastal areas, the largest numbers of swans occur in late September and early October. In addition to tundra swans, trumpeter swans have been documented on the refuge, although these are not common.

**Marsh and Other Water Birds.** Pacific loons are the most abundant loons nesting on refuge lands. Common, red-throated, and yellow-billed loons also nest in low numbers on the refuge. Sandhill cranes use the refuge's extensive wetlands. Red-necked grebes are common nesters, with limited numbers of horned grebes scattered in some areas of the refuge.

**Shorebirds.** Large numbers of shorebirds can be found on the wetland, lake, and river habitats of the refuge, primarily during spring and fall migrations. A variety of species has been observed. The most common breeding species include black turnstone, bar-tailed godwit, dunlin, long-billed dowitcher, Pacific golden plover, red-necked phalarope, semipalmated sandpiper, western sandpiper, Wilson's snipe, and whimbrel. Shorebird nest initiation usually peaks in early to mid-May (Wightman et al. 2002). Late August is the peak time for staging shorebirds along the coastal wetlands and mudflats (Moran 2007).



**Map 4-8**  
**Estimated Density of Waterfowl**

- Estimated density (birds per square kilometer)**
- Lowest (0 - 0.62)
  - Low (0.62 - 3.75)
  - Medium (3.75 - 9.43)
  - Highest (9.43 - 352.82)
  - Refuge Boundary
  - Designated Wilderness

0 5 10 15 20 Miles  
 0 6 12 18 24 Kilometers



Prepared for the Division of Realty and Natural Resources, Anchorage, Alaska  
 Current as of: May 24, 2011

Data from interpolation of spring systematic aerial surveys (1996 and 1997) done on wetland areas near the Selawik NWR.

Waterfowl Branch, Migratory Bird Management Division, Region 7, USFWS

(Back of Map 4-8.)

**Gulls.** Documented species of gulls on the refuge include Bonaparte's, mew, herring, Thayer's, slaty-backed, glaucous, Sabine's, ivory, Ross's, and Arctic tern. The most common breeders on the refuge are Arctic terns, glaucous gulls, and mew gulls.

**Raptors.** Seventeen species of raptors have been observed within Selawik refuge; however, only the northern harrier, northern goshawk, short-eared owl, and great horned owl are commonly seen. Bald eagles, sharp-shinned hawks, American kestrels, peregrine falcons, and merlins are considered uncommon summer visitors. Species documented as uncommon residents include northern goshawks, golden eagles, rough-legged hawks, gyrfalcons, and great horned owls (Figure 4-11). Snowy owls are occasionally seen in winter. The northern hawk owl, great gray owl, and boreal owl are resident species but are not often observed. Although not abundant, ospreys can regularly be seen along the banks of the Selawik and Kugurak rivers; stick nests in birches in riparian areas and fledglings indicate that ospreys breed on the refuge.



Figure 4-11. Great horned owls are common in parts of the refuge. Photo by Ben Crosby.

**Passerines.** Fifty passerine species have been identified on the refuge. Common summer residents of the refuge, most of which have been documented as breeders, include alder flycatcher, tree swallow, bank swallow, gray jay, black-capped chickadee, boreal chickadee, gray-cheeked thrush, American robin, varied thrush, yellow wagtail, yellow warbler, American tree sparrow, savannah sparrow, fox sparrow, Lincoln's sparrow, white-crowned sparrow, dark-eyed junco, Lapland longspur, snow bunting, rusty blackbird, and hoary redpoll. Twenty-nine other passerine species are also known to occur in different areas of the refuge.

**Bird Species of Concern.** With the delisting of the peregrine falcon (American subspecies), no federally endangered or threatened bird species breed or regularly occur on the Selawik refuge. State, national, and international lists of species of concern (e.g., American Bird Conservancy 2007) include birds found breeding, migrating through, or visiting the refuge (Appendix H, Table H-6). Eight species appear on at least three of these lists: American peregrine falcon, whimbrel, Hudsonian godwit, bar-tailed godwit, olive-sided flycatcher, blackpoll warbler, rusty blackbird, and yellow-billed loon. Four of the five species profiled at the 2004 Alaska Bird Conference for their declining populations breed on the refuge, namely rusty blackbirds, blackpoll warblers, solitary sandpipers, and olive-sided flycatchers (Hannah 2004; Johnson 2004; McCaffery and Harwood 2004; Wright 2004).

**Bird Conservation Regions.** The North American Bird Conservation Initiative (NABCI) has developed Bird Conservation Regions (BCRs) (U.S. NABCI Committee 2000a; U.S. NABCI Committee 2000b). The BCRs are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues. The refuge falls within BCR 2, Western Alaska Ecoregion, and BCR 4, Northwestern Interior Forest Ecoregion. The increasingly prominent use of BCRs in numerous national plans and initiatives is due to its all-bird, habitat-based ecosystem approach to implementing bird conservation rather than the traditional single species approach to conservation.

**4.3.2.4 Terrestrial Mammals**

Thirty species of land mammals are known or suspected to occur on the Selawik refuge (Appendix H, Table H-7). These include caribou, moose, black and brown bears, and furbearers.

**Caribou.** The Western Arctic Caribou Herd (WACH) ranges across the entire northwest Arctic region (Figure 4-12 and Figure 4-13). The summer range of the herd, including the calving grounds, consists of the western Brooks Range and its northern foothills west of the trans-Alaska pipeline (Dau 2007a). Portions of the Selawik refuge have traditionally been within the heart of the WACH wintering grounds. However, since the mid-1980s, much of the WACH has wintered in the Nulato Hills as far south as the Unalakleet River drainage. Since 1996, much of the WACH has wintered on the eastern half of the Seward Peninsula (Dau 2007a). The refuge continues to be a critical thoroughfare for both spring and fall migration events. The majority of the WACH crosses refuge lands during both the northerly spring migration and southerly fall migration.

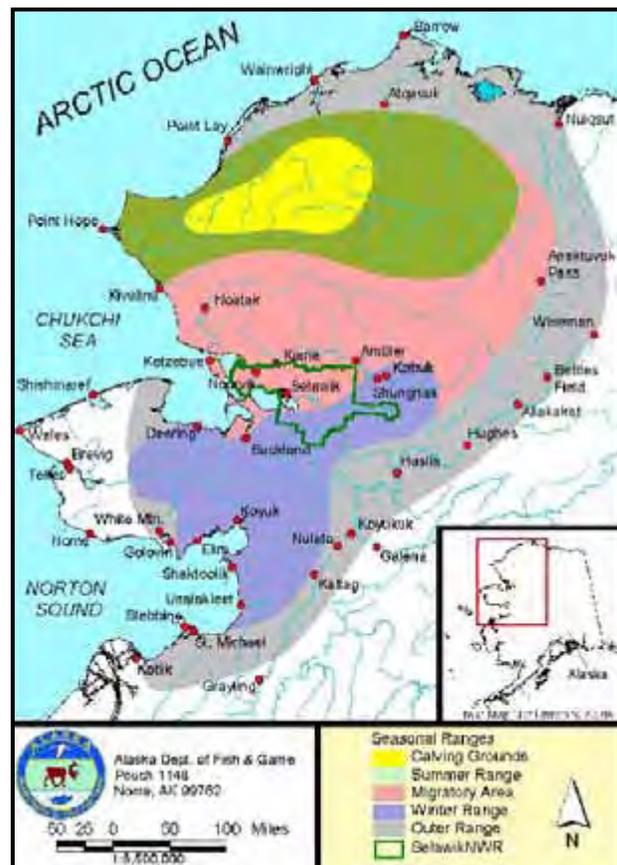


Figure 4-12. Seasonal range for the Western Arctic Caribou Herd (WACH). The WACH migrates through the Selawik refuge each spring and fall.

The WACH experienced a population crash in the 1970s, rapidly declining from approximately 242,000 individuals in 1970 to 75,000 individuals in 1976 (Dau 2007a). The herd rebounded, reaching a population apex of approximately 490,000 individuals in 2003 (Dau 2007a). The 2007 estimate revealed a 23 percent decline to 377,000 individuals (Dau 2007a). Declines in lichen cover within the core winter range (Joly et al. 2007) and/or severe icing events that made it difficult for the herd to find food (Dau 2005; Dau 2007a; GMU 23 Working Group 2010) are likely contributors to the decline. The 2009 census estimated the herd at 348,000 animals, which points to a continued modest decline in the size of the herd (ADF&G 2011).

Section 302(7) (B) of ANILCA directs the Service to conserve the WACH in its natural diversity, including participation in coordinated ecological studies and management of these caribou. The Service is also required to maintain opportunities for subsistence use of caribou. The WACH is an important subsistence resource for many villages whose residents harvest more than 10,000 animals annually from the herd (Dau 2007a). The refuge continues to support a satellite-collaring project sponsored by the State of Alaska to monitor the herd's migration (Dau 2007a). The refuge also supports wintering caribou habitat research.



Figure 4-13. Animals in the Western Arctic Caribou Herd cross numerous rivers in the region during fall migration movements. Photo by Chris Zimmerman.

**Moose.** Since the 1950s, moose have expanded their range from interior regions of Alaska to the Selawik valley in northwest Alaska (Hall 1972; Coady 1980). The expansion of moose into the region has added a new dimension to the already diverse ecosystem and provided a new species for subsistence hunting and for economic opportunities for local outfitters, hunting guides, and air transporters.

Although data are limited, moose populations appear to be relatively stable on Selawik refuge (Figure 4-14). Beginning in 2007, population surveys were expanded to include the entire refuge rather than only the Tagagawik River drainage. Relative to moose abundance in other parts of the region, moose numbers are high in the western, southern, and eastern portions of the Selawik refuge and low in the remainder of the refuge. The Kobuk River delta, Tagagawik River, and upper Selawik River are occupied by a large number of moose year-round. This is especially the case in winter and late spring when moose move into dense riparian habitat as snow depth increases at higher elevations and access to browse becomes difficult.

Despite the expansion of moose into the region, no comprehensive large-scale investigations of moose habitat have occurred within the refuge. However, a winter moose browse study was

completed as part of an academic research thesis (Campa 2008). Campa (2008) quantified browsing intensity, browse availability, stand composition, and stand structure to determine potential effects of moose herbivory. Campa (2008) identified five vegetation classes important to moose in refuge uplands and nine classes in riparian areas. Species with the most browsing intensity and greatest importance for moose are bebb willow, little tree willow, diamond leaf willow, and felt leaf willow (Campa 2008).

This study modeled the potential impacts of moose browsing on the successional trajectories of riparian plant communities on the refuge using browse utilization, vegetation composition, and structure data. From this analysis, Campa (2008) concluded that the addition of moose browsing pressure on riparian plant communities measurably changed successional patterns to favor production of browse species that are relatively less preferred by moose.

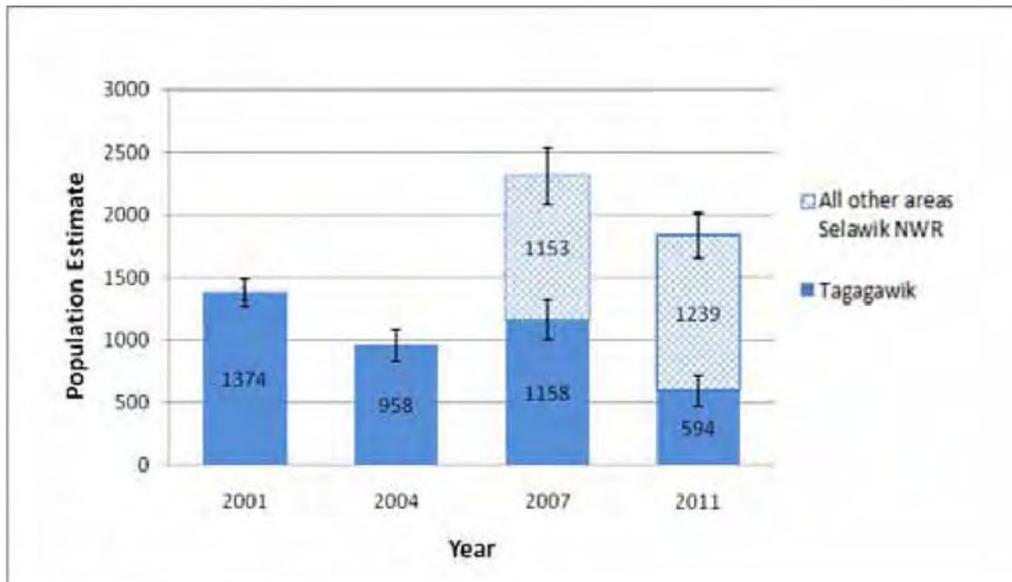


Figure 4-14. Spring moose population estimates for surveys conducted within the Selawik River drainages, 2001-2011, with 80 percent confidence interval (CI). Gasaway et al (1986) survey method was used in 2001 and 2004; GeoSpatial Population Estimator (DeLong 2006) was used in 2007 and 2011. Deteriorating snow conditions likely caused an underestimate in 2004.

Moose within the Selawik refuge are hunted by independent hunters and by big game guides and transporters who provide services to mostly non-local resident and non-resident hunters. In Game Management Unit 23 (GMU 23), moose harvests by non-local hunters have remained fairly stable during the past nine years (Dau 2004). In the Selawik River drainage, moose harvests by non-local hunters slowly increased since 1993, peaked in 2002, and then stabilized to current levels (Figure 4-15).

Moose are an important food source for subsistence hunters from the local villages of Selawik, Noorvik, Buckland, and Kotzebue. Federal subsistence moose harvest regulations have remained fairly consistent over the past decade in GMU 23 (including the Selawik refuge), while State of Alaska moose hunting regulations have gradually become more restrictive.

In a 2006 household survey, Selawik residents reported taking 46 moose during a 12-month period (ADF&G 2009a). Most of these were bulls harvested in August and September. Although not well documented, it is believed that subsistence harvest of moose by Selawik residents primarily takes place along the Selawik River below its confluence with the Tagagawik River and within the Selawik River delta. The harvest rate for moose on the lower Selawik River might be high for the

estimated moose population in the area. However, significant gaps remain in our knowledge of moose on the refuge. For instance, it is not known how moose distribution and population in the spring compare to the fall, when the majority of harvest occurs. Documentation of subsistence harvest areas for moose would be a useful contribution to moose management.

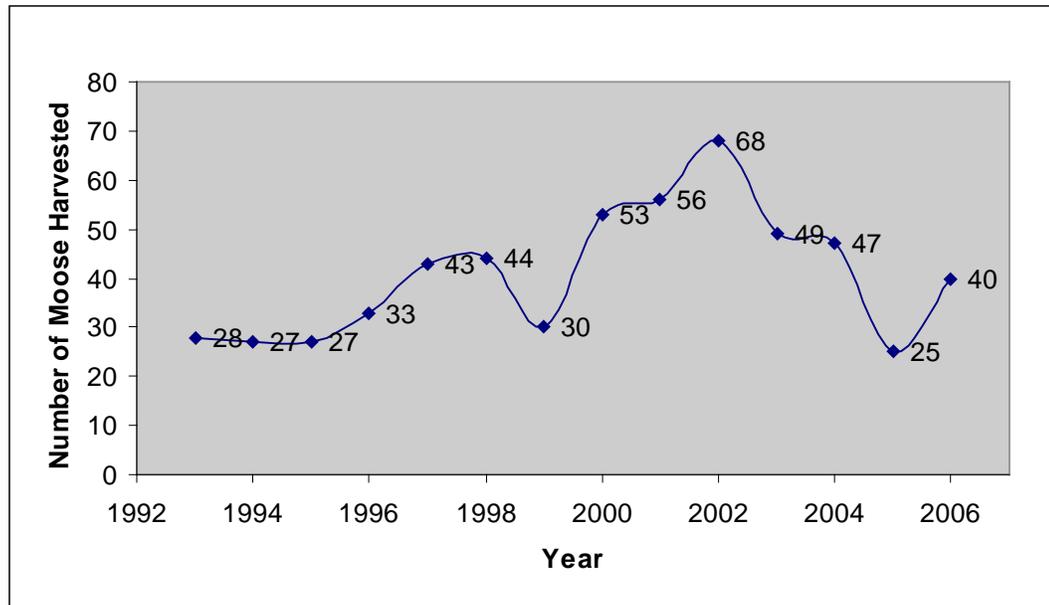


Figure 4-15. Moose harvested by non-local hunters in the Selawik River drainage from 1993–2006 based on State harvest ticket data.

**Muskoxen.** Indigenous to northwest Alaska, muskoxen were at one time prolific until they disappeared for unknown reasons during the 19th century. Two muskoxen populations currently inhabit the northwest Arctic region: one to the south on the Seward Peninsula and the other to the north from the Noatak River mouth to past Point Hope (Dau 2007b). Both populations are the result of translocation projects from Nunivak Island, Alaska, that occurred from 1970–1981 (Dau 2007b).

Muskoxen have been absent from the Selawik refuge for most of the 20th century. However, muskoxen have been observed in the Nulato Hills near the southern boundary of the refuge as early as 2004, and two bulls were observed near the village of Selawik in 2008. Most groups of muskoxen observed outside the core Seward Peninsula and Cape Thompson populations are composed of small groups of one to four individuals, mostly bulls (Dau 2007b). The Nulato Hills muskoxen groups observed in recent years near the refuge boundary are mixed sex-age groups, most likely the same animals year after year. These muskoxen likely emigrated from the Seward Peninsula population.

**Bears.** Both brown bear and black bear inhabit refuge lands, but little is known about their population trends. Black bear are known to den on the refuge in lake banks and slopes in the Selawik flats and Waring Mountains. Brown bear den throughout the refuge, including the Selawik Hills.

**Wolves.** Wolves are historically common throughout the refuge and are usually harvested incidentally to other subsistence activities (Figure 4-16). Ballard (1993) captured and affixed radio collars to 86 wolves from 1987–1992 in an area representing the core winter range of the Western Arctic Caribou Herd at that time (i.e., eastern half of Kobuk Valley National Park,

## Chapter 4: Refuge Environments

eastern two-thirds of Selawik refuge, and northern portion of Koyukuk Refuge). Wolf packs were found to maintain year-round resident territories averaging 1,410 square miles (3,652 square kilometers) and usually did not follow migratory caribou (Ballard 1993). Wolf packs on the refuge had home ranges that extended off the refuge, and most wolves that denned on the refuge tended to follow caribou south in the winter (Ballard 1993). Rabies was a significant natural limiting factor in wolf populations in northwest Alaska, but hunting was the main cause of wolf mortality (Ballard 1993). Ballard (1993) estimated this wolf population could sustain mortality rates of about 53 percent annually.

The primary prey bases for wolves on the refuge are caribou (50 percent) and moose (42 percent) (Ballard 1993). When present, caribou were the principal prey for wolves. However, when caribou were scarce, wolves shifted their diets to moose (Ballard 1993). Ballard (1993) estimated wolf densities (in relation to available ungulate biomass) in northwest Alaska to be low (1.5 to 6.6 wolves per 386 square miles). Wolf densities increased from 1987 to 1990, and then declined in the early 1990s in response to rabies and to harvest by humans (Ballard 1993). Current information on the refuge's wolf population is lacking.



Figure 4-16. Wolves were fairly common on the Selawik refuge in 2010, especially in the hills and along the upper river. Photo by Chris Zimmerman.

***Wolverine.*** Wolverines are historically common throughout the refuge. Wolverines are usually taken incidentally to other subsistence activities.

***Lynx.*** Lynx are present on the refuge. Lynx numbers are believed to fluctuate with hare population cycles. Lynx are found in the lower Selawik lowland habitats as well as surrounding upland habitats.

***Beaver.*** Beavers are a relatively recent arrival to the Kotzebue Sound region, first moving into the Kobuk, Shungnak, and Selawik areas in the 1950s and subsequently spreading westward, according to local residents. Beaver skins are not highly valuable on the commercial market at this time, and consequently, only a small number are harvested each year, mainly for subsistence use. A 2006 harvest survey in Selawik showed a harvest of 113 beavers over a 12-month period with 17 percent of Selawik households harvesting this animal (ADF&G 2009a).

The Selawik River receives heavy seasonal use by local residents for subsistence activities (hunting, fishing, and gathering), with numerous permanent subsistence camps scattered along

the river. Beavers are presently at historically high densities within the Selawik River drainage, having increased in most of the stream and lake systems in the area. The increase in beaver abundance has raised concerns with local residents about the potential impacts of beaver activity on water quality and fisheries resources on the refuge, indicating a need for additional research and communication on this issue between local residents and refuge staff.

**Furbearers.** Arctic fox are found only rarely on the treeless coastal habitats of the refuge. Red fox are common in tundra brush and forested areas of the refuge. Furbearers associated with wetland habitats are common throughout the refuge. Muskrat, mink, and river otters use the extensive rivers, lakes, and streams of the entire Selawik drainage. Short-tailed and least weasels can be found in various habitat types throughout the refuge. In the late 1940s and early 1950s, beaver moved into the upper Selawik drainages and then began colonizing the lower portions of the system. According to local trappers, fewer muskrats are found in areas where beaver have become established. The exact nature of the species interactions is unknown.

**Small Mammals.** Small mammals, which provide an important base for the food chain, occur throughout the refuge in large numbers. These include arctic shrew, masked shrew, dusky shrew, red-backed vole, tundra vole, singing vole, brown lemming, collared lemming, arctic ground squirrel, red squirrel, arctic (tundra) hare, and snowshoe hare.

#### **4.3.2.5 Marine Mammals**

Estuarine coastal areas of Hotham Inlet provide suitable habitats for several marine mammal species during both the ice-free and ice-covered seasons. Spotted seals, young bearded seals, and beluga whales are the most common inhabitants of the waters adjacent to the refuge. Spotted seals often follow chum salmon runs up the Kobuk and Noatak rivers. Ringed seals, bearded seals, and beluga whales are commonly seen in Kotzebue Sound, 20 miles west of the refuge. In 1985, a lone beluga whale was taken by residents of Selawik nearly 60 miles up the Selawik River. In 1987, several belugas were seen in the Selawik River, but none were harvested. Beluga whales are occasionally seen in Hotham Inlet and infrequently in Selawik Lake. In 2006, a lone walrus was harvested near the village of Noorvik about 30 miles up the Kobuk River, a highly unusual event. A lone polar bear was harvested in the village of Noorvik in the winter of 2007. Polar bears are rare but not unheard of visitors to the refuge; elders in Selawik recall sightings of them on a handful of occasions during their lifetimes. A complete list of marine mammals occurring on and adjacent to the refuge is provided in Appendix H, Table H-8.

#### **4.3.2.6 Sensitive Wildlife**

There are no threatened or endangered plants or animals listed by the Federal government on Selawik refuge lands. The American race of the peregrine falcon was removed from the endangered species list (USFWS 1999) but remains a species of concern. Peregrine falcons are known to nest along rivers to the north and south of the refuge. Although peregrines have not been documented nesting within Selawik refuge, observations suggest that small numbers are present during migration.

The polar bear was classified threatened under the Endangered Species Act (USFWS 2008). Polar bears occupy the Chukchi Sea west and northwest of Kotzebue. Polar bear sightings are rare on the refuge but have been documented. In 2010, critical habitat for polar bears was designated along much of northern coastal Alaska, including several barrier islands and spits near the mouth of Selawik River. Much of Alaska's sea ice environment was also included in the critical habitat designation (USFWS 2011).

### **4.3.3 Concerns Regarding Fish, Wildlife, and Habitats**

#### ***4.3.3.1 Energy and Mineral Development***

Interest in energy and resource development remains high in the region. Potential concerns for fish and wildlife related to these activities include fuel spills, noise and dust, loss or fragmentation of habitat from road building and staging areas in support of development activities, and degradation of water quality and fish habitat from increased turbidity or contamination of waterways.

#### ***4.3.3.2 Transportation***

Regional transportation needs are the focus of considerable discussion and planning. Recent proposals include roads linking Kotzebue, Noorvik, Kiana, and Selawik; a road from interior Alaska or Nome to mineral districts in the region; and local roads to gravel extraction sites or to meet other development needs. The impact of roads on fish, wildlife, and habitat has two stages: the initial, short-term construction phase and the longer-term use phase. The construction phase can lead to noise and dust, fuel spills, degradation of water quality and fish habitat from increased turbidity or contamination of waterways, loss of habitat, and disturbance of wildlife. The use phase can lead to fragmented habitats, disruption of migration patterns, increased pressure on fish and wildlife resources, noise and dust, and increased social conflicts.

In Arctic tundra areas, ice roads can provide temporary transport of goods and materials during the winter months when the surface is frozen and snow-covered. Ice road construction and use has potential to damage wildlife habitat, depending on where and how much water is taken from nearby sources such as lakes and ponds to produce the ice needed for overland road construction. Ice road failure can also substantially damage the tundra habitat.

#### ***4.3.3.3 Land Development Adjacent to the Refuge***

Private lands within and adjacent to the Selawik refuge have the potential to be developed for residential, mineral, energy, telecommunications, and recreational access. These developments may lead to fragmented habitats, degraded water quality, reduced in-stream flows, altered water tables, increased pressure on fishery and wildlife resources, and increased conflicts with local subsistence activities. Coordinated planning efforts among agencies and private landowners will help decrease inconsistencies.

#### ***4.3.3.4 Climate Change***

Scientific evidence confirms that the earth is undergoing a change in climate. Average Northern Hemisphere temperatures are likely higher now than in at least the past 1,300 years (IPCC 2007). Average arctic temperatures have increased at almost twice the global average rate in the past 100 years (IPCC 2007). A contributor to more pronounced warming at northern latitudes is ice-albedo feedback, when areas previously covered by highly reflective ice and snow are replaced by a darker surface (ocean or land) that absorbs more of the sun's energy, which leads to more warming and more melting—a positive feedback (Winton 2006). Many of the changes observed in the arctic system started or accelerated in the mid-1970s (Hinzman et al. 2005).

The documented and projected changes in northern Alaska as a result of a warming climate affect nearly every aspect of the environment. Evidence to date points to less predictable weather, thawing permafrost, increased thermokarst events, increased coastal erosion, more groundwater flow, earlier break-up and delayed freeze-up, increased water temperature and alkalinity of lakes, decline in soil moisture, earlier snowmelt, increased shrub cover, longer growing season, diminishing sea ice, and advancing tree line (Hinzman et al. 2005). These changes may lead to impacts on fish,

wildlife, and habitats, including increased mortality, increased sediment in rivers, changes in water chemistry and river flow, a longer open water season, changes in aquatic ecology, changes in vegetation, increased insect activity, and increased nesting periods and range extensions for birds (Hinzman et al. 2005). In short, the arctic system, as we currently know it, will likely be very different in the future. Whether and how plants and animals might adapt to and survive these changes is difficult to predict for most species.

Climate change research also predicts that Alaska's northern region will experience a decline in wetlands, an increased fire frequency and intensity, shifts in the distribution and composition of plant communities, changes in the ranges and breeding behavior of wildlife species, increased likelihood for invasive plant establishment, and increased possibility of wildlife disease and insect outbreaks (Karl et al. 2009; The Wilderness Society and SNAP 2009). These changes in habitat and wildlife will, in turn, affect human activities, including subsistence patterns of the local Iñupiat and commercial development such as arctic shipping, tourism, fishing, and resource extraction. These human activities could also have profound effects on fish, wildlife, and their habitats.

Changes in wetlands are of particular concern due to their extent on the Selawik refuge, contribution to biodiversity, and importance to numerous fish and wildlife species. Arctic Alaska receives relatively little precipitation, and the abundant wetlands result largely from short summers with low evapotranspiration and an impermeable permafrost layer, which prevents infiltration and impedes drainage of the upper unfrozen layer. Climate change has already caused noticeable widespread warming and thawing of permafrost (IPCC 2007) and increased evapotranspiration, resulting in shallower, more nutrient-rich wetlands (Rouse et al. 1997; Klein et al. 2005; Smith et al. 2005).

#### **4.3.3.5 Invasive Species**

Exotic invasive plant and animal species have been reported and documented in Alaska (e.g., Hébert 2001; McClory and Gotthardt 2008). Most exotic invasive plants occur in and adjacent to the major population centers in the southeast, south central, and interior regions of the State or are distributed along the ferry, road, and railway systems (AKEPIC 2005). Dandelion (*Taraxacum officinale*) and pineapple weed (*Matricaria discoidea*) are two non-native invasive plant species that have been reported growing in the City of Kotzebue (AKEPIC 2005), which is located 21 miles west of the Selawik refuge boundary.

The effects of accelerating climate change and future development of natural resources or transportation and utility corridors in northwest Alaska could increase the risk of invasion by non-native species. Invasive plants tend to colonize disturbed sites. Fires near villages or travel corridors can increase the amount of disturbed acreage for invasive plants to colonize. Visitors to the refuge may inadvertently introduce or spread invasive plant species or animals to refuge lands via their clothing, foot wear, and recreational gear or equipment. Non-native mammals, birds, or insects may expand their ranges across refuge boundaries as vegetation, temperature, and precipitation change.

To date, no non-native invasive plant or animal species have been identified or reported on lands or waters within the exterior boundary of the refuge. It is possible that a small number of non-native invasive plants occur, or will be identified in the future, on lands within local communities or other modified or developed sites, potentially threatening refuge lands. The presence of non-native invasive species on the Selawik refuge is not compatible with the purposes of the refuge, and control and management of such species would be required by Service policies (Chapter 3, Section 3.3.12.8).

## **4.4 Human Environment**

### **4.4.1 Area History**

#### ***4.4.1.1 Prehistory***

The prehistory of northwest Alaska is a series of cultural traditions, each representing a distinct lifeway, archeologically evident by broadly similar sets of artifact assemblages (Giddings 1952; Giddings 1964; Giddings and Anderson 1986; Anderson 1984; Dumond 1984). One of the most important research themes in Alaska is the entry of humans into the New World. A second theme, increasingly important after World War II, is the understanding of the “origins” of Eskimo peoples and culture.

Although most of the known archaeological sites from the Selawik area are of comparatively recent origin (within the past two centuries), nearby sites such as Onion Portage on the Kobuk River, Trail Creek Caves on the Seward Peninsula, and the Nogahabara Sand Dunes on the Koyukuk Refuge date to as old as 13,000 years ago (Odess and Rasic 2007; Anderson 1968; Anderson 1984). Extensive research by the National Park Service at Cape Krusenstern and Bering Land Bridge national monuments, Gates of the Arctic National Park, and Noatak National Preserve, as well as Anderson’s early work on the Selawik refuge, documents a rich cultural history into the 20th century. The prehistory of the Selawik River is likely to share extensive parallels to these areas. Circumstantial evidence indicates that people have been living along the Selawik River since the end of the last glacial period about 12,000 years ago (Anderson and Anderson 1977).

In the earliest period from perhaps 13,000 to 8,000 years ago, the area of the Selawik refuge was presumably occupied by people of the American Paleoarctic tradition. This widespread and well-documented tradition featured items such as microblades, large cores with steeply angled platforms, bifacial implements, some classes of cutting tools called burins, and few or no specialized projectile points (Dumond 1984; Anderson 1984; Odess and Rasic 2007). In northern Alaska, microblades were inset into the sides of bone dart and spear heads. The people of this tradition were probably full-time tundra hunters of the large herd animals that were typical at the end of the Pleistocene (Anderson 1984). This tradition shows clear relationships to the Ushki and Ul'khum sites of Kamchatka and Chukotka, the Duiktai Complex of Siberia, and more distant sites in Japan, northeastern China, and Mongolia (Mochanov 1973). Paleoarctic materials have been found in the Nenana River valley, at Aishihik Lake in western Canada, and at Groundhog Bay, Hidden Falls, and Chuck Lake in Southeast Alaska.

Reinterpretation of data from the Mesa Site of the North Slope suggests a different group of people, called Northern Paleoindian and related to Agate Basin and Hell Gap big game hunting traditions of mid-continent North America, followed periglacial environments northward as the glaciers retreated. The Mesa Site dates between 10,300 and 11,500 years ago. Most of the fluted points found in Alaska lack clear dates and cultural context. The relationship of Northern Paleoindian to the rest of Alaska’s cultural history and development is unclear. Some researchers see the Nenana Complex of central Alaska as having links to these Paleoindian traditions (Kunz 1982; Kunz and Reanier 1994).

The next tradition found in northern Alaska is the Northern Archaic tradition (about 6,600 to 4,200 years ago), during which the cultures of the northwest Arctic began to resemble those from the North American boreal forests (Anderson 1984). The people of this era incorporated fishing into their activities, as well as taiga and tundra hunting. The tool kits of these people included a variety of notched, stemmed, and lanceolate projectile points, large bifacial knives,

end scrapers, notched pebble net sinkers, and microblades made from large cores. Similar assemblages are found in other areas of North America rather than in Asia, leading to the presumption that this era reflected the northward movement of southern hunters following the final end of glaciation and the northward expansion of the boreal forests (Dumond 1984). The Northern Archaic is often seen as the arrival of an intrusive group around 6,000 years ago. However, the remains are sometimes found with the microblades and cores of the Paleoarctic and Arctic Small Tool traditions and the Nogahabara assemblage, showing evidence of continuity of occupation and use between the Northern Archaic and other traditions (Dumond 1984; Anderson 1984).

Following the Northern Archaic was the period of the Arctic Small Tool tradition, beginning with the Denbigh Flint complex perhaps 4,200 years ago (Giddings 1964). This tradition encompasses the development of the earliest known sea mammal hunters in northwest Alaska (Giddings and Anderson 1986). The people of this tradition were Eskimo-like in subsistence patterns, equally at home on the coast and in the interior, but substantially different in artifact styles (Giddings and Anderson 1986). All the phases are generally characterized by tiny, finely made stone tools, including delicately chipped end- and side-blades, burins, microblades, and the less common polished adze blades and burin-like grooving tools (Irving 1964; Dumond 1984).

Disagreement exists over the subsequent course of the Arctic Small Tool tradition after about 3,000 years ago. Many investigators (Anderson 1984; Giddings and Anderson 1986; Irving 1964) see a number of phases, including Choris, Norton, and Ipiutak, following the Denbigh Flint complex. A strong thread of cultural continuity indicates such a connection. Other researchers (Dumond 1984) see a hiatus following Denbigh, with a shift to the Norton tradition. In this scenario, in northern Alaska, the early phase of the Norton tradition is called Choris. Ipiutak is a later, localized variant of the widespread Norton tradition. The tradition is distinguished by the appearance of pottery, derived from Asian antecedents, that is fiber-tempered and linear or check-stamped. Microblade use diminishes, projectile points are larger with more lanceolate forms, burins change form, and oil lamps and slate tools appear. Settlements change to large coastal communities, reflecting an increased reliance on sea mammal hunting for subsistence.

The Norton tradition persisted until around 1,000 AD, when it was superseded by the Ipiutak culture (Larsen and Rainey 1948; Anderson 1984). Ipiutak lacked pottery, ground slate, and oil lamps, but otherwise maintained a technological continuity with Norton. With the Ipiutak phase, typified at Point Hope, lavish burials, elaborate Asian-influenced art and the earliest use of iron in arctic Alaska make their appearance (Anderson 1984). Point Hope (Larsen and Rainey 1948) contains hundreds of permanent houses and lavish burials. Ipiutak sites have been found in the Brooks Range, along the Noatak River, in the Gates of the Arctic National Park, and along the coast as far south as Kotzebue. Ipiutak lasted from around 2,000 years ago until about 800 AD. Some archeologists regard the people of this tradition as ancestral to present-day Eskimos.

The final prehistoric phase in the Selawik area has been defined as the Northern Maritime tradition, beginning about 1,400 years ago to the present. This tradition encompasses the development of Eskimo culture in northwest Alaska as it was first encountered historically (Giddings and Anderson 1986). People of this tradition in the Selawik vicinity fully utilized a broad range of resources, following a seasonal round throughout the area to maximize the availability of foods of all types.

The earliest cultures of this tradition, Okvik and Old Bering Sea, were found in Siberia, on St. Lawrence Island, and on other islands of the Bering Strait. The assemblages typically contain polished slate, fiber-tempered pottery, and toggling harpoon heads of bone or ivory. The

elaborate art of carved ivory objects differs from Ipiutak. About 1,500 years ago, these cultures evolved into the Punuk and then Birnirk cultures on both sides of the Bering Strait.

Late Ipiutak was contemporaneous with Birnirk until 1,200 years ago. Originally, Birnirk focused on seals and caribou. Around 800 AD, whaling harpoons appeared. Birnirk gave rise to the classic Thule lifeway of winter ice hunting, kayak and *umiaq* open sea hunting, dogs and dog sleds, and settlement in large villages focused on whale hunting.

### 4.4.1.2 Ethnography

The Selawik refuge lies within the homeland of the Iñupiat, one of three Eskimo cultural groups in Alaska. To the southeast, the refuge borders the traditional territory of the Koyukon Athabascans. Contacts between the two groups took place via the Tagagawik River. The Iñupiat of the Tagagawik River were specialists in trade between the Selawik and Koyukuk during much of the 19th century (Burch 1998).

At the time of European contact, the *Siilviñmiut*, or people of the Selawik drainage, comprised two distinct nations: the *Kiitaaġmiut* of the lower river, Inland Lake, portions of Selawik Lake, and surrounding areas; and the *Siilviim Kañianiġmiut* of the upper Selawik River, Tagagawik River, and surrounding areas (Burch 1998). The name *Kiitaaġmiut* appropriately means “people down below,” while *Siilviim Kañianiġmiut* means “people of the headwaters portion of sheefish country.” People in each nation were linked by kinship, a sense of belonging, and a similar way of life. The upriver area was distinguished “... by a greater number and variety of terrestrial fur-bearing animals and conditions that allowed a longer winter ice fishing season, whereas the lower area had better conditions for spring ice fishing, carried out at Selawik Lake, and a greater accessibility to the coast and its late spring and summer resources” (Anderson and Anderson 1977).

Burch (1998) estimated the early 19th century population of the *Kiitaaġmiut* at about 700 people scattered in 27 winter settlements and described it as “the most widely dispersed of any people in northwest Alaska.” The population of the *Siilviim Kañianiġmiut* was an estimated 570 people in 24 small winter settlements. Taken together, the Selawik River area contained the largest population in the region at that time. Winter settlements consisted of several types of substantial and relatively permanent houses with associated caches for storage of food and belongings. Spring and summer camps tended to be less substantial, with skin tents or dome-shaped willow-frame shelters covered in grass or moss. Other structures, such as fish-drying racks, were also present.

In the late 1800s, the *Kiitaaġmiut* and the *Siilviim Kañianiġmiut* followed similar yet somewhat different yearly cycles. Break-up in the spring was spent in small dispersed settlements hunting waterfowl and muskrats, followed by fishing with gillnets. In summer, some families traveled to Sisualik on the coast near Kotzebue for an annual trade fair, while remaining families fished; hunted belugas (*Kiitaaġmiut* only), molting waterfowl, and caribou; and gathered greens and berries. Fishing, waterfowl hunting, and picking berries continued to be important until freeze-up in the fall. Before or soon after freeze-up, families located themselves at their winter homes, often at the same location as the previous year. The winter months were spent fishing through the ice, snaring small game, hunting caribou, trapping, and feasting and socializing.

A combination of factors led to a dramatic population decline of these two Iñupiaq nations in the latter decades of the 19th century, including changes in the availability of caribou, emigration, disease, and famine.

### 4.4.1.3 History

Although the Russian Lieutenant Zagoskin learned of the existence of the Selawik River while in the Norton Sound community of St. Michael in 1842–1843, the first European to actually enter the Selawik River drainage was the surgeon John Simpson of the British ship HMS Plover in May 1851. Impending break-up prevented him from extensive exploration. He was followed in 1883 by Johan Adrian Jacobsen, a Dane employed by The Royal Museum in Berlin, and Henry D. Woolfe, a representative of the Alaska Commercial Company. Jacobsen was interested in purchasing artifacts, while Woolfe was interested in furs. Jacobsen explored essentially the same country visited by Simpson (Burch 1998).

In August 1884, the American John C. Cantwell of the U.S. Revenue Cutter Service surveyed Selawik Lake, Tuklomarak and Fox rivers, Inland Lake, and the lower Selawik River. Shortly thereafter, J. L. Purcell of George Stoney's second U.S. Navy expedition similarly explored Selawik Lake and Tuklomarak and Fox rivers. The survey of the lower Selawik area was completed by Stoney in the summer of 1886 (Burch 1998).

Despite these initial explorations, the river was largely ignored by westerners until the turn of the 20th century when a few prospectors entered the area, most of whom proved unsuccessful.

The modern village of Selawik was founded in 1908 on a site "... selected by some influential *Silviimiut* on the basis of its proximity to good winter and summer fish netting sites, the presence of alder for firewood, and its proximity to Kotzebue, the supply center" (Anderson and Anderson 1977). Census records from 1900 place the Selawik River population at 367 people. Many of the *Kiitaagmiut* and *Silviim Kajianigmiut* moved to the village from their small settlements shortly after its establishment to take advantage of the presence of the school and church. However, most families continued to use seasonal camps, spending only the winters in the village. Until about 1940, the village was essentially empty of people during the spring and summer months. In the early decades of the 20th century, fur prices were high, and trapping provided the principal source of cash for many Selawik residents. For this reason, some of the *Silviim Kajianigmiut*, in particular, continued to live upriver in winter to remain close to good trapping areas. Some families wintered in upriver areas as late as 1955 (Anderson and Anderson 1977).

Reindeer herding played a significant role in Selawik's history throughout much of the 20th century, as it did in many other villages in the region. Early reindeer herds were established at Kotzebue in 1901 and Selawik in 1909 (Stern et al. 1980). Except for a few years in the early 1940s, Selawik residents were actively involved in herding activities until 1970 when the expanding Western Arctic Caribou Herd absorbed the loosely herded reindeer (Stern et al. 1980). Only a few reindeer remained in the Selawik River area east of Selawik Lake after 1970 (Connery 1983).

A new reindeer operation sponsored by NANA Regional Corporation began in 1974 when 900 animals from BIA were brought to the Baldwin Peninsula from Nome. This herd expanded to 9,000 over six years. The goal was 33,000 animals in 11 sub-herds centered in the Buckland River drainage. To prevent the loss of reindeer to migrating caribou, NANA moved the reindeer from the Baldwin Peninsula to the Candle area in fall. When caribou moved north to their calving grounds in spring, NANA herded the reindeer back to the Baldwin Peninsula for summer.

The last permit to allow reindeer grazing on lands that eventually became the Selawik refuge was issued in 1963 to Lawrence Gray and George Keats for 10 years and later reauthorized for another two years (until 1975) (U.S. Department of Interior 1970; Connery 1983). This permit was officially transferred to NANA in December 1976 with lands that today are refuge lands excluded from the grazing area.

### 4.4.1.4 Historic and Cultural Sites

Archeological investigations of portions of the Selawik River drainage were carried out by Douglas and Wann Anderson (1977) of Brown University from 1968 to 1977, prior to establishment of the refuge. The 1968 archeological surveys focused on the middle Selawik and lower Kugarak rivers and the 1969 survey on the lower Selawik River and Selawik Lake. In 1976, Anderson spent a week surveying the lower Tagagawik River. The following year, he conducted archeological surveys of the upper Kugarak River, the Kuutchiaq, and the Waring Mountain foothills in the upper Kugarak and Fish River regions. Anderson had intended but was unable to survey the lake region south of the middle Selawik River. Additional archeological surveys on the refuge have not taken place in the past 30 or more years.

In their work, Anderson and Anderson (1977) documented 76 archeological sites on what is now the refuge. At present, 26 sites on the Selawik refuge are listed on the Alaska Heritage Resource Survey. Undoubtedly, many other sites remain to be discovered and recorded. None of the known sites have been evaluated for their eligibility for the National Register of Historic Places, although most undoubtedly are eligible for such inclusion.

The presumed earliest archeological remains identified by Anderson were found at three sites in the western Rabbit Mountains, where a chipping station, rock-lined hearth, and an obsidian flake were found. Ancient sites are scarce, largely due to a lack of survey effort but also because few people lived in these areas and because interior riparian sites were likely to be eroded away or buried as the river changed course over time (Anderson 1968). Promising sites in interior locations are likely to be found only where the ground is elevated and dry.

Most of the recorded archeological sites in the Selawik valley date to the historic post-1700s period in Alaska. Anderson excavated a house ruin in the City of Selawik dating to the early 19th century and a house pit along Fox River dating to the early 20th century (Anderson and Anderson 1977).

Anderson and Anderson (1977) produced a description of settlement types found in the Selawik area that can help predict the location of additional sites from the recent period. These sites are commonly found where sluggish streams draining lakes enter the major rivers through V-shaped notches in the river banks. According to Anderson and Anderson (1977), “the remains of former campsites and dwellings are so common at these spots that an archeologist can expect to find a site wherever one of these ‘nicks’ in the river banks occurs.” Older sites, more deeply buried or located further from present watercourses, are harder to identify.

In 1977, Anderson and Anderson prioritized a list of sites in the Selawik drainage for investigation. The highest priority was for important sites threatened by erosion, including four in imminent danger of destruction at that time and six in the process of eroding. Other priorities included prime sites for potentially establishing the region’s chronological cultural sequence, including *Kahuk* (the only high hill in the delta area), *Upingivik* (stable high bluffs along the middle Selawik River), and *Narvappaat* (a large winter settlement site near the mouth of Kugarak River). These sites are located on a mix of allotments and Federal public lands. Anderson and Anderson (1977) also presented a research plan for future archeological work in the Selawik River drainage. Very little monitoring or investigations of cultural sites have occurred on the refuge since their work.

Anderson and Anderson (1977) documented 260 Iñupiaq place names in the lower Selawik valley, encompassing only a portion of the place names used by local indigenous people. In the early 1990s, NANA Regional Corporation sponsored additional research in Selawik, Noorvik, Kiana, and other villages in the region, carried out by Selawik resident Hannah Loon. In this work,

more than 160 place names were recorded for Selawik, a similar number for Noorvik, and 140 for Kiana. Earlier place names research was conducted in the 1970s in the Kobuk River communities (Anderson et al. 1998). Burch (1998) provides Iñupiaq place names for many natural features and former settlements in northwest Alaska. A few examples of the hundreds of Iñupiaq place names in the refuge area are listed in Table 4-7 and shown in Map 4-9.

Table 4-7. Iñupiaq place names for select features and sites on Selawik Refuge.

Iñupiaq Name	English Name on USGS Map	Notes
Aliqataaǵiaq	Olikatuk Channel	
Attiniq	Attiniuk Point	
Avalliq	Melvin Channel	
Iggiaq	Throat River	
Ikaaǵiaq		Old settlement and contemporary camp
Ikkuiyiq	Fish River	
Imaǵraitchiaq	Inland Lake	
Iñǵisugruk	Purcell Mountain	
Kiglavaitch	Hockley Hills	
Kuugruaq	Kugarak River	
Kuuquqpaat	Kokopuk Creek	
Kuutchiaq	Kawichiark River	
Napaaqtulik	Mangoak River	
Napaaqtulik	Oblaron Creek	
Niliq		Old settlement and trading post; Figure 4-17
Paniqsiǵvik		Shelter cabin and trail crossing of Kugarak River
Qakkivik	Hunt Creek	
Sauniqtuuq	Shoniktok Point	
Tagraǵvik	Tagagawik River	
Ukallit Iñǵii		Rabbit Mountain (major landmark between Selawik and Ambler/Shungnak)
Unaaqtaaq		Selawik Hot Springs
Uvlasraun		Traditional and contemporary camp



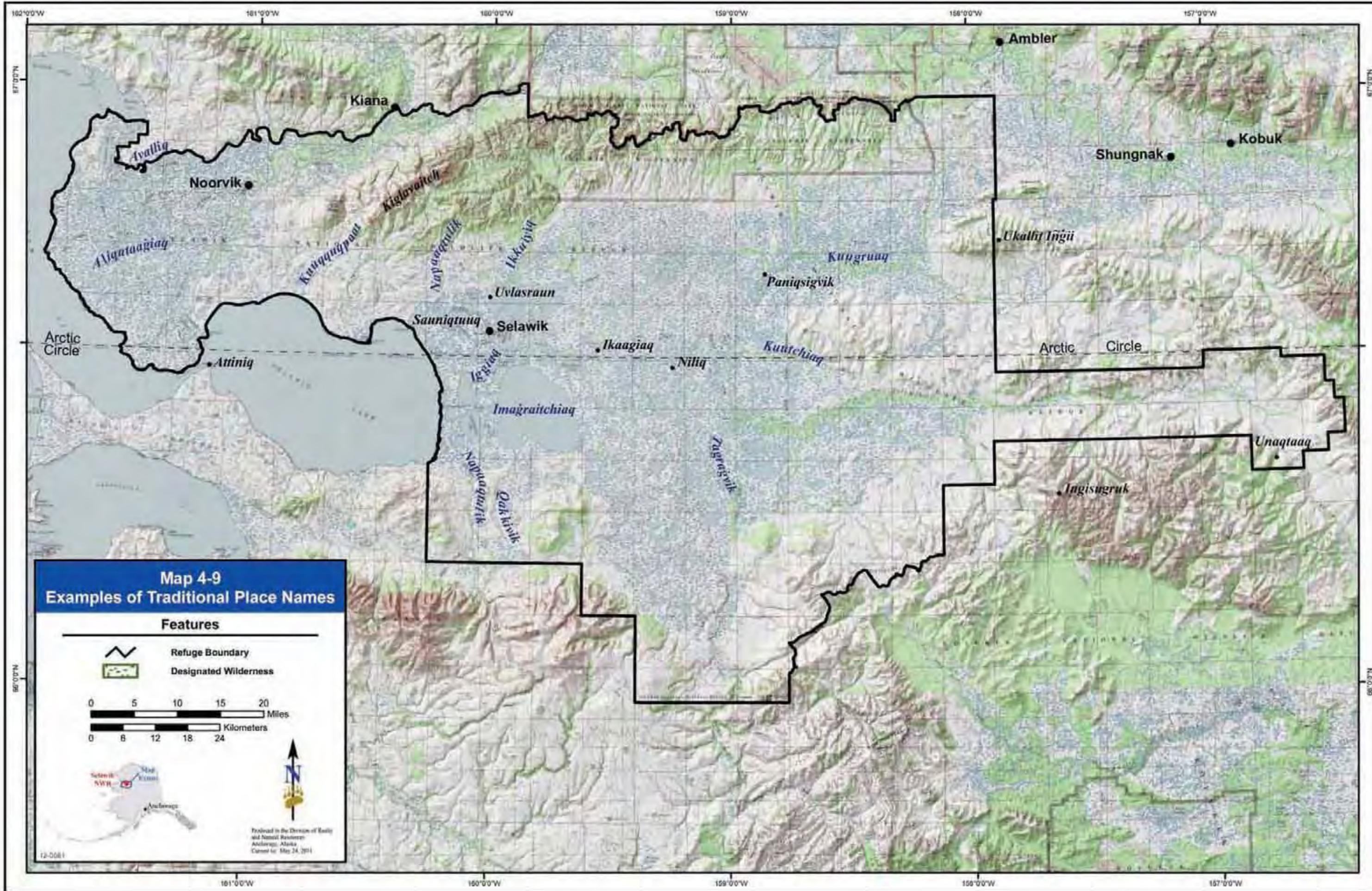
Figure 4-17. *Niliq*, site of a former settlement and trading post along the Selawik River. On USGS maps, this site is spelled “Nilik” and shown at an incorrect location.

### ***4.4.1.5 Population Trends and Composition***

The Selawik refuge lies within the Northwest Arctic Borough, a 36,000-square-mile area the size of Indiana. In 2010, the U.S. Census Bureau reported that the borough was home to 7,523 people, or one percent of Alaska’s population (U.S. Census Bureau 2010). The sparsely populated borough had a density of 0.2 persons per square mile. In 2010, its 1,919 households had an average size of 3.7 persons, among the highest in Alaska (U.S. Census Bureau 2010).

Eleven communities are located within the borough. Of these, Kotzebue is the largest with 3,201 people, or about 43 percent of the borough’s population in 2010. The smaller villages range in size from 122 (Deering) to 829 (Selawik) (U.S. Census Bureau 2010). Rivers and near-shore waters are important transportation routes for area residents, and all communities are located on the coast or on one of the region’s major rivers. None of the communities are connected to Alaska’s road system.

About 87 percent of the borough’s population is Alaska Native (U.S. Census Bureau 2010). Most non-Natives reside in the regional hub of Kotzebue, whose population was about 81 percent Alaska Native in 2010 (U.S. Census Bureau 2010). The outlying villages are 88–98 percent Alaska Native. The median age of borough residents is 25.7 years, one of the youngest in Alaska. More males (54 percent) than females (46 percent) reside in the region (U.S. Census Bureau 2010). About 79 percent of the adult population has at least a high school education (U.S. Census Bureau 2009a). Over the next 20 years, the borough population is forecast to grow about one percent annually, with a predicted population of roughly 9,500 people in 2030 (ADL&WD 2007). Natural growth (more births than deaths) accounts for most of this predicted increase; net migration in the region is expected to be negative.



**Map 4-9**  
**Examples of Traditional Place Names**

**Features**

-  Refuge Boundary
  -  Designated Wilderness
- 0 5 10 15 20 Miles  
 0 6 12 18 24 Kilometers



Prepared in the Division of Realty  
 and Natural Resources  
 Anchorage, Alaska  
 Current to: May 24, 2011

(Back of Map 4-9.)

#### 4.4.1.6 Area Communities

Two communities—Noorvik and Selawik—are located within the boundaries of the refuge. Another community—Kiana—is immediately adjacent to, but not within, the refuge border. Nearby communities that heavily rely on the refuge include Kotzebue, Buckland, Ambler, Shungnak, and Kobuk. Although the refuge is used intermittently by residents throughout the region and beyond, these eight communities are most likely to affect and be affected by refuge management.

Table 4-8 depicts the populations for these communities at 10-year intervals since 1960. While many of the villages grew substantially into the 1980s or 1990s, population growth has since slowed in most of them and declined in some. The next section provides narrative summaries of each community adapted from the Alaska Department of Commerce, Community and Economic Development (2009) and updated with U.S. Census Bureau population figures (2010).

Table 4-8. Population of communities in the Selawik refuge area, 1960–2010.

COMMUNITY	1960	1970	1980	1990 <sup>a</sup>	2000	2010
Ambler	70	169	192	311	309	258
Buckland	87	104	177	318	406	416
Kiana	253	278	345	385	388	361
Kobuk	54	56	63	69	109	151
Kotzebue	1,290	1,696	2,054	2,751	3,082	3,201
Noorvik	384	462	492	531	634	668
Selawik	348	429	561	596	772	829
Shungnak	135	165	202	223	256	262
<b>TOTAL</b>	<b>2,621</b>	<b>3,359</b>	<b>4,086</b>	<b>5,184</b>	<b>5,956</b>	<b>6,146</b>

<sup>a</sup>Source: Alaska Department of Labor and Workforce Development 2000; U.S. Census Bureau 2010.

**Noorvik.** Noorvik (*Nuurvik* in Iñupiaq, meaning “place to move to”) is located on the south bank of the Kobuk River, 45 miles east of Kotzebue (Figure 4-18). It is the closest village to Kotzebue and the only community on the Kobuk River delta. Noorvik was established in 1914 by people from Deering looking to relocate to a place with an adequate wood supply, better access to fish and wildlife, and greater distance from the mining activity and associated influences at Deering. Noorvik also drew residents from Aksik, a long-established settlement a few miles upriver. The first hospital in the region was built in Noorvik in 1916; it was moved to Kotzebue in 1938. Today, Noorvik is the third largest community in the northwest Arctic with a population of 668. Its residents are primarily Iñupiaq Eskimos engaged in a mixed subsistence-cash economy.



Figure 4-18. The community of Noorvik sits atop a high bluff along the Kobuk River near the head of the river delta.

The Noorvik post office was established in 1937, and the city government incorporated in 1964. A federally-recognized tribe—Noorvik Native Community—is located in the village. Most of Noorvik’s homes have electricity and piped water and sewer. The primary local employers are the school district, the city, the health clinic, and two stores.

Noorvik is accessible by plane year-round, by shallow-draft vessel in summer, and by snowmachine in winter. An expanded airport was built in the community in recent years.

Fuel, building materials, and other supplies are barged in during the summer. Boats, ATVs and snowmachines are common means of transportation locally. Staked winter trails link Noorvik with Selawik, Kiana, Kotzebue, and points beyond. In some years, a winter road is plowed on the ice between Noorvik and Kotzebue, enabling residents to drive vehicles between the two towns.

**Kiana.** Kiana is the next village on the Kobuk River, about 20 miles upriver from Noorvik. Its Iñupiaq name, *Katyaak*, meaning “fork in the river,” is an apt description for its location at the confluence of the Squirrel and Kobuk rivers. The present-day site of Kiana was settled around 1902 by a handful of white prospectors (Lee et al. 1992). Iñupiaq families at the time lived north of the site and at other places along the river. By 1909, gold mining was underway at Klery Creek, a Squirrel River tributary. Job opportunities, trading posts, and a school and church attracted local families from the surrounding area. Gold mining at Klery Creek operated into the 1940s and continues to occur intermittently there and in other nearby drainages. Today, Kiana has a population of 361 people, primarily Iñupiaq Eskimos engaged in a mixed subsistence-cash economy.

A post office was established in Kiana in 1915, and the City government was incorporated in 1964. A federally-recognized tribe—Kiana Traditional Council—is located in the village. Most households have electricity and piped water and sewer.

The school district, city, tribal office, and Maniilaq Association provide the majority of year-round jobs. The Red Dog Mine also provides employment. Kiana has three general stores and a school (kindergarten through 12th grade). Boats, ATVs, and snowmachines are commonly used

for local transportation. Staked winter trails link Kiana with Noorvik, Selawik, Ambler, and points beyond.

**Ambler.** Located 70 miles east of Kiana, Ambler is one of three communities on the upper Kobuk River. It is a relatively new village, established in 1958 by a splinter group of Shungnak residents seeking better access to caribou hunting. Ambler's Iñupiaq name, *Ivisaappaat*, means “mouth of the Ivisaaq River,” also known as the Redstone River (*ivisaaq* is a red mineral used for paint) (Lee et al. 1992). The traditional Iñupiaq settlement in the area was located on the island across from Ambler. The nearby Jade Mountains have been a source of jade in the region for many years, both for handmade tools in former days and for commercial sale in contemporary times. Today, Ambler has a population of 258, a decline of 51 people since 2000. Its residents are primarily Iñupiaq Eskimos engaged in a mixed subsistence-cash economy. Proportionally more non-Natives reside in Ambler than in the other villages in the region, excluding Kotzebue (U.S. Census Bureau 2010).

The Ambler post office was established in 1963, and the City was incorporated in 1971. The Ambler Traditional Council is the federally-recognized tribe in the community. Employment opportunities center on the school, city, health clinic, tribal office, and local stores.

Ambler's major means of transportation are by barge, plane, small boat, and snowmachine. Low water levels in recent years have hindered reliable barge service, and in some years, Ambler has had to fly in fuel at a high cost. Winter trails link Ambler with Shungnak, Kiana, and Selawik.

**Shungnak.** Located 150 miles east of Kotzebue between Ambler and Kobuk, Shungnak is one of three communities on the upper Kobuk River. Its name derives from its Iñupiaq name, *Isiqnaq*, meaning “jade,” which sounded like “Shungnak” to English speakers (Lee et al. 1992). Shungnak was established around 1927 when its original site at Kobuk proved prone to flooding and erosion. Families did not relocate quickly to the new village but, over time, moved downriver to the higher ground. The school and teacher's house at Kobuk were dismantled and rafted to Shungnak, and a church was built with donations of logs from each household (Lee et al. 1992). Shungnak today has 262 people, mostly Iñupiaq Eskimos engaged in a mixed subsistence-cash economy.

The city government was incorporated in 1967. The Native Village of Shungnak is the federally-recognized tribe in the community. Shungnak has a health clinic, store, small community center, and school (kindergarten through 12th grade). Except for the old part of town at the bottom of the hill, most homes have piped water and sewer. The school district, city, tribal office, health clinic, and store provide the majority of full-time jobs. Some residents work at Red Dog Mine, and others find seasonal employment as firefighters or in local construction. Many families continue to spend weeks at a time at fish camps in the fall.

Shungnak is accessible by plane, barge, small boat, and snowmachine. Fuel and supplies are typically barged in each summer, but in some years, low water prevents the barge from reaching the village, necessitating the delivery of fuel and goods by air. Small boats, ATVs, snowmachines, and dog sleds are used for local travel. Winter trails link Shungnak with Kobuk, Ambler, Selawik, and points beyond. A hot springs in the upper Selawik River is a common spring destination for residents of Shungnak and other upper Kobuk communities.

**Kobuk.** Kobuk is the furthest upriver village on the Kobuk River, about seven miles east of Shungnak. The village was established at a steamship docking area that served mining operations at Dahl Creek at the turn of the 20th century (Lee et al. 1992). After a post office was established in 1903 and a school built in 1905, more Iñupiaq families moved to the village

from camps upriver (Burch 1998). Until 1920, Kobuk was the largest village in the region, housing workers and providing support for the nearby mining activity. Its original Iñupiaq name, *Isiqmaq* (translated “jade”), was later changed by the first white teacher to *Laugviik*, a variation of “Long Beach,” his hometown in California. When people moved to Shungnak and took the original village name with them, *Laugviik* residents began calling their village “Kobuk.” The community has close kinship and social ties with Shungnak and Ambler.

The city government was incorporated in 1973. The Kobuk Traditional Council is the federally-recognized tribe in the community. With its low-lying terrain, Kobuk is susceptible to flooding each spring. Most homes have piped water and sewer. Until recently, Kobuk School served only kindergarten through 8th grade, requiring teenagers to attend high school in Shungnak or elsewhere; now the local school includes a small high school. An expanded airport was constructed in Kobuk in the early 2000s. Kobuk purchases electric power from Shungnak via an intertie.

Today, Kobuk is the second smallest village in the Northwest Arctic Borough with a population of 151, primarily Iñupiaq Eskimos engaged in a mixed subsistence-cash economy. As in most small villages, jobs are limited and available primarily through the school district, city, tribal office, and health clinic. Seasonal employment in firefighting or construction is available in some years.

Small boats, ATVs, snowmachines, and dog sleds are the primary means of local travel. A three-mile gravel road connects Kobuk to the Dahl Creek airstrip north of the village and continues for another 10 miles to the mining district near Bornite. A staked winter trail links Kobuk with Shungnak and points beyond.

**Selawik.** Located about 75 miles southeast of Kotzebue, Selawik is the only community in the Selawik River drainage (Figure 4-19). Its Iñupiaq name, *Siiilvik*, means “place of sheefish,” an apt description for its location on a river with one of two sheefish spawning areas in the region. The modern village was established in 1908 with the founding of a school, church, and reindeer herd, attracting Iñupiaq families from their small, scattered settlements. Selawik today is the second largest community in the region (after Kotzebue) with a population of 829, primarily Iñupiaq Eskimos engaged in a mixed subsistence-cash economy. The community has close kinship and social ties with Noorvik and the upper Kobuk. The village straddles two river channels, separating it into three sections linked by bridges.



Figure 4-19. The village of Selawik lines two channels of the Selawik River with bridges linking the separate sections. The river and wet tundra make building roads in the village difficult, so boardwalks are used instead.

The city was incorporated in 1974. The Native Village of Selawik is the federally-recognized tribe in the community. The primary employers in the community include the school, city, tribal office, health clinic, Maniilaq Association, and stores. Some residents work at Red Dog Mine. A substantial number of homes have piped water and sewer, but chronic problems with the system leave many households without water or sewer for extended periods. Selawik's diesel-based electrical plant is supplemented with several wind generators. Gravel is in short supply in the local area, creating challenges for construction projects. The community is developing a new landfill, the road to which was built in 2009 with gravel hauled on an ice road from an upland area to the north called "Spud."

Spud was originally a small agricultural development initiated in the early 1980s about 13 miles from Selawik. Land was cleared, buildings constructed, and at least 10 acres planted in cabbage, greens, potatoes, and other root crops. The project, operated by the City of Selawik and Rural Venture Alaska, aimed to provide fresh produce to local and North Slope markets. By the late 1980s, the project was abandoned due to financial constraints. The facilities have since been used in a variety of endeavors, most recently by Maniilaq Association as a residential recovery camp called *Mavsigviq* to help individuals and families heal from drug and alcohol addictions. An airstrip is maintained at the site. A summer ATV trail connects the site to Spud Landing, where a boat can be taken to Selawik village. In winter, Spud can be reached by snowmachine.

Selawik is accessible by plane, barge, small boat, and snowmachine. Fuel and equipment are typically barged in each summer. Other goods and mail arrive by air. In contrast to most villages, Selawik has boardwalks rather than local roads, making it impossible to drive cars or trucks within the community. Repairs to the heavily worn boardwalks began in 2008. Boats, ATVs, and snowmachines are the primary means of local travel. Winter trails link Selawik with Noorvik, Kiana, Buckland, Ambler, Shungnak, and points beyond.

**Buckland.** Buckland is one of two contemporary communities on the northern Seward Peninsula and the only community in the Buckland River drainage. In the early 1900s, Buckland people moved several times, including to *Ikiggagruaq*, Elephant Point, and New Site, in search of a

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suitable location for the community (Lee et al. 1992). Buckland's Iñupiaq name is *Nunatchiaq*, meaning "new place." Gold mining at nearby Candle and reindeer herding both played a major role in the economic life of Buckland in the early 1900s. A coastal bay near Buckland has been the site of an important beluga hunt in Kotzebue Sound, although this has diminished in recent years due to fewer belugas in the area. Today, Buckland is one of the larger communities in the Northwest Arctic Borough with a population of 416, most of whom are Iñupiaq Eskimos engaged in a mixed subsistence-cash economy.

The City government was incorporated in 1966. The Native Village of Buckland is the federally-recognized tribe in the community. Most homes in Buckland do not have functioning plumbing; residents typically haul their own water, and the city hauls solid waste to the sewage lagoon. The primary local employers are the school district, city, health clinic, tribal office, and stores. Buckland is susceptible to flooding from ice jams during spring break-up.

Fuel and supplies reach Buckland via barge and air services. Small boats, ATVs, and snowmachines are commonly used for local transportation. Staked winter trails link Buckland with Kotzebue, Selawik, Deering, and points beyond.

**Kotzebue.** Modern-day Kotzebue is the regional hub of the Northwest Arctic Borough (Figure 4-20). It is situated near an old village site that has been continuously occupied for more than 600 years and that was the main and most populous settlement of the *Qikiqtaġrujmiut* nation in the early 1800s (Giddings 1952; Burch 1998). The large population (200 people) in traditional times was possible because of the area's unusually rich natural resources (Burch 1998). Kotzebue's Iñupiaq name, *Qikiqtaġruk*, means "almost an island." Sisualik, and after the mid-1880s Kotzebue, was the traditional site for an annual summer trade fair. This was believed to be the largest regular Eskimo gathering in the world at the time, attracting 2,000 or more people from throughout northwest Alaska and as far away as Point Hope, Wales, Big and Little Diomedé islands, and the Russian mainland (Burch 1984).



Figure 4-20. The regional center of Kotzebue is situated on a coastal peninsula near the mouth of the Noatak River.

Euroamerican explorers first ventured into Kotzebue Sound in 1816, then more frequently as the century wore on. In 1897, missionaries with the Friends Church arrived in Kotzebue, establishing a school, church, post office, and reindeer herding. Stores were established in the early 1900s, and a cannery was built around 1910–1912 (Lee et al. 1992). The population of Kotzebue grew with the arrival of more white people and with Iñupiaq families who wanted their children to attend school. Kotzebue's position as the regional center, however, did not solidly emerge until the 1940s when government facilities and services were established there.

Today, Kotzebue has a population of 3,201, more than three times the size of the next largest community in the region. The economy is more diversified than in the smaller villages, and more jobs are available. Major employers include the school district; medical center; tribal office; Maniilaq Association; regional and village Native corporations; Red Dog Mine; local, State and Federal government; transportation services; utilities; and retail businesses. Non-Natives, many of whom hold professional jobs in the community, reside in Kotzebue to a greater extent than in the smaller villages. In 2010, about 19 percent of Kotzebue's population was non-Native.

The City was incorporated in 1958. The Native Village of Kotzebue is the federally-recognized tribe in the community. The airport receives daily passenger jet service from Anchorage and frequent commuter flights in smaller planes to the area's villages. Fuel and heavy freight arrive by barge in summer; mail and additional freight arrive year-round by air. Cars and trucks are a common means of transportation around town and on the limited local road system. Boats, ATVs, and snowmachines are used for local travel, inter-village travel, and subsistence activities. A winter trail system connects Kotzebue with outlying camps and with Kivalina, Noatak, Noorvik, Buckland, and points beyond.

#### **4.4.1.7 Regional Access**

Historically, non-motorized boats, dog sleds, and foot travel were the only means of access to the area that is now the Selawik refuge. In the 1930s, airplanes came into use. Motorized boats became increasingly common in the 1940s. Snowmachines rapidly replaced dog teams in the 1960s. Changes in technology brought many changes to life and the movement of people and goods in the region. Today, nearly all access to refuge lands is by motorboat, snowmachine, or aircraft; aircraft must be equipped to land on snow, water, or gravel bars, as there are no landing strips on refuge lands.

For transportation within communities, residents use trucks and cars, snowmachines, boats, and all-terrain vehicles such as four-wheelers. Many simply walk or ride bicycles. In Selawik, boardwalks serve as roads across the community's marshy tundra, making trucks and cars virtually useless (Figure 4-21). Boats and snowmachines are used for travel between villages and for subsistence activities throughout the region. A network of marked winter trails suitable for snowmachines and dog teams links the region's communities. In most years, snow and ice conditions make these trails passable from late October until early May. Many smaller, local winter trails exist near each community for travel to camps, wood cutting areas, and resource harvest areas. Major waterways on the refuge include the Selawik, Kugarak, Tagagawik, Fish, and lower Kobuk rivers, along with their associated channels and lake systems. No roads connect any of the borough communities to each other or to the rest of Alaska.



Figure 4-21. In Selawik, boardwalks serve as the community's roads. Sections of the aging boardwalks have been replaced beginning in 2008.

In some years, an ice road is constructed with State and Federal funds to allow highway vehicles to travel from Kotzebue to nearby communities, particularly Noorvik and Kiana. This road is not built every year and, when it is, it usually lasts for only a short time before drifting snow renders it impassable. Ice roads are also occasionally constructed to extract resources or move heavy equipment. In 2009, a private contractor constructed an ice road from “Spud” to Selawik to haul gravel for use in building a road to a new village landfill (Figure 4-22). Similar ice roads have been built in the past between these two points. To date, ice roads have primarily traversed Native corporation lands and State-managed waterways, not refuge lands.

In recent years, rising costs of transportation and energy have led to renewed interest in development of a road system linking nearby communities. In 2009, one of the proposals looked at by the Northwest Arctic Borough would connect Kotzebue, Selawik, Noorvik, and Kiana with a road. Among other social and economic benefits, this is envisioned as improving freight distribution, facilitating natural resource extraction, improving energy accessibility and affordability, supporting telecommunications and broadband utility expansion, and allowing for long-term community expansion and development. Despite its expense and complexity, road development will undoubtedly remain a topic of considerable interest into the foreseeable future.



Figure 4-22. Ice roads, such as this one near Selawik in spring 2009, are built from time to time to haul gravel, move heavy equipment, or transport goods and fuel.

All of the villages have State-maintained airports regularly served by scheduled commercial flights and local air charters. Kotzebue receives jet service from Anchorage three times daily; these flights also stop in Nome. One carrier flies twin-turbine aircraft between Kotzebue and Fairbanks several days each week. Commercial air travel is the primary means of transportation between communities in the region and between the region and the rest of Alaska.

The borough has no natural deepwater harbor. Deep draft vessels must anchor 15 miles from shore, where cargo is transferred to smaller barges and transported to the shallow dock in Kotzebue. Supplies are then barged or air lifted to the villages. The cost of cargo delivery is high with this system. Barges provide freight service to Selawik and the Kobuk River villages several times each year, assuming adequate water levels in the rivers. Kotzebue Sound is ice-free for only four months of the year, making the marine shipping season highly seasonal.

#### 4.4.1.8 Regional Economy

Although the Northwest Arctic Borough covers a vast geographical area, it is one of the most economically and culturally unified regions in Alaska (ADL&WD 1999). As elsewhere in rural Alaska, government is the leading employer in most borough communities with 40 percent of the borough's employment in 2008 in this industry. Local government (borough, school district, city offices, etc.) provides the largest portion of these jobs with a substantially smaller number in State and Federal agencies. In 2008, the Northwest Arctic Borough School District was the largest employer in the borough (ADL&WD 2009b). Additional income and employment are indirectly related to government, as in the case of Maniilaq Association—the region's largest private-sector employer in 2008—which is primarily funded through State and Federal programs (ADL&WD 2009b). Employment in the borough is concentrated in Kotzebue. In most of the outlying villages, job opportunities are scarce (ADL&WD 2009b). In all communities, the education, health, and social services sectors have the greatest number of jobs (Alaska Department of Commerce, Community and Economic Development 2009). Of the borough's population 16 years and over, about 67 percent were in the labor force and about 50 percent were employed (U.S. Census Bureau 2009a).

The cost of living in the borough is considerably higher than in road-connected areas of Alaska. A recent State of Alaska study concluded that the cost of living in Kotzebue was 61 percent higher than in Anchorage (McDowell Group 2009).



Figure 4-23. Commercial fishermen in Kotzebue Sound sell their salmon catch to a buyer in the town of Kotzebue.

A commercial fishery for chum salmon takes place each summer near Kotzebue (Figure 4-23), but low salmon prices in recent years (\$0.25 per pound in 2009; \$.40 per pound in 2010) have diminished the economic importance of this fishery to the region (ADF&G 2009b, ADF&G 2010). In 2010, 67 permit holders fished for a total catch of 270,343 chum salmon, the highest commercial harvest since 1995. The ex-vessel value of \$860,125 provided the highest average value per fisherman since 1988. From 1974–1988, the annual ex-vessel value of the fishery averaged more than \$1.3 million. Since 2004, the number of Kotzebue area permit holders who fished has been less than one-half the number who fished in the 1990s and well below the nearly 200 permit holders who fished in the early 1980s (ADF&G 2010).

Red Dog Mine, the world's second largest zinc mine, is an important component of northwest Alaska's economy. Located 90 miles north of Kotzebue, the mine operates under lease to Teck Alaska, a Canadian resource development company, on land owned by NANA Regional Corporation. Operating continuously since its opening in 1989, the mine has spurred private sector employment growth and greatly improved the borough's wage and employment picture (ADL&WD 1999). Red Dog Mine accounts for 30 percent of the Northwest Arctic Borough's private employment; about 58 percent of the mine's 549 employees are NANA shareholders (NANA Regional Corporation 2010). In lieu of regional taxes, Teck makes annual payments to the Northwest Arctic Borough, providing about 60 percent of the borough's revenue. The annual payment to the borough in 2009 was \$6.7 million (NANA Regional Corporation 2010). With many businesses and joint ventures in the oil and gas, health care, and hospitality industries, NANA has been a significant player in the expansion of the private sector in the borough and in the creation of jobs and personal income for borough residents.

Although many residents benefit from the mine, high unemployment, low labor force participation, and high incidences of poverty are still prevalent in the region. Per capita income in the Northwest Arctic Borough was \$20,001 for 2005–2009. This was 32 percent less than the statewide per capita income of \$29,382 (U.S. Census Bureau 2009b). Transfer payments (retirement and Social Security checks, Permanent Fund dividend, family assistance, veteran's benefits, etc.) made up 32 percent of the borough's personal income in 2007, compared to 16 percent for the state overall (ADL&WD 2009b). In the 2005–2009 period, about 19 percent of persons in the borough lived below the poverty line, although in some villages—such as Selawik and Ambler—this was as high as 33–40 percent (U.S. Census Bureau 2009b). Many residents rely heavily on subsistence resources, which represent an important source of non-cash income and help offset the unemployment and high cost of living. Because subsistence work is not done for pay, personal income statistics can give a misleading picture of the well-being of places where subsistence makes a significant contribution to meeting the food and other needs of a community. Such communities often have more resources available than is reflected by personal income. Nevertheless, even in the most subsistence-oriented communities, cash is still needed to invest in the tools used in subsistence such as fuel, firearms, ammunition, fishing nets, snowmachines, boats, other equipment, and maintenance (Wolfe 1989).

#### ***4.4.1.9 Subsistence Way of Life***

The Iñupiat of northwest Alaska have relied upon the harvest of wild foods and natural resources for thousands of years and have passed this way of life, its culture, and its values down through contemporary generations. Subsistence is important to many Alaskans, both Alaska Natives and others, particularly in rural Alaska. Alaska residents who live in or visit the rural north reported that hunting, fishing, berry picking, and gathering of other foods are the most important outdoor activities in which they participate (Fix et al. 2009).

In 1980, Congress passed the Alaska National Interest Lands Conservation Act (ANILCA), which established the Selawik refuge and other conservation system units in Alaska. One of the purposes of the act, and of the refuge, is to provide the continued opportunity for rural residents to engage in a subsistence way of life (ANILCA sec. 101(c)). Subsistence entails the harvest of fish, game, plants, and other products of the land for direct personal or family use. It is a cultural and economic way of life rather than a recreational activity. The meaning of subsistence goes beyond hunting, fishing, and gathering food; it is also about cultural identity, strongly held values, family traditions, self-reliance, spirituality, personal and community health, traditional knowledge and skills, and relationships with time, place, and the natural world. Economists find it challenging to estimate the economic value of subsistence in rural Alaska, in part due to its multiple and interrelated dimensions, which are not well researched (Brown and Burch 1992).

In addition to harvesting, subsistence includes the processing of harvested products for food, clothing, and other uses, and the activities associated with the harvest, such as care of dog teams and maintenance of snowmachines. Subsistence is sometimes viewed as a job because time spent in subsistence activities produces food, shelter, clothing, and other items for sustaining life. People working for wages trade their labor for money that they subsequently trade for food, shelter, and clothing. People engaged in subsistence activities trade their labor directly for these products instead of exchanging cash for them.

It is a common misconception that there is no money in traditional subsistence economies. Trade and commerce have been part of subsistence systems in Alaska for thousands of years, and commercial fur trade with European markets began about 300 years ago. In Alaska today, rural economies are “mixed economies,” where families and communities live by combining wild food harvests with wage employment. Rural families use money to purchase basic household goods and services, such as fuel oil, electricity, gasoline, appliances, clothing, and shelter.

One important feature of subsistence is inter-family and inter-community sharing. Generally, not all households participate directly in subsistence hunting or fishing, but resources are shared by those that do. In fact, it is not uncommon for a few “super-households” in a given village to harvest the majority of the resources utilized by the community (Wolfe 1987).

One of the most significant changes in subsistence harvesting during the past 50 years was the widespread replacement of dog teams with snowmachines in the 1960s. This freed people from the need to harvest resources to feed numerous sled dogs, each of which could consume 4–6 pounds of meat per day in winter (Burch 1985). Although the human population in the region has increased over the past half-century, the decline in the dog population has resulted in subsistence harvests that are no greater, and likely less, than those that occurred in the pre-1960s. In addition, certain harvest activities fell into disuse when large volumes of food, fish in particular, were no longer needed to feed dogs.

On Selawik refuge, fish, wildlife, and plants are harvested by residents of all communities in the borough. However, because of their central location within the refuge, the communities of Selawik and Noorvik are the most reliant on refuge lands for subsistence activities. Other nearby communities using the refuge to a lesser extent for subsistence include Kotzebue, Buckland, Kiana, and the upper Kobuk River villages of Ambler, Shungnak, and Kobuk. The Athabaskan community of Huslia on the Koyukuk River occasionally uses the far eastern end of the refuge for subsistence activities.

In the early 2000s, northwest Alaska had generally abundant fish and wildlife and fairly liberal hunting and fishing regulations. For the most part, these provided the residents of local

communities with the opportunity to harvest what they needed, although changing climate conditions, the cyclical nature of certain species, and social conflicts between local subsistence hunters and non-local hunters during the fall caribou migration continue to be concerns. A brief description of subsistence activities is presented for each of these communities.

**Selawik.** With its central location in the refuge, Selawik uses refuge lands extensively. Nearly all its subsistence activities, with the exception of occasional seal hunting and some ice fishing, take place within the refuge boundaries. Large mammal hunting in Selawik focuses on caribou, although moose and occasionally bears are also taken. The Western Arctic Caribou Herd, the largest caribou herd in Alaska with 348,000 animals in 2009, crosses the refuge twice annually on its northward (in spring) and southward (in fall) migrations. Scattered bands of caribou can typically be found on the refuge year-round, and—in some years—substantial numbers winter on the refuge. Fall hunting takes place by boat along the Selawik River and adjacent waterways; winter hunting takes place by snowmachine throughout the area. Community-based harvest surveys showed that Selawik residents harvested 1,289 caribou in 1999 and 934 caribou in 2006 (ADF&G 2009a). The estimated moose harvests were 64 animals in 1999 and 46 in 2006 (ADF&G 2009a). Moose are relative newcomers to the area, moving west from interior Alaska in the first half of the 20th century.

Selawik has unusually rich fish resources, which are widely distributed and available year-round. Fishing takes place with gillnets in open water and under the ice, with hooking through the ice in winter and spring, and with rods-and-reels in summer. Virtually the entire lower Selawik River drainage is utilized for fishing, especially streams and sloughs draining lake systems. Fishing also takes place at many locations along the Selawik River upstream of the village and, in spring, on Selawik Lake and lower Kobuk Lake. The primary subsistence fish species are sheefish, several types of whitefish, northern pike, and burbot. Salmon are notably absent. In 2006, Selawik residents harvested 26,431 whitefish, 5,129 sheefish, and 11,108 pike (ADF&G 2009a). Fish were harvested by 62 percent of Selawik households and big game by 64 percent of households in 2006.

Selawik residents also harvest a wide variety of other resources at appropriate times of year, including seals, waterfowl, upland birds, hares, beaver, wolf, other furbearers, berries, plants, and wood.

**Noorvik.** Like Selawik, Noorvik's proximity to refuge lands makes this village one of the regular users of the refuge for subsistence activities. The entire Kobuk River delta, the Hockley Hills, and the north side of Selawik Lake are traditional subsistence use areas for Noorvik. Large mammal hunting in Noorvik focuses on caribou from the Western Arctic Caribou Herd, which migrates through the area in spring and fall. In some years, caribou can be found in the Noorvik area throughout the winter. Moose and bears (black and brown) are also taken frequently by Noorvik hunters. In 2002, a community-based survey in Noorvik showed a harvest of 988 caribou, 56 moose, 14 black bears, and 5 brown bears (ADF&G 2009a). Fall hunting takes place by boat along the Kobuk River and its many channels and sloughs; winter hunting takes place by snowmachine throughout a broad area.

Fish species important to subsistence in Noorvik are similar to those in Selawik—sheefish, whitefish, burbot, and northern pike—with the notable addition of salmon. Chum salmon, along with small numbers of other salmon species, spawn in the Kobuk River and its tributaries. Salmon fishing, primarily with gillnets, takes place in summer. Sheefish are caught on their upstream migration in spring, their downstream migration in fall, and under the ice throughout the winter. Whitefish are harvested most intensively in early summer when the weather is dry

and cool and suitable for making *paniqtuq* (dried fish). Based on community household surveys from 1994–2004, Noorvik’s annual salmon harvest ranged from 7,391 to 17,855 fish or an average of 13,086 fish for this 11-year period (Georgette and Koster 2005). Annual sheefish harvests in Noorvik averaged 3,318 fish for the 10-year period from 1995–2004 and ranged from 1,605 to 5,048 fish. Noorvik’s annual whitefish harvest averaged 20,113 fish from 1997–2004, ranging from 13,287 to 30,938 fish (Georgette and Koster 2005; Georgette et al. 2004; Georgette et al. 2003a; Georgette et al. 2003b; Georgette and Utermohle 2001; Georgette and Utermohle 2000; Georgette and Utermohle 1999; Georgette and Utermohle 1998; Georgette and Utermohle 1997; Georgette 1996).

Unlike upper Kobuk River villages, Noorvik has access to some sea mammals, particularly young bearded seals, which can be found in Kobuk Lake in late fall. Noorvik residents also harvest a wide variety of other resources at appropriate times of year, including waterfowl, upland birds, hares, porcupine, muskrat, beaver, wolf, other furbearers, other fish species, Dall sheep, berries, plants, and wood.

**Kiana.** As a neighboring lower Kobuk River community, Kiana’s subsistence patterns are similar to those in Noorvik. Its use of the refuge for subsistence activities is sustained throughout much of the year. The Kobuk River from the vicinity of the Salmon River to the coast provides the vast majority of fish harvested by Kiana residents. Many other resources, including waterfowl, berries, furbearers, caribou, and moose, are also harvested in this area. A community-based household survey showed that in 2006, Kiana harvested 306 caribou, 16 moose, and no bears (ADF&G 2009a). Similar data from 1999 indicated a harvest of 488 caribou, 8 moose, 9 black bears, and 2 brown bears (ADF&G 2009a).

Fish was the major component of Kiana’s subsistence harvest in 2006, accounting for 53 percent of the harvest by weight (ADF&G 2009a). Chum salmon and whitefish, followed by sheefish, were harvested in the greatest amounts by weight. Kiana’s salmon harvest averaged 4,215 fish annually over the period 1994–2004 (Georgette and Koster 2005). Annual sheefish harvests from 1997–2004 ranged from 572 to 1,840 for a yearly average of 1,121 fish. During the same period, whitefish harvests averaged 9,351 fish annually, ranging from 5,188 to 21,877 fish (Georgette and Koster 2005; Georgette et al. 2004; Georgette et al. 2003a; Georgette et al. 2003b; Georgette and Utermohle 2001; Georgette and Utermohle 2000; Georgette and Utermohle 1999; Georgette and Utermohle 1998).

As in other villages, Kiana residents also harvest a wide variety of other resources throughout the year. In 2006, this included bearded seals, migratory birds, beaver, muskrat, red foxes, northern pike, grayling, char, burbot, berries, plants, and other resources.

**Ambler, Shungnak, and Kobuk.** Strong kinship and social ties link the three upper Kobuk villages of Ambler, Shungnak, and Kobuk. For this reason and because they share a similar environment, their subsistence patterns have much in common. Except for sea mammals, the resources of the upper Kobuk are similar to those in the lower Kobuk, although their proportions and timing are different.

As in all northwest Alaska communities, the major terrestrial resource is caribou. In some years, caribou winter in the upper Kobuk. In all years, at least in contemporary times, caribou pass through the area on their spring (northward) and fall (southward) migrations. Fall hunting takes place by boat along the rivers, while spring hunting takes place by snowmachine throughout an extensive area. In 2002, caribou accounted for 36 percent of Shungnak’s harvest of wild foods by weight (Magdanz et al. 2004). In terms of numbers of animals, Shungnak

harvested 403 caribou in 2002 and 561 in 1998; Ambler took 325 caribou in 2003; and Kobuk harvested 134 caribou in 2004 (Magdanz et al. 2004; ADF&G 2005; ADF&G 2009a).

Upper Kobuk residents also harvest other big game, including moose, black and brown bears, and occasionally Dall sheep, the latter taken in winter and spring in the Noatak valley by hunters on snowmachines. Community household surveys showed moose harvests as the following: Shungnak, 11 moose in 2002 and 21 in 1998; Ambler, 11 moose in 2003; and Kobuk, 7 moose in 2004 (Magdanz et al. 2004; ADF&G 2005; ADF&G 2009a).

Fish are a major component of the subsistence harvest in the upper Kobuk, as it is in other nearby communities. A distinctive feature of the upper Kobuk is that spawning grounds for sheefish and whitefish are located there, making these fish available in prime condition. The eggs of both are prized. Whitefish are a staple food in upper Kobuk communities, harvested in larger quantities than any other fish, including salmon. In 2002, whitefish, primarily humpback, accounted for 31 percent of Shungnak's harvest of wild foods by weight (Magdanz et al. 2004). Salmon accounted for 15 percent of the harvest by weight, and sheefish contributed 7 percent.

Late summer and fall is the primary season for harvesting sheefish, whitefish, and salmon in the upper Kobuk. At this time of year, fish gather in large numbers, and seining is a particularly efficient harvest technique (Georgette and Shiedt 2005). Whitefish and salmon are cut and dried, and sheefish are typically stored in the ground to age and freeze. Upper Kobuk residents especially savor *amaitchiaq* (dried, aged whitefish with roe intact). Fishing for broad whitefish continues under the ice in early winter.

The upper Kobuk's combined salmon harvest averaged 11,918 fish annually over 9 of the 11 years from 1994–2004 (Georgette and Koster 2005). Salmon harvests ranged from a high of 21,433 fish to a low of 6,240 fish. Annual sheefish harvests from 1997 to 2004 ranged from 2,662 to 5,379 for a yearly average of 3,597 fish. During the same period, whitefish harvests averaged 28,218 fish annually, ranging from 13,569 to 42,946 fish (Georgette and Koster 2005; Georgette et al. 2004; Georgette et al. 2003a; Georgette et al. 2003b; Georgette and Utermohle 2001; Georgette and Utermohle 2000; Georgette and Utermohle 1999; Georgette and Utermohle 1998).

As in other villages, upper Kobuk residents also harvest a wide variety of other resources throughout the year. In 2002 in Shungnak, this included migratory birds, ptarmigan, grouse, beaver, porcupine, lynx, wolf, fox, other fur animals, bearded seal, grayling, northern pike, burbot, Dolly Varden, other fish, berries, plants, and wood.

The upper Kobuk is north of the refuge, and the areas most heavily used for subsistence by these communities are therefore not refuge lands. However, during months of snow cover, Ambler residents regularly hunt in the Kugarak River and surrounding area in the northeast portion of the refuge. Upper Kobuk residents also venture by snowmachine into the far eastern arm of the refuge in winter and spring to hunt caribou, wolves, and other animals and to camp at a hot springs renowned for its healing qualities.

**Kotzebue.** As a regional center with a large, diverse population, Kotzebue exhibits a wide variety of subsistence harvest patterns. Because Kotzebue's population is drawn from all corners of the region, individual hunters often prefer to harvest in their areas of origin where they have kinship ties or personal knowledge of the terrain and conditions. Although Kotzebue has greater employment opportunities and a more diversified cash economy than the smaller outlying villages, its subsistence sector remains a powerful force.

One of the unusual features of Kotzebue's subsistence harvest is that it is fairly evenly divided among three very different resource categories: fish, marine mammals, and big game (Georgette and Loon 1993). This contrasts with many other rural Alaska communities where one resource category, often fish, accounts for one-half or more of the community's total harvest. Community-based harvest surveys in Kotzebue in 1986 and 1991 showed that four resources—caribou, bearded seal, salmon, and sheefish—accounted for 72–75 percent of the community's harvest by weight (ADF&G 2009a).

As in the rest of the region, caribou is the major terrestrial resource in Kotzebue. The Western Arctic Caribou Herd passes through twice annually on its northward and southward migrations; in some years, scattered bands of caribou winter in the area. Caribou hunting takes place primarily in fall when bulls are fat. Residents hunt by boat on the Noatak and Kobuk rivers and along the coast near Kotzebue. In winter and spring, hunters travel by snowmachine throughout an extensive area to take caribou as needed. Cows are preferred at this time because bulls are lean and stringy (Georgette and Loon 1993). Household surveys in Kotzebue showed an estimated harvest of 1,917 caribou in 1986 and 3,782 caribou in 1991 (ADF&G 2009a).

Caribou have not always been as plentiful in northwest Alaska as they are today. Caribou were virtually absent from the Kobuk River valley from the late 1800s to the mid-1940s, at which time local residents traveled north to the Noatak River to hunt them (Foote 1966). In 1949, caribou appeared in the Cape Krusenstern area during the fall migration for the first time in the 20th century (Uhl and Uhl 1977). With these shifts in caribou population and range, the local uses of and harvest strategies for taking caribou have changed accordingly over time (Georgette and Loon 1993).

Moose are hunted by Kotzebue residents, although they are secondary to caribou in terms of importance and desirability. Moose are a relatively recent addition to the resource base of northwest Alaska. In the 1940s, moose were present in tributaries of the middle and upper Noatak River but were not common along its timbered lower sections until after 1960 (Georgette and Loon 1993). The first moose seen in the Cape Krusenstern area was in 1947, at which time most elders had never seen one in their lifetimes (Uhl and Uhl 1977). In the upper Kobuk River, moose did not appear until the 1920s, eventually populating the river all the way to the delta. The Iñupiaq term for moose, *tiniikaq*, is adopted from the Athabaskan language of interior Alaska, indicating unfamiliarity with this animal among northwest Alaska's Iñupiat. Estimated moose harvests in Kotzebue were 65 animals in 1986 and 235 animals in 1991 (ADF&G 2009a).

Bearded seal, or *ugruk*, is the most significant marine resource in terms of harvest quantity (Figure 4-24). Most bearded seal hunting takes place in June as the seals migrate through Kotzebue Sound on their way north with the ice (Georgette and Loon 1993). In fall when slush ice begins to run from the rivers, hunters pursue juvenile bearded seals in nearby coastal waters. Other marine mammals are also taken as need and opportunity allow, including ringed seal, spotted seal, beluga, and the occasional walrus or polar bear. Bearded seal harvests in Kotzebue in 1986 were an estimated 443 animals and in 1991 an estimated 963 animals (ADF&G 2009a).

Fishing of one kind or another occurs nearly year-round in Kotzebue. In summer, chum salmon and Dolly Varden are caught with gillnets and rods-and-reels. In late fall, as soon as the near-shore waters freeze, Kotzebue residents jig through the ice for saffron cod ("tomcod"). Nets are set under the ice for sheefish in early winter. As the days lengthen towards spring, residents jig for sheefish and burbot through the ice on Kobuk Lake and the lower Noatak River. At break-up, herring are harvested from the shorelines near Kotzebue.

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In 1986 and 1991, salmon and sheefish together accounted for 76–81 percent of Kotzebue’s fish harvest by weight (ADF&G 2009b). Kotzebue’s estimated salmon harvest in 1995–2001 ranged from 17,756 to 67,264 fish with an annual average of 40,654 (Georgette et al. 2004). In both 1986 and 1991, Dolly Varden ranked third among fish resources in terms of pounds harvested in Kotzebue.

As in other communities, Kotzebue residents also harvest a wide variety of other resources throughout the year, including bears, Dall sheep, musk ox, small game, furbearers, waterfowl, northern pike, grayling, whitefish, berries, plants, and wood.



Figure 4-24. Hunters wait for seals during freeze-up in front of Kotzebue.

**Buckland.** Located on the northern Seward Peninsula, Buckland has a somewhat different resource base than other communities surrounding the refuge. In particular, Buckland is situated near the beluga calving grounds in Eschscholtz Bay, where a major early summer hunt traditionally took place. Beluga whales frequent this area considerably less often now than they once did, and the scale of this hunt has accordingly diminished. Buckland also has an unusually sizeable smelt run for which the community is well known. Finally, Buckland has access to seabird nesting colonies on the cliffs of Puffin and Chamisso islands.

As in Kotzebue, bearded seals play an important role in Buckland’s subsistence harvest. Ringed and spotted seals are also hunted. Seal hunting takes place in late spring and early summer and again in fall. A household survey showed that in 2003, Buckland harvested 106 bearded seals, 49 ringed seals, 87 spotted seals, and 40 unknown seals (Magdanz 2009). No belugas were taken that year. Marine mammals accounted for 19 percent of Buckland’s subsistence harvest by weight in 2003.

Caribou is the foremost terrestrial resource in Buckland and accounted for more than one-third of Buckland’s total subsistence harvest by weight in 2003. An estimated 630 caribou were harvested that year (Magdanz 2009). Caribou hunting takes place by boat in fall and by snowmachine during the snow-covered months. Moose, musk ox, and bears round out Buckland’s typical big game harvests.

Salmon is the primary fish harvested for subsistence in Buckland, followed by smelt and whitefish. Chum salmon comprise the majority of the salmon harvest, but a notable number of coho salmon

are also taken along with small numbers of Chinook, pink, and sockeye salmon. In 2003, salmon accounted for 65 percent of Buckland's subsistence fish harvest and 24 percent of Buckland's total harvest by weight. An estimated 10,523 salmon were harvested in 2003. Smelt accounted for 15 percent of Buckland's fish harvest in 2003 with an estimated harvest of more than 100,000 fish (Magdanz 2009). Sheefish are not available in the immediate Buckland vicinity and consequently do not figure as prominently in the community's harvest as in Selawik and Kotzebue.

As in other communities, Buckland residents also harvest a wide variety of other resources at appropriate times throughout the year, including small game, furbearers, waterfowl, bird eggs, northern pike, grayling, herring, saffron cod, burbot, berries, plants, and wood.

## 4.4.2 Public Use

### 4.4.2.1 Overview

The refuge provides opportunities for visitors to participate in wildlife-dependent recreational activities. These include hunting, fishing, wildlife observation, photography, and other incidental activities such as camping, river floating, boating, hiking, and dog sledding. The amount of public recreation on the refuge is difficult to gauge with certainty because the refuge does not have controlled entry points where visitation is recorded. There are no recreational facilities located on the refuge, such as campgrounds, trails, boat launches, or photo blinds.

In 2006–2007, a statewide survey exploring travel patterns, subsistence, and recreation activities of Alaska residents found that an estimated 1,340 people (plus or minus four percent) visited the Selawik refuge during the study year (Fix 2009). All of the respondents visiting the Selawik refuge resided in the northern region of the State. About 75 percent lived in Kotzebue or Selawik, with the remainder living in Noorvik, Kiana, Buckland, Nome, or Barrow. No respondents in other parts of Alaska reported visiting Selawik refuge during the study year. The most common activities engaged in by the respondents visiting the refuge were motor boating, snowmachining, food gathering, and camping; 90 percent or more of respondents participated in each of these activities. These findings underscore the predominance of subsistence-oriented activities by local residents as the primary public use of the refuge.

Most non-local recreational visitors accessing the refuge, both for guided and independent trips, utilize commercial air-taxi operators or transporters. Businesses providing these services within the refuge are required to submit annual reports summarizing their client numbers, trip dates and locations, and the primary purposes of the trips. These annual reports, along with informal observations and reports from local residents, indicate that overall visitation for recreation is low, largely owing to the refuge's remoteness and difficulty of access. Hunting for moose and caribou is the primary purpose of most recreational visits. Fishing is a secondary activity on the refuge.

Minimal visitation occurs for other recreational activities such as river floating, wildlife viewing, and hiking. Remoteness, difficulty and high cost of access, and hiking and river floating opportunities in the Brooks Range to the north that may be more desirable are likely factors keeping more visitors from pursuing these activities at Selawik refuge. These visitors are typically not local residents but from other areas of Alaska, the nation, and the world. In 2009 and for several preceding years, no commercial operators have reported transporting clients for recreational activities other than hunting and fishing.

Since 1993, the refuge has annually issued three to seven special use permits to commercial air-taxi operators to provide transportation services on the refuge (Figure 4-25). Five permits were

issued in 2010; three were issued in 2008 and 2009; six were issued in 2006 and 2007. The number of permits is not limited at this time. In some years, a special use permit has been issued to a commercial boat operator to provide transportation services.

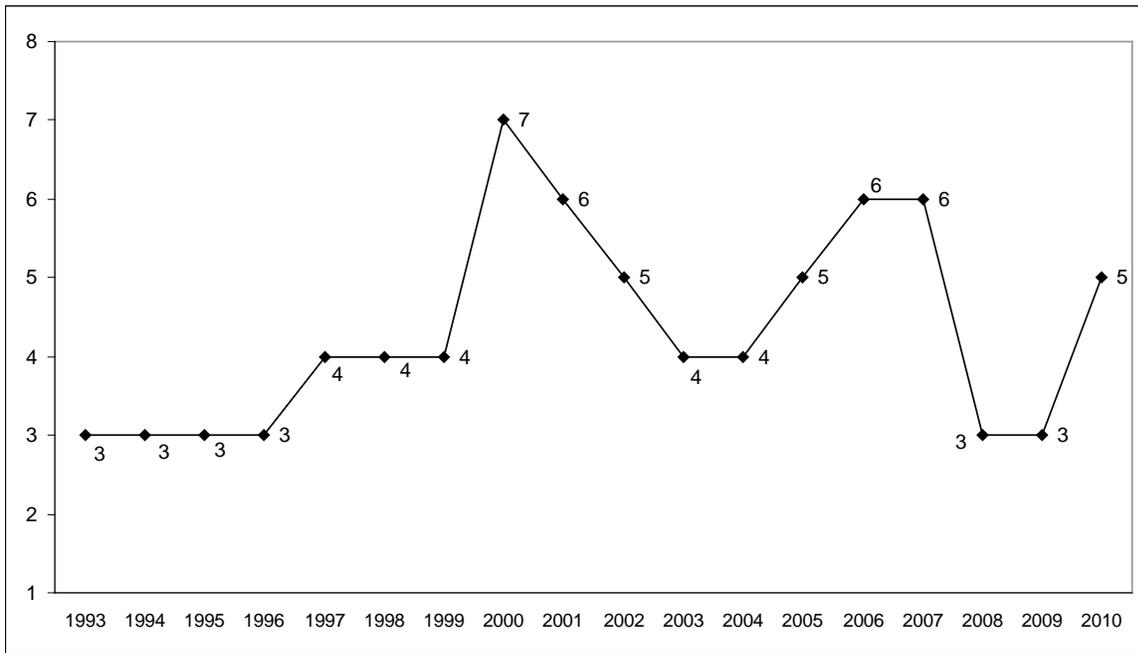


Figure 4-25. Number of big game transporters and air-taxi operators at Selawik National Wildlife Refuge, 1993–2010.

#### 4.4.2.2 Local Public Uses

Several public use activities take place on the refuge that do not fall neatly under either recreation or subsistence. These activities are unique in that they incorporate a cultural or historical component and are engaged in almost solely by local residents. In these ways, they differ from standard recreational activities (such as recreational hunting and fishing or wildlife viewing) in which visitors from around the world participate.

Visiting the Selawik Hot Springs is a notable example of these local public uses. Located at the far eastern edge of the refuge, the hot springs is an oasis for camping, bathing, healing, and rejuvenation, receiving frequent multi-day visits from local residents during the long spring days in March and April. Access is only by snowmachine or dog team with most visitors traveling from the upper Kobuk River villages and Huslia, the nearest communities. Two public cabins and a bathhouse at the hot springs were constructed years ago by local residents. Since 1996, the Upper Kobuk Elders’ Council and the City Council of Huslia have held a special use permit for these facilities. From 1996–2001, Maniilaq Association also held a permit for the hot springs.

Other notable local uses are two competitive events of a historical nature, namely a long-distance sled dog race (the Kobuk 440) and a long-distance snowmachine race (the Willie Goodwin/Archie Ferguson Memorial Snowmachine Race). These take place in April and follow the established winter trail system in the region. Local residents are the primary participants, along with a small number of people from outside the region. These eagerly anticipated annual races have been taking place since before establishment of the refuge. In 2010, 12 dog mushers competed in the Kobuk 440 for a total purse of about \$30,000. The snowmachine race attracted about 70 riders in 2010 with a purse of about \$44,000.

Substantial public use by local residents takes place on the extensive winter trail system that crisscrosses the refuge. These trails—the winter “highways” of northwest Alaska—link Selawik with Noorvik, Kiana, Ambler, Shungnak, and Buckland. Another trail links Shungnak with the Selawik Hot Springs and Huslia. These primary trails are marked with tripods on land and with willows on the ice of frozen waterways (Figure 4-26). Reflective tape attached to the trail markers assists travelers at night and in stormy weather. Maintenance of the trail markers is funded largely by the Northwest Arctic Borough and carried out by community search and rescue organizations. In recent years, the refuge has contributed funds and staff to trail marking and maintenance. Most of the winter trails receive daily use by snowmachine or dog team travelers for several months each year in all but the worst weather. Many other unmarked trails receive frequent traffic to hunting, fishing, trapping, and wood cutting areas.



Figure 4-26. Tripods with reflector tape mark this trail across the tundra between Selawik and Noorvik.

Public shelter cabins are situated along the trail systems roughly halfway between many of the villages. These are available for emergency shelter or as a place for travelers to simply take a break and warm up. Occasionally, dog mushers or other non-motorized travelers overnight in the cabins or search and rescue crews base out of them. The cabins are typically equipped with a wood stove and a raised platform for sleeping. Some are in serious disrepair, while others are brand new. Three shelter cabins were located within the refuge in 2010: one at *Paniqsigvik* on the Selawik-Ambler trail, one at Rabbit Creek on the Selawik-Shungnak trail, and one at *Sijiaġruk* on the Selawik-Noorvik trail (Map F-1). The first two are in good condition, while the latter needs major renovation.

#### **4.4.2.3 Recreational Hunting**

The Selawik refuge lies within Alaska Game Management Unit (GMU) 23. All of the public lands in the refuge are open to both recreational and subsistence hunting. The bulk of recreational hunting on the refuge occurs in the Tagagawik River and upper Selawik River during the first three weeks of September. Moose and caribou are the primary focus of these hunts, although bears and wolves are occasionally taken. Both guided and unguided recreational hunting takes place on the refuge.

In 1993, permitting regulations were restructured on all Alaska refuges. Since that time, Selawik refuge has allowed one big game guide to operate. This guiding permit, valid for five years and renewable for another five years, is issued through a competitive process. The refuge has

attached several conditions to the permit, including limits on clients and harvests. The current guide is allowed up to 26 guided or outfitted clients who can collectively harvest no more than 12 moose, 22 caribou, and 4 brown bears. In addition, the big game guide is currently restricted to using only temporary camps on the refuge. The big game guide, under his or her prospectus application, is required to report the number of clients, animals taken, and hunting locations.

In 2010, the permitted big game guide reported taking 17 clients who harvested eight caribou, three moose, and one wolf. In 2009, the guide reported taking eight clients who harvested four moose and two caribou. In previous years, client numbers for the permitted guide have ranged from one to seven.

Because the refuge has no roads, most unguided hunters use air-taxis to access the refuge. As a condition of their permits, these commercial service providers are required to report the number of clients they serve annually. These reports are believed to be fairly accurate and thereby provide a good estimate of recreational hunting on the refuge. A small number of visitors, particularly those with private airplanes or with social connections in the local communities, hunt on the refuge without air-taxi or guide support. Estimates of the numbers of these hunters are not available.

As shown in Figure 4-27, the number of hunters peaked in 2000 and has been on a downward trend since. In 2010, 47 hunters were transported within the refuge compared to 154 in 2000. Transported hunters nearly doubled in number between 2009 and 2010 but were still considerably fewer in number than in the 1997–2005 period. The number of hunters annually transported in 2007 through 2010 was less than one-third of the number in 2000 and among the lowest since records were kept (Figure 4-27). A number of factors likely contributed to this overall decline. These include more restrictive moose hunting regulations, reduced caribou bag limit, unpredictable caribou migrations, increasing cost of air charters, a worsening national economy, and the absence of two particularly active air-taxi operators. In 2005, non-resident moose hunting in GMU 23 was restricted to a drawing permit hunt with 24 permits available for the area encompassing the Selawik River drainage, Kobuk River delta, and the north side of the Selawik Hills. In 2009, this hunt received 39 applications for these 24 permits.

With fewer recreational hunters, moose and caribou harvests by these users have declined, as shown in Figure 4-28 and Figure 4-29. During a recent five-year period (2006–2010), recreational hunters harvested an average of 11 moose annually. During the preceding five-year period (2001–2005), recreational hunters harvested an average of 40 moose annually. Since 2006, caribou harvests have similarly declined (Figure 4-29).

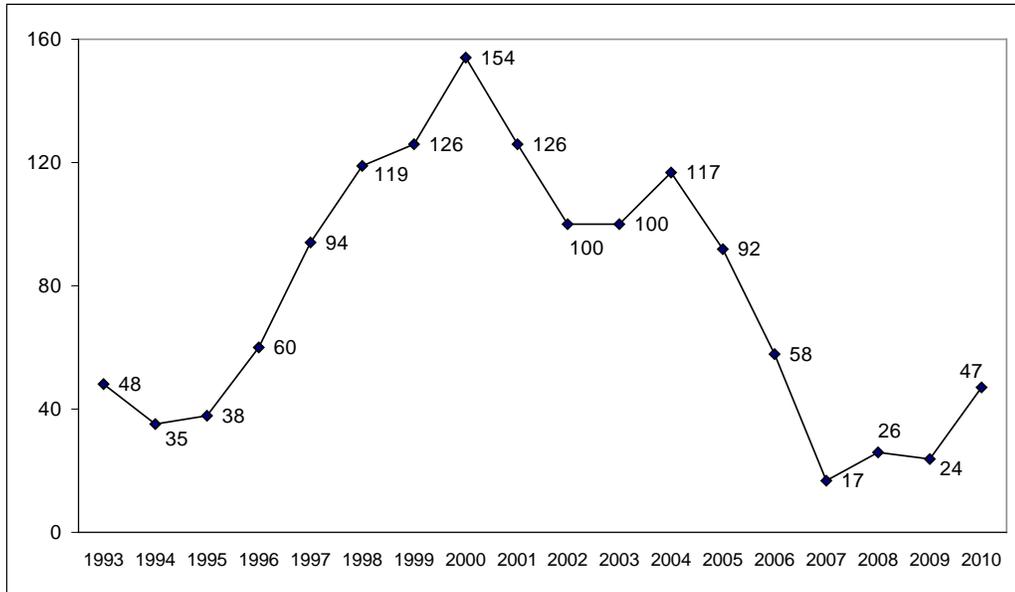


Figure 4-27. Number of transported hunters at Selawik National Wildlife Refuge, 1993-2010.

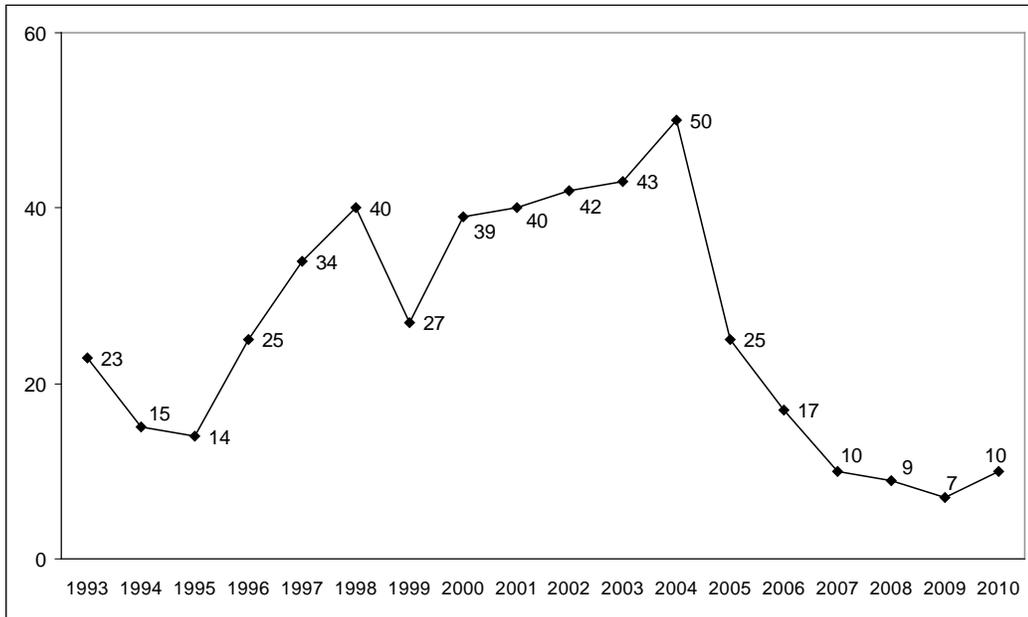


Figure 4-28. Number of moose harvested by transported hunters at Selawik National Wildlife Refuge, 1993-2010.

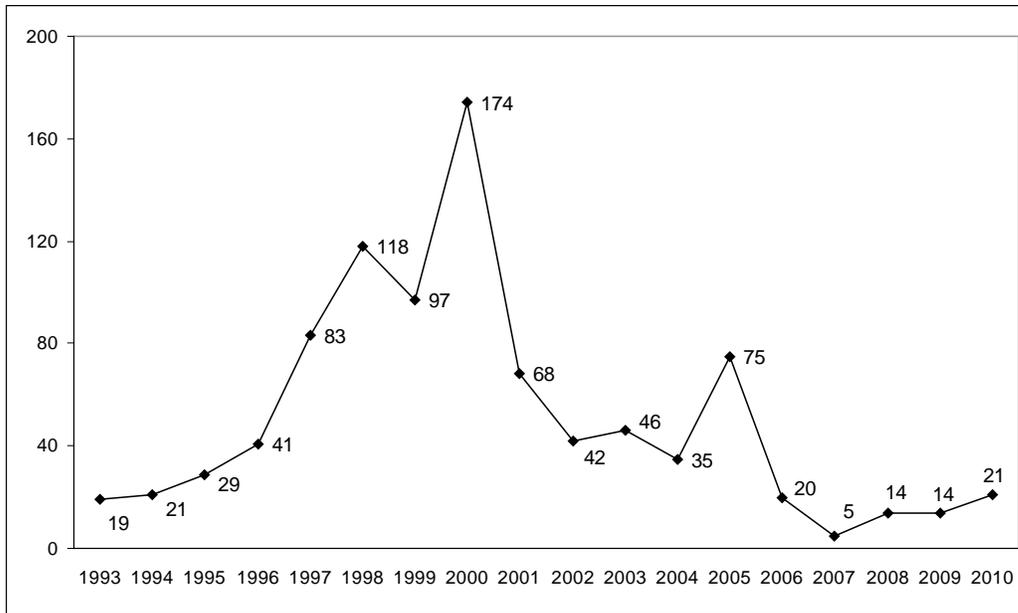


Figure 4-29. Number of caribou harvested by transported hunters at Selawik National Wildlife Refuge, 1993–2010.

For the past 20 or more years, one of the most significant issues in GMU 23 has been the social conflict between local subsistence hunters and non-local recreational hunters. This deep-rooted issue has a long and complex history with temporal, spatial, social, cultural, aesthetic, and economic aspects, some of which are discussed or summarized in papers and reports (Jacobson 2008; Magdanz 2007; Steinacher 2006; Georgette and Loon 1988). As a local land manager, the refuge is one of several stakeholders in this region-wide issue. Since the late 1990s, several planning processes and permitting efforts have been initiated by agencies and local governments to address this issue, but none have yielded a conclusive solution. Increased enforcement efforts and regulatory changes in bag limits and meat salvage have improved the situation, as has an education campaign for visiting hunters. Non-local hunters in GMU 23 are urged to review an online orientation program sponsored by the ADF&G that explains hunting regulations, proper salvage and care of meat, and respect for other hunters and residents. Beginning in 2010, pilots transporting big game parts with an aircraft in GMU 23 are required to complete a one-time, online education course on big game hunting and meat transportation.

In 2006, the ADF&G assigned a planner to assess the issue. In 2007, ADF&G organized a meeting of key individuals and agencies who recommended that a working group be created to try to cooperatively resolve social conflicts in the region. In 2008, the 21-member GMU 23 Working Group was formed with representatives from regional and tribal governments, Federal and State resource management agencies, NANA Regional Corporation, the Big Game Commercial Services Board, the Alaska Professional Hunters Association, advisory committees, the Northwest Arctic Regional Advisory Council, the Alaska Board of Game, and the Federal Subsistence Board. This group completed the first phase of its work in May 2010, establishing the mandatory education course for pilots. The decline in transported hunters on the refuge has led to fewer reported conflicts and filed complaints in recent years, but substantial concerns remain.

#### 4.4.2.4 Recreational Fishing

The Selawik River is one of two river systems in northwest Alaska in which sheefish are found. This large, predatory whitefish, called *sii* in Iñupiaq, is renowned among recreational anglers

for its tremendous size, fighting ability, and fine eating qualities. The refuge and the Kobuk River to the north harbor the largest sheefish in Alaska (ADF&G 1994). Most of the fishing occurring within the refuge is subsistence take by people living in nearby villages. A small amount of recreational fishing for sheefish, pike, and other species also takes place on the refuge, but no data are available on the extent of this activity. There are currently no recreational fishing guides operating within the refuge. Although occasional inquiries have been made, no permits for guided sport fishing have ever been requested or issued for the refuge. Informal observations indicate that recreational fishing on the refuge tends to be incidental to hunting. A small number of anglers likely access the refuge with private airplanes or boats for the specific purpose of fishing. Non-local people visiting or working in Selawik or other nearby communities occasionally accompany friends or colleagues on fishing outings in the refuge.

#### ***4.4.2.5 Outreach and Environmental Education Programs***

The focus of the outreach and environmental education program at Selawik refuge is to promote greater public understanding of the refuge and its resources through culturally appropriate materials and methods. The preferred strategy used at Selawik refuge is to combine modern biological science with traditional ecological knowledge. The program also strives to strengthen partnerships by working closely with nearby communities and others on goals and programs of mutual benefit. Outreach activities include school and community programs held in Kotzebue and nearby villages, development and distribution of educational resources and cultural materials, and public contact via community events, radio programs, newsletters, brochures, and Web sites. The refuge partners with the Northwest Arctic Borough School District and Selawik Tribal Council to conduct a science-culture camp for Selawik students each year. The refuge information technician in Selawik, the refuge outreach specialist, and the refuge environmental education specialist have primary responsibility for developing and implementing outreach and environmental education programs.

## **4.5 Resource Values and Special Designations**

### **4.5.1 Wilderness**

Section 304(g) of ANILCA requires the Service to identify and describe wilderness values for the Selawik refuge. The 1964 Wilderness Act recognized wilderness as an important national resource and established the National Wilderness Preservation System (NWPS) to protect wilderness in the United States. The definition of wilderness provided by the Wilderness Act provides a general framework for identifying and describing wilderness values in this comprehensive plan. The fundamental qualities of wilderness are undeveloped, untrammelled, natural, opportunities for solitude, and opportunities for unconfined recreation.

In Alaska, designated wilderness is unique compared to the rest of the United States in that subsistence harvest of resources by rural residents can be commonplace in designated wilderness areas and is allowed by law (Van Zee et al. 1994).

#### ***4.5.1.1 Undeveloped***

The undeveloped quality of wilderness is defined as free from roads, structures, and other evidence of modern human occupation or improvements, where the land essentially retains its original character and ecological function (Landres et al. 2008). The undeveloped quality can influence opportunities to experience solitude and unconfined recreation. Certain kinds of structures or improvements that minimally impact ecological function may be considered desirable in some wilderness settings (e.g., trails). Some human occupation or presence may be

acceptable in wilderness settings according to specific legislation (e.g., subsistence). However, such developments can be a reminder of human presence for some recreational visitors and may be viewed as impacts to the wilderness resource.

### ***4.5.1.2 Untrammeled***

The Wilderness Act states that wilderness is an area where the land and its biological communities are untrammeled by humans. In other words, wilderness is essentially unrestricted and free from modern human control or manipulation (Landres et al. 2008). The untrammeled quality of the wilderness resource can be diminished when ecological events or processes are constrained or manipulated to suit modern human purposes (e.g., suppressing naturally ignited fires to protect timber or introducing non-native plants or animals for food).

### ***4.5.1.3 Natural***

In wilderness, ecological systems are substantially free from the effects of modern civilization (Landres et al. 2008). Naturalness is a measure of the overall composition, structure, and function of native species and ecological processes in an area. In contrast to untrammeled, the natural quality of an area may sometimes be enhanced through purposeful human action (e.g., eradicating an invasive species).

### ***4.5.1.4 Opportunities for Solitude***

Solitude in a wilderness setting is indicated by remoteness from sights and sounds of people inside wilderness and remoteness from occupied and developed areas outside wilderness (Landres et al. 2008). The relative amount of remoteness from these things necessary to experience solitude is highly personal and variable. Encountering other people, hearing mechanized sounds (e.g., aircraft, chainsaws), or seeing the lights of a distant city are examples of things that may affect solitude.

### ***4.5.1.5 Opportunities for Unconfined Recreation***

Unconfined recreation in wilderness settings is characterized by freedom from management restrictions on visitor behavior (Landres et al. 2008). Travel in wilderness usually is by non-motorized and non-mechanical means (e.g., walking or paddling). Wilderness recreation may often include the experiences of challenge, risk, self-reliance, and/or freedom. Facilities in wilderness can decrease the challenges of self-reliant recreation. Dispersed travel and camping patterns, in an area with little or no facilities, can enhance opportunities for unconfined recreation.

### ***4.5.1.6 Other Special Features***

Lands that exhibit the wilderness qualities described may also contain additional special features of scientific, educational, scenic, cultural, or historic importance. In the context of Alaska refuges, special features might include such things as active volcanoes, unique abundance or concentrations of a given species, fossil deposits, evidence of prehistoric cultures, or rural subsistence values.

Designated wilderness and other protected areas have great value for Alaska Natives because these places are often part of their traditional homelands and historic hunting grounds. Many contemporary rural Alaskans, both Natives and others, go to these places to hunt, fish, and gather foods and other resources such as wood to use in their daily lives.

Many people living in rural Alaska attach important meanings to the land and these special wilderness places in ways that are similar for people from outside Alaska who visit designated wilderness and other wild places. In one study, Alaska Native residents of the Kotzebue area

associated the land with the values of personal and community identity, traditional way of life, survival, personal growth, humility, health for body and mind, and self-sufficiency (Whiting 2004).

#### 4.5.2 Wilderness Review Areas

All refuge lands in Alaska were reviewed and evaluated during the early 1980s planning processes for their suitability to be included, by act of Congress, in the NWPS as directed by ANILCA. The 1987 comprehensive plan for Selawik refuge described the wilderness values and special features of four areas: the previously designated Selawik Wilderness Area in the Waring Mountains, headwaters of the Selawik River, Selawik River delta and lowlands, and Selawik Hills (USFWS 1987a). The 1987 Record of Decision document did not include a proposal to the Congress for further wilderness designations at Selawik refuge (USFWS 1987b).

##### 4.5.2.1 Selawik Wilderness Area

The Selawik Wilderness Area was designated by the Congress under ANILCA and the Wilderness Act and encompasses approximately 240,000 acres within the Waring Mountains along the northern boundary of the refuge (Map 2-1). Characterized by deep permafrost, this area provides the immediate watershed for the Selawik lowlands.

This wilderness area has unique plant communities that are associated with underlying sedimentary rock. The area includes a unique group of rolling, vegetated sand dunes that were formed by the last glacial recession (Figure 4-30). The dunes feature is thought to be part of a larger system that once included the Great Kobuk Sand Dunes to the north. These sand dunes form one of the most topographically interesting and scenic parts of the refuge. The area also has spruce forests, foothills rising in elevation to about 1,700 feet, and alpine habitats. The Western Arctic Caribou Herd migrates through the area each spring and fall.

The Selawik Wilderness Area, similar to most of the refuge, is remote, undeveloped, and has retained ecological integrity. Although difficult to access, the area offers the occasional outside visitor good opportunities for solitude and backcountry hiking and camping. There are no recreational facilities and a minimal amount of private land.



Figure 4-30. Sand dune habitat near the Waring Mountains.

### **4.5.2.2 Headwaters of the Selawik River**

This area contains the upper reaches and tributaries of the Selawik River and the designated Wild River corridor. The riparian and aquatic habitats of the area have primarily retained their ecological function and natural qualities, supporting major fisheries and wildlife resources (USFWS 1987a). The area offers extensive opportunities for backcountry recreation such as float trips, hunting, and fishing. There are no public recreational facilities and minimal amounts of private land.

The headwaters area of the Selawik River was evaluated during preparation of the 1987 comprehensive plan for the refuge and was found to have suitable wilderness qualities and some special features, but it was not recommended for inclusion in the NWPS.

### **4.5.2.3 Selawik River Delta and Lowlands**

This area consists of extensive wetlands, rivers, lakes, and streams, supporting large numbers of migratory waterfowl and fisheries resources (USFWS 1987a).

Although Alaska Natives have relied on the resources of the area for generations, it retains ecological function. The Iñupiaq community of Selawik, which primarily follows a subsistence way of life, is located within this area, and there is a relatively substantial amount of private land. There are some opportunities for backcountry hunting and fishing, but no public recreation facilities exist.

The Selawik River delta and lowlands area was evaluated during preparation of the 1987 comprehensive plan for the refuge and was found to have suitable wilderness values and some special features, but it was not recommended for inclusion in the NWPS.

### **4.5.2.4 Selawik Hills**

This area is located in the remote southwestern corner of the Selawik refuge between the Selawik Hills and Inland Lake. Opportunities for backcountry hunting of large mammals such as moose and caribou exist. There are no public recreation facilities and some private lands.

The Selawik Hills area was evaluated during preparation of the 1987 comprehensive plan for the refuge and was found to have suitable wilderness values and some special features, but it was not recommended for inclusion in the NWPS.

## **4.5.3 River Values**

Section 304(g) of ANILCA requires the Service to identify and describe the unique values of refuges in Alaska, including those associated with rivers or segments of rivers. In northwest Alaska, rivers provide vital habitat and function as important travel corridors for people and animals. Rivers support traditional and modern subsistence activities and attract recreational users interested in fishing, hunting, boating, and paddling. Wildlife and fish travel and feed in and along rivers and rear young in associated terrestrial habitats, ponds, and wetlands.

The Wild and Scenic Rivers Act of 1968 provides for the protection of rivers of the nation that are found to possess at least one unique, rare, or exemplary feature that is significant at a regional or national scale. Based on national guidelines derived from this legislation, the Service developed the following descriptions for the predominant river values at Selawik refuge (Diedrich and Thomas 1999).

### 4.5.3.1 Recreation

The river or corridor has recreational opportunities that are unique or rare within the region and may be popular enough to attract visitors from throughout the region and beyond. River-related recreational opportunities could include wildlife viewing, motor boating or floating, camping, photography, fishing, and hunting.

### 4.5.3.2 Geology

The river or corridor contains a geologic feature or process that is unique to the region. The feature may be in an unusually active stage, represent a textbook example, or embody a unique or rare combination of geologic characteristics.

### 4.5.3.3 Fish

The river provides exceptionally high quality habitat for fish species of the region and/or is an important producer of resident and/or anadromous fish populations. Of particular significance is the presence of unique or sensitive species or species that are important for local and regional subsistence. Diversity of species and habitats is also an important consideration.

### 4.5.3.4 Wildlife

The river or corridor contains nationally or regionally important populations of indigenous wildlife species and/or provides exceptionally high quality habitat for wildlife of national or regional significance. Of particular significance are species considered to be unique and/or populations of rare, threatened, endangered, or sensitive species, or species that are important for local and regional subsistence. Diversity of species and/or habitats may also be of remarkable quality.

### 4.5.3.5 Cultural

The river or corridor contains an area significant to traditional cultures. Examples might include sites that support traditional subsistence activities, spiritual ceremonies, community gatherings and events, or important subsistence resources such as whitefish.

## 4.5.4 River Descriptions

The Service identified and described six exceptional examples of free-flowing rivers or segments of rivers for the Selawik refuge (Table 4-9, Map 4-10).

Table 4-9. Rivers described for Selawik refuge.

River/Segment	Predominant Values
Upper Selawik	Fish, recreation, cultural, and geologic
Lower Selawik	Fish, wildlife, and cultural
Kugarak	Wildlife and cultural
Tagagawik	Wildlife, recreation, and cultural
Fish	Fish and cultural
Kobuk Delta	Fish, wildlife, and cultural

### 4.5.4.1 Upper Selawik River

The Selawik River, from its headwaters to its confluence with the Kugarak (*Kwugruaq*) River, was designated by Congress as a National Wild River in 1980 when ANILCA became law. The upper Selawik River is free of dams and impoundments and has undeveloped shorelines and

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high water quality. It is generally inaccessible except by winter snowmachine trail, airplane, or small non-motorized boats. The lower stretches of the Wild River segment can be traveled by small motor boats, especially ones with jet outboards. With upland terrain and relatively swift, clear water, the upper Selawik River is one of the refuge's most attractive rivers to float for backcountry hunting and other types of recreation (Figure 4-31).

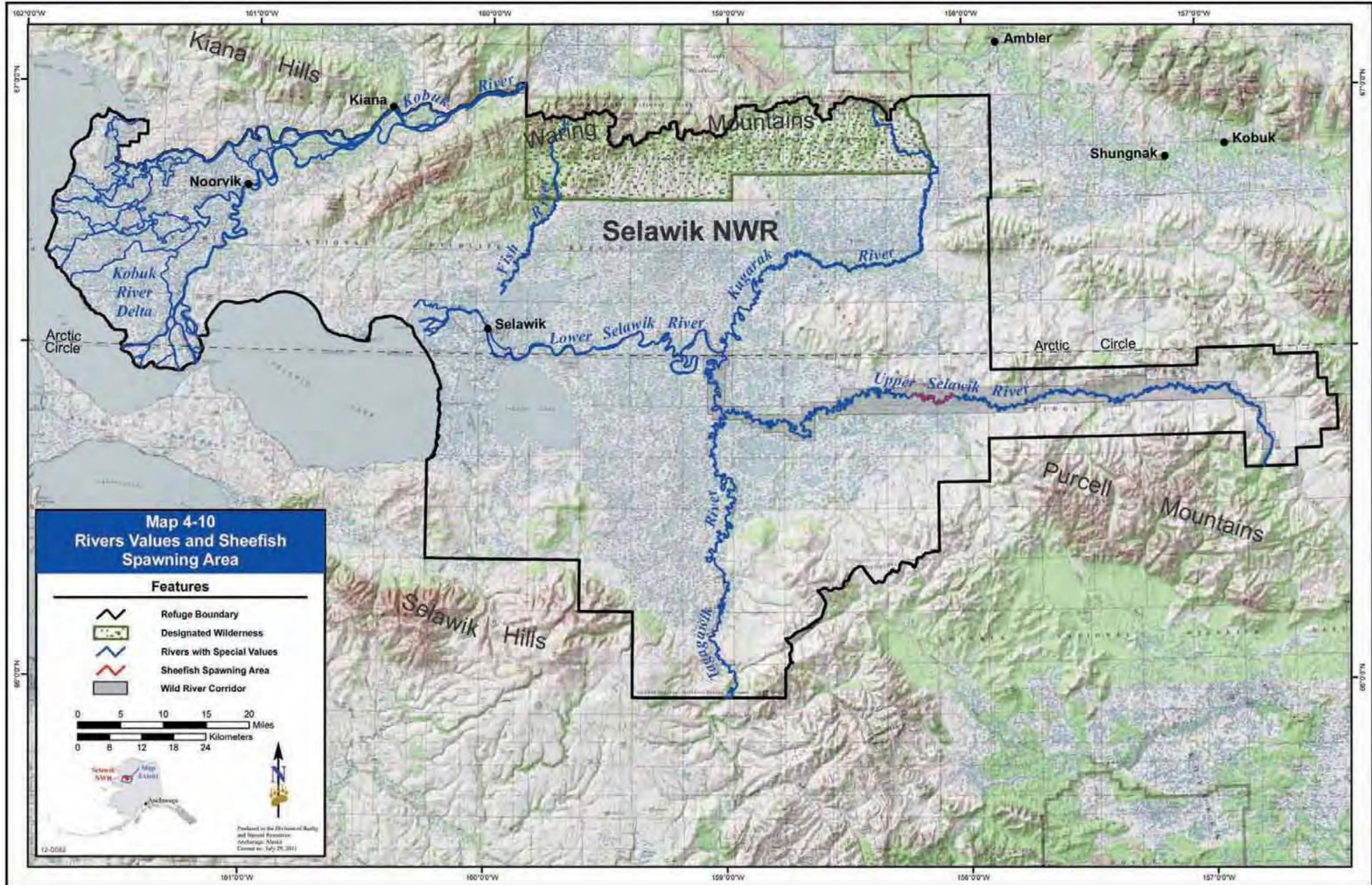


Figure 4-31. The upper Selawik River flows through an area of mixed forest and tundra. Photo by Ben Crosby.

The upper section of this 160-mile stretch of river lies in a low basin surrounded on three sides by ranges of hills: the Purcell Mountains, Zane Hills, and Sheklukshuk Range. The low Continental Divide (800 feet) separating the Purcell Mountains from the Zane Hills makes a natural trail between the upper Selawik River and the Koyukuk River, the former Iñupiaq country and the latter Athabascan country. This route was historically used for trade and exchange between the two cultures and continues to serve as a travel route today.

The upper Selawik River harbors one of two spawning areas for sheefish in northwest Alaska, making this an area of critical habitat. As of 2009, the spawning area had been roughly delineated as an eight-mile stretch of river near Ingruksukruk Creek (Hander and Olson 2007). As a trust species, sheefish is of special interest to the refuge and is one of the most important subsistence resources in the northwest Arctic region.

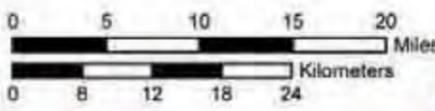
A special feature of the upper Selawik River is the hot springs located in a headwaters tributary. One of the two springs in this area is hot enough to brew tea or to cook a ptarmigan simply by dipping it into the water (Burch 1998). The springs have been developed by local residents into rustic therapeutic baths accessed primarily by snowmachine in the spring.



**Map 4-10**  
**Rivers Values and Sheefish Spawning Area**

**Features**

-  Refuge Boundary
-  Designated Wilderness
-  Rivers with Special Values
-  Sheefish Spawning Area
-  Wild River Corridor



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 and Natural Resources  
 Anchorage, Alaska  
 Current as of July 26, 2011

(Back of Map 4-10.)

A large permafrost thaw slump occurred along the upper Selawik River in 2004, creating a feature of unusual geologic interest (Figure 4-32). The slump, the largest of its kind known in Alaska, has attracted the attention of university researchers and others who continue to investigate and document its effects.



Figure 4-32. Erosion from the upper Selawik River retrogressive thaw slump has created a silty outwash bar that has pushed the river to the far bank.

#### 4.5.4.2 Lower Selawik River

Below the Kugarak River, the Selawik River flows through the Selawik flats, a nearly level maze of thaw lakes, meandering streams, and intricate waterways. This huge wetland is the only arctic tundra wetland complex of its size in the National Wildlife Refuge System, providing outstanding habitat for a multitude of migratory waterfowl, shorebirds, and other avian species (Figure 4-33).



Figure 4-33. The slow-moving lower Selawik River drains a huge wetlands complex that provides ideal habitat for fish, birds, and other wildlife.

The many rivers, sloughs, and lakes also support abundant fish resources, most notably sheefish, whitefish, northern pike, and burbot, which are important local foods. The waters of the lower Selawik River are intensely used by local Iñupiat for subsistence fishing and for travel related to other subsistence activities. Numerous traditional settlement sites are located throughout this area.

### **4.5.4.3 Kugarak River**

The Kugarak (*Kuuugruaq*) River is the major northern tributary of the Selawik River, draining a large, low-lying area—an extension of the Selawik flats—between the Waring Mountains and the Sheklukshuk Range. Like the Selawik River, waters of the Kugarak are slow moving and tannic.

The wetlands and waterways of this river basin provide excellent habitat for waterfowl and other migratory birds, especially greater white-fronted geese, black scoters, and greater scaup.

Because of its plentiful muskrats, the lower Kugarak River was an important spring camping area for the Iñupiat in the 19th and 20th centuries. Several major Iñupiaq winter settlements were also located on the lower Kugarak, including *Kuutchiaq*, the largest winter settlement in the entire Selawik drainage in the 19th century (Burch 1998).

### **4.5.4.4 Tagagawik River**

A major tributary of the Selawik River, the 100-mile long Tagagawik (*Tagragvik*) River begins in the Nulato Hills, then follows a sinuous course to the north across the Selawik flats. In the upland areas, the river is a clear, swift, shallow stream, popular among recreational moose hunters for river floating in the fall. The riparian vegetation adjacent to the river and surrounding the associated lake complex provides exceptionally good habitat for moose, lynx, and hares.

Historically, the lower Tagagawik River was an important spring camping area for the Iñupiat because of its abundant muskrats (Burch 1998). The area also included several major winter settlements of the upper Selawik Iñupiat. At the end of the 19th century, the most important Iñupiaq trader in the upper Selawik was based at a settlement in the upper Tagagawik, from where he could readily trade with both his own people and the neighboring Athabascans on the Koyukuk side (Burch 1998).

### **4.5.4.5 Fish River**

The Fish River (*Ikkviiyiq*) originates in the timbered Waring Mountains, flowing south out of the hills to a network of waterways on the Selawik flats. The shallow, swift river is unusual in the area for its clear water and gravel bottom; most of the waters of the Selawik flats are mud bottomed, dark, and tannic. More importantly, the Fish River is a spawning ground for humpback whitefish, a staple subsistence food in Selawik and in other communities in the region. The river thus provides critical habitat for this resource and quite possibly for other fish species as well. With its sandbars and large schools of fish, the Fish River is the only area near the village of Selawik with conditions suitable for seining in the fall. In years past, the upper Fish River was a key location for traditional fish weirs constructed to catch substantial numbers of whitefish to feed humans and sled dogs. Evidence remains today of these weirs and associated camps.

### **4.5.4.6 Kobuk River Delta**

Among the largest rivers in northwest Alaska, the Kobuk River begins in the rugged mountains of the central Brooks Range and flows 280 miles west to Hotham Inlet in Kotzebue Sound. Its

broad, 30-mile-long delta is interlaced with countless sloughs, ponds, oxbow lakes, river channels, and channel mouths. This maze of waterways provides outstanding habitat for migratory waterfowl and other birds, particularly tundra swans, greater white-fronted geese, and northern pintails. In the fall, the coastal portion of the delta is a staging area for thousands of migratory birds, especially swans, ducks, and geese (Moran 2007). Many fish species, including sheefish, whitefish, salmon, and burbot, traverse the delta en route to spawning grounds further upstream. The delta provides rearing, feeding, and wintering habitat for many of these species, as well as for northern pike and grayling.

Tall, dense willow thickets along the delta's channels support one of the highest concentrations of moose on the refuge. Numerous subsistence camps dot the delta, used by local Noorvik residents to harvest and process fish, moose, and caribou. In the 19th century, the primary winter settlements of the Kobuk delta Iñupiat were located along or near Riley and Nazuruk channels. One of these, *Kuupaamiit*, was likely the largest village in the entire Kobuk valley at the time (Burch 1998).

## 4.6 Refuge Infrastructure and Administration

### 4.6.1 Administrative Facilities

The headquarters for Selawik refuge is located in Kotzebue (Figure 4-34). The Kotzebue facilities consist of an office building, bunkhouse, and airplane hangar. The hangar is located on property owned by the State of Alaska adjacent to the Kotzebue airport and has a floatplane dock on the leased lot. The refuge owns three single-family residences in Kotzebue, one of which is on leased property. A member of the refuge staff occupies one of the three apartments located in the office building. The office building and aircraft hangar are also used by the National Park Service and managed through a shared facility agreement.

In the community of Selawik, the refuge leases a small office from a local vendor and a lot from the City of Selawik on which boats and other vehicles are stored.

The Selawik refuge maintains a two-bedroom, pan-abode® field cabin with several small outbuildings located at the confluence of the Kugarak and Selawik rivers.



Figure 4-34. Entrance to the Selawik refuge office in Kotzebue.

### 4.6.2 Staffing

The current staffing at the refuge consists of one intermittent and 10 permanent staff positions. The refuge occasionally hires temporary biological technicians and maintenance helpers, Student Temporary Employment Program personnel, and other student and career program participants. The refuge has a very active volunteer program coordinated through the Friends of Alaska Refuges.

Currently, the Selawik refuge is authorized to have the following staff:

- Wildlife refuge manager
- Administrative officer
- Deputy wildlife refuge manager
- Supervisory wildlife biologist
- Interdisciplinary biologist
- Outreach specialist
- Environmental education specialist
- Refuge information technician (located in Selawik village)
- Maintenance worker
- Intermittent maintenance worker (located in Selawik village)
- Airplane pilot

The following two positions are shared with the Koyukuk and Nowitna refuges. These employees are based and supervised out of the Galena office.

- Law enforcement/park ranger
- Fire management officer

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## **5. Implementation and Monitoring**

### **5.1 Introduction**

The Selawik Revised Comprehensive Conservation Plan (comprehensive plan) will be implemented through the goals, objectives, management guidelines and policies, and specific actions described in Chapters 2 and 3. The refuge will also use various step-down management plans described in Section 5.2 to implement the comprehensive plan. Each step-down plan has its own focus and identifies and directs the implementation of specific actions, techniques, and tools designed to achieve the objectives outlined in this comprehensive plan (Service Manual 602 FW 1.5).

The vision and goals adopted in the comprehensive plan are intended to guide management of the Selawik refuge for the next 15 years. The management objectives and actions adopted in the comprehensive plan are the concrete steps that the Service will take to reach those goals and therefore serve an integral role in implementation. The Service intends for these objectives to be a measure of real progress toward our goals for the Selawik refuge. Because opportunities and needs for new objectives will most likely arise, the Service considers these objectives to be dynamic and responsive to changing environmental and social conditions and management situations, such as those anticipated from accelerating climate change or infrastructure development in local communities.

Implementation of this comprehensive plan will require the Service to closely coordinate with its partners in the region and across Alaska to implement strategies for accomplishing the objectives of this comprehensive plan. The Service and the refuge will identify and use new partnership opportunities as they arise (Section 5.4).

Monitoring progress toward meeting the objectives will be achieved using various methods and strategies, including but not limited to surveys, inventories, censuses, and strategic frameworks. The Service will maintain flexibility in implementation of the comprehensive plan to account for changing environmental conditions, policies, budgets, new technologies, and opportunities for partnerships that may occur during the life of the comprehensive plan. The Service will evaluate the results of monitoring and amend and revise this comprehensive plan accordingly to improve wildlife conservation and refuge management (Section 5.5).

## **5.2 Current Step-down Plans**

### **5.2.1 Fishery Management Plan**

The Fishery Management plan currently used by the Service for Selawik refuge describes the biophysical environment of the refuge, fishery resources, human uses and activities, management history for the main fisheries, and major issues and concerns. The Fishery Management plan provides for continued use by subsistence harvesters and commercial and recreational anglers.

The Fishery Management plan provides goals and objectives to ensure the conservation of fishery resources and water quality and quantity at Selawik refuge. In general, management objectives are aimed at cooperatively administering the fishery program with Alaska Department of Fish and Game (ADF&G) based on the best available information while gathering new data to improve our knowledge base. This Fishery Management plan also

describes specific strategies, tasks, and constraints for addressing the issues and concerns regarding management of fishery resources on refuge lands, and it assigns priorities and costs for Federal tasks.

The Fishery Management plan for Selawik refuge was completed in 1993 and is outdated. This important step-down management plan is scheduled for revision within five to eight years of publication of this comprehensive plan (Chapter 2, Goal 1, Objective 12).

### 5.2.2 Western Arctic Caribou Herd Cooperative Management Plan

This cooperative management plan was published in 2003 by the Western Arctic Caribou Herd Working Group (Working Group), of which the Selawik refuge is a signing member (Chapter 2, Goal 1, Objective 4). The Working Group developed this plan with the purpose of allowing State, Federal, and Alaska Native organizations to work together to ensure the long-term conservation of the Western Arctic Caribou Herd and the ecosystem on which it depends to maintain traditional and other uses for the benefit of all people now and in the future.

The plan provides broad principles for guiding planning and management, as well as providing specific goals, strategies, and actions for seven key elements of caribou management in the region. These elements are cooperation, population management, habitat protection, consistent and clear regulations, reindeer herding, scientific and traditional ecological knowledge, and education. The Working Group began the revision process to update this plan in 2010, and the revised plan is scheduled to be published in 2012.

### 5.2.3 Fire Management Plan

Service policy requires all refuges with vegetation capable of sustaining fire to develop a fire management plan (FMP). An approved FMP is a prerequisite to implementing prescribed fire and use of wild fire for resource benefits on refuge lands. Wild fire events occasionally occur within the refuge (Chapter 4, Section 4.2.9), and a FMP for Selawik refuge was completed and approved in 2005.

In conjunction with the Alaska Interagency Wildland Fire Management plan, the Selawik refuge FMP serves as the guiding framework for all fire management decision making and activities on the refuge. It provides goals and objectives for the refuge's fire management program, and it specifies the uses of fire that are consistent with national fire policy, Service direction, and refuge conservation goals and objectives. The FMP describes the relationship between land management goals and fire policy, wildland fire management strategies, organization and budget, monitoring and evaluation, public safety, and coordination and collaboration with multiple partners.

The Service is scheduled to review and update the step-down FMP for Selawik refuge following the publication of this comprehensive plan (Chapter 2, Goal 1, Objective 10).

### 5.2.4 Cultural Resources Management Plan

This step-down plan provides guidance for refuge staff in meeting legal requirements to protect and manage cultural resources on Selawik refuge lands. The refuge's current Cultural Resources guide provides a reference for legal guidance and regulation derived from the Service Manual and the Cultural Resources Management Handbook. It outlines roles and responsibilities, summarizes legislation governing management of cultural resources, and

contains useful information for the refuge manager in prioritizing projects. The guide describes the current state of knowledge for the prehistory and history of the region and includes a list of current and ongoing projects, as well as new projects to address knowledge gaps.

The refuge is working with the Service's regional office to set the schedule to update and revise the Selawik Cultural Resources guide within five to eight years of publication of this comprehensive plan (Chapter 2, Goal 6, Objective 3). The new guidance document will be titled Cultural Resources Management plan, and its development is scheduled to begin in 2012.

### **5.2.5 Water Resources**

Refuges in Alaska share the common purpose of ensuring that water quality and quantity are both maintained and protected (Chapter 3, Section 3.3.10.2). The Service operates and monitors stream gauges within the Selawik refuge to measure and analyze physical, nutrient, inorganic, and other indicators of water quality. Monitoring water quality and quantity on refuge lands is guided by the Service's regional quality assurance plan for assessing inorganic water quality (Peck 2004); a strategic plan for documenting water resources on Alaska refuges (Bayha et al.1997); and a study plan specific to the Selawik refuge (Peck 2000). Refuge staff will continue to use these documents to guide the collection of hydrologic data on waters within and draining into the refuge. The Service will continue to implement the goals and objectives for water resources monitoring as described in these plans and reports. Refuge staff will work with the Service's Water Resources Branch to review, revise, and update the refuge-specific study plan for Selawik as required.

### **5.2.6 Inventory and Monitoring Plan**

An inventory and monitoring plan (I & M plan) directs the annual program of fish and wildlife related surveys conducted on the refuge. This step-down plan is mandated by Service policy (Service Manual 701 FW 2) and is used to describe inventory and monitoring studies in broad context as they relate to resource management programs at the refuge. The Selawik refuge I & M plan contains three parts: (1) program goals and objectives, study justifications, and prioritization and administration of the program; (2) peer-reviewed study protocols; and (3) the Service's regional directive for refuge inventory and monitoring. Study protocols detail how a specific survey or project is executed at the refuge and, where appropriate, contain measurable thresholds for initiating specific management actions. The Service's regional directive outlines policies and guidelines for prioritizing and implementing inventory and monitoring activities on refuges in Alaska.

The Selawik refuge I & M plan was completed and approved in June 2009 (Chapter 2, Goal 1, Objective 1; Appendix E). The Service and the refuge will use this I & M plan as the vehicle to implement and monitor progress toward Objectives 2–8 under Goal 1 of this comprehensive plan (Chapter 2).

The schedule for review of the Selawik refuge I & M plan is every two years by the refuge staff and every five to eight years by the Service's regional office. Study protocols for current and ongoing projects were reviewed in 2011. Study protocols for new projects will be reviewed as they are implemented.

## **5.3 Future Step-down Plans**

### **5.3.1 Land Protection Plan**

A land protection plan (LPP) is a step-down management plan that is required for refuges by Department of the Interior and Service policies (Chapter 3, Section 3.3.4), and it is required for acquisitions using Land and Water Conservation Funds. The LPP is used to identify priorities for habitat conservation on private lands within refuge boundaries. The LPP will be used to guide the refuge's land conservation activities and provide a framework for cooperation between the Service and private landowners. The LPP for the Selawik refuge is scheduled to be completed by December 31, 2013 (Chapter 2, Goal 1, Objective 11).

Within the framework of the LPP, there are a number of ways for interested landowners to work with the Service to benefit wildlife species and habitats. The Service may be able to develop a cooperative management agreement, purchase a conservation easement, or trade lands; in some cases, we may be able to buy key lands from willing landowners who desire to sell (USFWS 2002). Any course of action would require mutual consent, and the LPP does not obligate either the refuge or the landowner to undertake any of the conservation measures identified.

The Service will consider management goals, priorities, and the availability of funds when it is approached by private landowners who are interested in sharing ideas and proposals for land conservation within refuge boundaries. The Service understands that many private lands are already sufficiently protected, providing quality habitats and resources for wildlife. In these cases, the Service usually would not recommend taking additional conservation actions.

### **5.3.2 Wilderness Stewardship Plan**

A wilderness stewardship plan (WSP) is a step-down management plan that is used to guide the preservation, stewardship, and use of a designated wilderness area (Service Manual 610 FW 3). The WSP provides detailed strategies and implementation schedules for meeting the broader wilderness objectives identified in this comprehensive plan and other refuge priorities. The WSP also describes ongoing and needed monitoring and research, appropriate and compatible uses, and minimum requirement analyses for refuge administrative activities and commercial visitor services.

The Service will develop a WSP for the Selawik Wilderness Area using planning guidance published in the Service Manual (602 FW 1, 3, and 4) within 15 years of publication of this comprehensive plan (Chapter 2, Goal 5, Objective 10). The refuge staff and the planning team will develop management goals and objectives for the Selawik Wilderness Area based on the refuge purposes, Wilderness Act purposes, the ANILCA provisions for managing designated wilderness in Alaska (Service Manual 610 FW 5), the Refuge System mission, and current principles of wilderness management (Service Manual 610 FW 1.14). The Service will provide adequate opportunities for its partners and the public to meaningfully contribute to the WSP for the Selawik Wilderness Area.

## 5.4 Partnership Opportunities

### 5.4.1 Introduction

The guiding mission of the Service reads, “Working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people” (Service Manual 602 FW 1.6). The Selawik refuge exists within dynamic ecological and social systems, and many of the resources on refuge lands are of local, regional, national, and international importance and value. For these reasons, diverse segments of the public, other governments and agencies, and various non-governmental organizations have wide-ranging interests in the Selawik refuge and the work of the Service. Successful implementation of the refuge’s conservation programs will depend on, and will continue to require, effective communication; relationship building; trust; active community participation and support; partnering; and assistance by Service leadership, refuge staff, and local communities (Jacobs and Brooks 2010).

### 5.4.2 A Focus on Partnering

Partnerships involve voluntary sharing and pooling of resources such as labor, money, and information by two or more stakeholders to address key issues and resolve problems that cannot be addressed by either group acting alone (Gray 1985; Selin 2004). More than 20 of the planning objectives described in Chapter 2 directly address partnering and relationship building. Maintaining existing partnerships and seeking new opportunities to partner with others are among the best ways for the Selawik refuge to accomplish its work, fulfill the mission of the Service, and improve conservation in the Selawik area (Meretsky et al. 2006). To implement this comprehensive plan, the refuge will continue to seek opportunities to work with others, including but not limited to the following:

- Bureau of Land Management (BLM)
- Commercial recreation interests
- Friends of Alaska National Wildlife Refuges
- Kikiktagruk Inupiat Corporation (KIC)
- Local businesses
- Local tribal and city councils
- Maniilaq Association
- NANA Regional Corporation (NANA)
- National Oceanic and Atmospheric Administration
- National Park Service (NPS)
- Non-governmental organizations
- Northwest Arctic Borough (NWAB)
- Northwest Arctic Borough School District
- Northwest Arctic Federal Subsistence Regional Advisory Council
- State of Alaska
- Universities and museums
- U.S. Geological Survey

### **5.4.3 Partnerships to Address Key Planning Issues**

#### ***5.4.3.1 Commercial Guides and Transporters***

Commercial guides and transporters for big game hunting provide public access to the Selawik refuge and wildlife resources on refuge lands. These services are regulated by the State of Alaska (i.e., Division of Occupational Licensing, Division of Natural Resources, Big Game Commercial Services Board, and Board of Game). It is essential that the refuge closely coordinate with each of these agency's respective programs when implementing program objectives and actions that involve harvest of wildlife on refuge lands.

The refuge is also adjacent to lands administered by the BLM and NPS. Guided clients and other hunters utilizing BLM lands adjacent to the Selawik refuge often harvest wildlife that regularly move in and out of the refuge. The refuge will work to benefit the public and the programs of both agencies by coordinating with the BLM when establishing numbers of guides and locations of base camps in drainages in and adjacent to the refuge.

The use of commercial guides and transporters for big game hunting has been a controversial topic in the region for a number of years (e.g., Georgette and Loon 1988; Jacobson 2008; Chapter 4, Section 4.4.2.3). There are numerous stakeholders involved in addressing the complex issues of access to wildlife resources and related social conflicts between non-local hunters and local subsistence hunters. The Game Management Unit 23 Working Group (Working Group), of which the Selawik refuge is a member, was formed in 2008 to collaboratively address these issues. The initial purpose of this group was to develop proposals and recommendations for ways to minimize user conflicts resulting from increasing numbers of hunters in GMU 23 through coordinated planning and management. The initial phase of this group's work has been completed. The Selawik refuge fully supports the next phase of the Working Group as a participant (Chapter 2, Goal 4, Objective 3). The next phase of the Working Group will review and provide suggestions on Federal and State agency plans related to commercial use for big game hunting. The second phase of the Working Group also serves as a forum to address new issues related to big game hunting and commercial uses in the region as they arise.

In addition to the coordinated interagency efforts, a strong partnership with local village tribal councils and the private trespass officer program will remain paramount when making permit decisions; accurately analyzing the effects of the refuge's permitting program on subsistence users; and assisting in the enforcement of permit stipulations. Communication between the various law enforcement entities and those living within the refuge boundaries during the hunting seasons has many benefits. This is an example of improved communication that has resulted from the collaborative efforts of the Working Group and should continue to be encouraged and facilitated by the Selawik refuge and Service leadership.

#### ***5.4.3.2 Shared Community Building***

The idea of a shared community building originated with the refuge staff, the village of Selawik, and NANA Regional Corporation. The refuge will work closely with the tribal and city governments and NANA to implement this idea. Office space in most villages is extremely limited. Many organizations and agencies regularly need space in communities to hold public meetings or for temporary housing and office space for staff. Agencies and organizations interested in partnering on this project in both Selawik and Noorvik include Maniilaq, Environmental Protection Agency, NWAB, Alaska Native Tribal Health

Consortium, and Wells Fargo Bank. These potential partners expressed a view that by having such a shared resource, they would be able to provide improved support to the village, improve communication to village residents about the programs designed to serve them, and better manage subsistence resources. The strategy would involve locating a suitable building and identifying the needs of the communities and partnering organizations. Then, the partners would work together to remodel a building to accommodate these needs. The building would be owned by the community, and the partners would contribute funds to pay operating costs. A shared facility agreement and other appropriate agreements would be established to cover use and address annual and long-term maintenance needs. Currently, a building in Selawik has been located, and the village is identifying its needs, which include a meeting place for search and rescue efforts and tribal and city council meetings.

#### ***5.4.3.3 Winter Trail Marking***

The refuge's existing partnership with the NWAB, local search and rescue organizations, and the largest private landowner within the refuge, NANA, has proven to be an effective way of ensuring safe access to the refuge for winter travelers. The NWAB plays an important role in public safety for the region, making this partnership an ideal way for the refuge to work with local organizations to address winter trail marking and accomplish its objectives for managing local public use.

#### ***5.4.3.4 Shelter Cabins***

A long-term informal partnership between the public and members of community search and rescue teams has historically taken responsibility for the construction and maintenance of shelter cabins within the refuge. Organizations such as the NWAB and NANA have joined this partnership, providing materials and financial support. The refuge will look for ways to assist with the maintenance of these cabins and periodically meet with partners and the public to determine if additional cabins are needed or existing ones should be relocated as a result of changing public use patterns.

#### ***5.4.3.5 Singauruk (Sinjagrak) Bridge***

To successfully implement the preferred alternative, extensive public input and participation will be required on the part of those who use the Singauruk (*Sinjagrak*) Bridge during the winter and who are knowledgeable of local environmental conditions at the site. The bridge was first built under a cooperative agreement with the NWAB. A continued partnership with the borough and their involvement in designing and maintaining a bridge that meets the regional and refuge needs is recommended. The bridge and/or any other river crossing in this area provide important access to NANA lands and an associated gravel deposit. Involvement on the part of NANA, either as a partner or in a potential land exchange, should be part of the long-term solution to this planning issue.

#### ***5.4.3.6 Public Use at the Hot Springs***

Management of the Selawik Hot Springs has been accomplished through a long-standing partnership between the Upper Kobuk and Huslia elders' councils. Although not the only users of the site, these councils represent the most active users of this area and thermal spring resource. We propose to support and take guidance from their experience. The refuge joined this partnership in the 1990s by assisting with the purchase and transport of materials to

improve outbuildings that support the traditional use of this special place. The refuge will continue to assist in documenting the rich history and traditional practices of the hot springs with elders in nearby communities. If the public advocates additional marking of winter snowmobile trails to the hot springs, the NWAB would be another partner to consider because the refuge works closely with the borough to mark winter trails and provide information about trail locations and conditions to the public.

### 5.5 Plan Amendment and Revision

Periodic review and revision of this comprehensive plan will be necessary. Fish and wildlife populations, habitats, local communities, visitors from the public, management practices on adjacent lands, and other factors change with time, often in unforeseen ways. Challenges also may be encountered while implementing the comprehensive plan that the Service and the refuge staff will need to address. As our knowledge of the refuge environment changes and improves, changes in management may be identified and incorporated into the comprehensive plan.

Revisions are a necessary part of the adaptive management framework used by the Service. Adaptive management incorporates new information learned from research and monitoring into management actions (Service Manual 602 FW 1); it is the integration of project design, management, and monitoring to systematically test assumptions in order to adapt and learn (Salafsky et al. 2001). This means that objectives and strategies used to reach goals can be adjusted as we learn more about refuge management as a result of implementing the comprehensive plan and monitoring our progress.

As important public or policy issues arise, or when the refuge manager determines an important need to do so, the refuge will hold meetings or use other techniques (e.g., newsletters, comment cards, and surveys) to solicit comments that enable visitors and public user groups, adjacent landowners, government agencies, and other interested parties to express their views on how the refuge is being managed. By encouraging continual input from the public, the refuge will be better able to serve these groups and interested parties, understand potential problems before they occur, and take immediate action to address issues or resolve existing problems.

Every five years, or as needed, the refuge staff will review public comments, local and State government recommendations, staff recommendations, data from research and monitoring studies, and other sources to determine if revisions to the comprehensive plan are necessary. The goal is to fine-tune the comprehensive plan as needed without necessarily modifying this document through a new public planning process. Minor changes will be addressed using more detailed permit stipulations, annual work plans, or step-down plans.

A major change in management of the refuge in response to a new issue, situation, or policy would most likely make it necessary to amend this document. Major changes or amendments to this comprehensive plan would require a new environmental assessment, or possibly an environmental impact statement, and a public involvement process to comply with the National Environmental Policy Act (NEPA).

Formal review and complete revision of this comprehensive plan, with public process and NEPA compliance, will occur every 15 years.

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**Appendix A:**  
**Legal and Policy Guidance**



## **A. Legal and Policy Guidance**

Management of the Selawik refuge is largely dictated by the legislation that created this conservation unit and the refuge purposes and goals described in Chapter 1. Numerous laws, regulations and policies, and agreements with the State of Alaska also guide the management of the refuge. This appendix identifies the laws and policy guidance that were integral for the development of this comprehensive plan.

### **A.1 Legal Guidance**

Operation and management of the Selawik refuge is influenced by a wide array of acts, treaties, and Executive orders. Among the most important are the National Wildlife Refuge System Administration Act, as amended by the National Wildlife Refuge System Improvement Act; the Refuge Recreation Act; the Endangered Species Act; ANILCA, and the Wilderness Act. These laws are described briefly along with other acts and legal guidance that influence the planning process and management of the refuge.

#### **A.1.1 International Treaties**

The international treaties that affect Selawik refuge are migratory bird treaties with Canada, Mexico, Japan, and the Soviet Union, and the Convention on Nature Protection and Wildlife Conservation in the Western Hemisphere. These treaties differ in emphasis and species of primary concern but collectively provide clear mandates for identifying and protecting important habitats and ecosystems and for protecting and managing individual species.

Treaties for migratory bird protection include the following management provisions.

- Prohibiting disturbance of nesting colonies.
- Allowing the Secretary of the Interior to establish seasons for the taking of birds and collections of their eggs by Alaska Natives for their own nutritional and other essential needs.
- Directing each nation to undertake, to the maximum extent possible, measures necessary to protect and enhance migratory bird environments and prevent and abate pollution or detrimental alteration of their habitats.
- Requiring each nation to provide immediate notification to the other when pollution or destruction of habitats occurs or is expected.
- Stipulating that each nation shall, to the extent possible, establish preserves, refuges, protected areas, and facilities for migratory birds and their habitats and manage them to preserve and restore natural ecosystems.
- Stipulating that special habitats outside the jurisdictional boundaries (territorial limits) may be designated in which, to the maximum extent, persons under each nation's jurisdiction shall act in accordance with the principles of the treaty (for example, this stipulation might require U.S. oil tankers to avoid or prevent pollution of special seabird areas on the high seas).
- Providing that protective measures under the treaty may be applied to species and subspecies not listed in the specific convention, but which belong to one of the families containing listed species.

## A.1.2 National Guidance

### ***A.1.2.1 National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, 16 U.S.C. 668dd-668ee (Refuge Administration Act)***

The Refuge Administration Act serves as the "organic act" for the National Wildlife Refuge System. The act, as amended, consolidated the various categories of lands administered by the Secretary of the Interior (Secretary) through the U.S. Fish and Wildlife Service (Service) into a single National Wildlife Refuge System (Refuge System). The act establishes a unifying mission for the Refuge System, a process for determining compatible uses of refuges, and a requirement for preparing comprehensive conservation plans. This act states, first and foremost, that the mission of the National Wildlife Refuge System be focused singularly on wildlife conservation.

This act identified six priority wildlife-dependent recreation activities or uses; clarified the Secretary's authority to accept donations of money for land acquisition; and placed restrictions on the transfer, exchange, or other disposal of lands within the Refuge System. Most importantly, this act reinforces and expands the compatibility standard of the Refuge Recreation Act. The Refuge Administration Act authorizes the Secretary, under such regulations as he may prescribe, to "permit the use of any area within the [Refuge] System for any purpose, including but not limited to hunting, fishing, public recreation and accommodations, and access whenever he determines that such uses are compatible with the major purposes for which such areas were established."

### ***A.1.2.2 Refuge Recreation Act of 1962 (16U.S.C.460k-460k-4, as amended)***

This act requires that any recreational activities or uses on areas of the National Wildlife Refuge System be compatible with the primary purpose(s) for which the area was acquired or established. This act also requires that sufficient funding be available for the development, operation, and maintenance of recreational activities or uses that are not directly related to the area's primary purpose(s).

### ***A.1.2.3 Alaska Native Claims Settlement Act of 1971 (ANCSA)***

This act provides for "a fair and just settlement of all claims by Natives and Native groups of Alaska, based on aboriginal land claims." In exchange for a land and monetary settlement and the creation of 12 land-based Native regional corporations (13 regional corporations exist today), Native land claims were established. In exchange for this settlement, all aboriginal titles and claims, including any fishing and hunting rights, were extinguished. Section 17(d)(2)(A) of ANCSA provided the basis for the enactment of ANILCA, described in the next section. Under Section 22(g), refuge lands conveyed to the village corporations remain subject to the laws and regulations governing use and development of the refuge. This section applies only to lands that were designated as refuge lands at the time ANCSA was passed. Section 17(b) of ANCSA provided for public easement across Native lands for access to Federal lands.

### ***A.1.2.4 Alaska National Interest Lands Conservation Act of 1980, as amended, 16 U.S.C. 140hh-3233, 43 U.S.C. 1602-1784 (ANILCA)***

In addition to amending ANCSA, the Alaska Statehood Act, and the Wild and Scenic Rivers Act, and modifying portions of the Wilderness Act as it applies to lands in Alaska, ANILCA expanded the Federal conservation unit system throughout the State (including refuges,

parks, forests, designated wilderness areas, and designated wild rivers). ANILCA sets forth the purposes of the Selawik refuge, defines provisions for planning and management, and authorizes studies and programs related to wildlife and wildland resources, subsistence opportunities, and recreational and economic activities or uses (such as oil and gas exploration and development, access, and transportation and utility systems). Section 1317 of ANILCA requires all refuge lands that are not designated as wilderness to be reviewed regarding suitability for wilderness designation.

Title VIII of ANILCA authorizes the State of Alaska to regulate subsistence activities and uses on Federal public lands if several requirements are met. The State of Alaska regulated subsistence activities and uses between 1980 and late 1989. (For the purposes of Federal subsistence management, Federal public lands are defined to include conservation units managed by the U.S. Fish and Wildlife Service, the National Park Service, the Bureau of Land Management, and the U.S. Forest Service.) In late 1989, the Alaska Supreme Court ruled that the rural residency preference required by ANILCA violated the constitution of the State of Alaska. In 1990, the Federal government assumed management authority for subsistence hunting and trapping and subsistence fisheries on non-navigable waters on Federal public lands in Alaska. On October 1, 1999, Federal management authority was expanded to include navigable waters within and adjacent to the exterior boundaries of Federal public lands in which the United States has an interest by virtue of the reserved water rights doctrine.

Acting under authority delegated by the Secretaries of the Interior and Agriculture, the Federal Subsistence Board (Board) establishes regulations for the harvest of fish and wildlife for subsistence purposes by qualified rural residents on Federal public lands in Alaska. The Federal process for establishing subsistence regulations involves substantial public input (50 CFR 100.18). Individuals and organizations submit proposals for regulatory changes. Then, these proposals are analyzed by Federal subsistence staff, often incorporating data from local Federal managers and the Alaska Department of Fish and Game. These analyses are subsequently reviewed by Federal Subsistence Regional Advisory Councils (Councils) (e.g., the Northwest Alaska Subsistence Regional Advisory Council). The Councils, which are composed of local citizens, make recommendations to the Board about these proposals. Under ANILCA (Section 805(c)), the Board accepts recommendations of the Councils unless the recommendations: 1) violate recognized principles of fish and wildlife management; 2) are detrimental to subsistence needs; or 3) lack substantial evidence.

While the subsistence regulations of the State of Alaska apply to all Federal public lands (unless superseded by Federal subsistence regulations), the State of Alaska has not been successful, to date, in amending its constitution to bring its regulatory framework back into compliance with the rural residency preference required by ANILCA. At present, Federal subsistence regulations governing the harvest of fish and wildlife are in place on most Federal public lands in Alaska. The Federal subsistence management program was intended to be temporary, and the original Federal regulatory program mirrored the program used by the State of Alaska in 1990. Since 1990, the Federal subsistence management program has grown, and, in many cases, its regulations no longer mirror the regulatory program put in place by the State of Alaska. In numerous instances, the Board has issued Federal regulations to provide for use only by eligible rural residents in order to implement the ANILCA Title VIII preference for local rural users or protect a wildlife population or fishery under 50 CFR 100.10(d)(4).

***A.1.2.5 Wilderness Act of 1964 (P.L. 88-577)***

This act established the National Wilderness Preservation System, provides the framework for designation by Congress of new units to the system, and prescribes policy for management of designated wilderness areas. Section 702(10) of ANILCA designated about 240,000 acres in the Selawik refuge as wilderness. Section 707 of ANILCA provides that except as provided for in ANILCA, wilderness areas designated under ANILCA shall be managed in accordance with the Wilderness Act. Section 1317 of ANILCA requires the “review, as to their suitability ... for preservation as wilderness, of all land within ... units of the National Wildlife Refuge System in Alaska not designated as wilderness by this Act ...”

***A.1.2.6 Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271-1287; P.L. 90-542; 82 Stat. 906)***

This act established a National Wild and Scenic Rivers System and prescribes the methods and standards through which additional rivers may be identified and added to the system. Rivers in the National Wild and Scenic Rivers System have outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, ecological, or other values and are managed in a way that protects these values for present and future generations. Rivers are classified as wild, scenic, or recreational; and hunting and fishing are permitted in components of the system under applicable Federal and State laws. The Wild and Scenic Rivers Act states in section (d)(1), “In all planning for the use and development of water and related land resources, consideration shall be given by all Federal agencies involved to potential national wild, scenic and recreational river areas.”

***A.1.2.7 Marine Mammal Protection Act of 1972, as amended (16 U.S.C. 1361-1421h; 50 CFR 13, 18, 216 and 229 as amended)***

This act established a Federal responsibility for conservation of marine mammals. Management of walrus was vested in the Department of the Interior. The act established a moratorium on the taking and importation of marine mammals and products made from them. Alaska Natives who take marine mammals for subsistence purposes, however, were exempt from the moratorium.

***A.1.2.8 Endangered Species Act of 1973, as amended, P.L. 93-205 (16 U.S.C. 1531-1544, et seq., as amended) (ESA)***

The ESA provides for the conservation of threatened and endangered species of fish, wildlife, and plants by Federal action and by encouraging the establishment of State programs. Among its provisions, the ESA authorizes the determination and listing of endangered and threatened species and the habitat critical to those species; prohibits unauthorized taking, possession, sale, transport, etc., of endangered species; provides authority to acquire land for the conservation of listed species with land and water conservation funds; and authorizes the assessment of civil and criminal penalties for violating the act or its implementing regulations.

Section 7 of the ESA requires Federal agencies to ensure that any action authorized, funded, or carried out by them does not jeopardize the continued existence of listed species or modify their critical habitat. Management actions and direction found in this comprehensive plan do not adversely affect listed species or designated critical habitat. There are no threatened or endangered plants or animals on Selawik refuge that have been listed under the ESA by the Federal government. This comprehensive plan is fully consistent with Section 7 of the ESA.

***A.1.2.9 Antiquities Act (16 U.S.C. 431-433); Archaeological Resources Protection Act of 1979, P.L. 96-95; (16 U.S.C. 470, et seq., as amended); 43 CFR 50-58; and the National Historic Preservation Act of 1966, (P.L. 89-665; 16 U.S.C. 470 et seq., as amended)***

These laws make reference to cultural resources and/or direct the management of cultural resources on Federal lands. In general, these historic preservation laws do the following:

- Vest ownership of historic and prehistoric properties and of materials collected from such sites with the State and Federal government.
- Protect archeological and historic sites from unauthorized disturbance and prescribe penalties for individuals who damage (or collect cultural resources from) such sites.
- Provide for issuing of permits to qualified individuals and institutions to conduct scientific research.
- Mandate the inventory and evaluation of all sites on government owned and managed lands; inventory is the responsibility of the individual Federal agency involved.
- Require that all projects with State or Federal involvement be conducted in such a way as to protect any significant cultural resources that may be present. This includes but is not limited to the performance of archeological surveys, site evaluations, and, if necessary, mitigation of adverse impacts to such resources.

***A.1.2.10 National Environmental Policy Act of 1969 (NEPA), as amended, 42 U.S.C. 4321-4347, and the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of NEPA, 40 CFR 1500-1508***

NEPA is the basic national charter for protection of the environment. The procedural provisions in the CEQ regulations require Federal agencies to integrate the NEPA process with other planning processes, at the earliest possible time, whenever taking a major Federal action that may significantly affect the environment; identify and analyze the environmental effects of their actions; describe appropriate alternatives to the proposal; involve the affected State and Federal agencies, Tribal governments, and the affected public in the planning and decision making processes; and fully integrate all refuge proposals that may have an impact on the environment with the provisions of NEPA (40 CFR 1501.2). Implementation of any one of the management alternatives in the draft plan for the Selawik refuge is such an action, and this planning process was subject to NEPA requirements.

***A.1.2.11 Federal Water Pollution Control Act of 1972, as amended by The Clean Water Act of 1977, P.L. 95-217; (33 U.S.C. 1251-1387, et seq., as amended; 33 CFR 320 ff; 40 CFR 15, 100-400, 220-233, 400-471)***

This law regulates the discharge of pollutants into waters of the United States. The act protects fish and wildlife, establishes operation permits for all major sources of water pollution, and limits the discharge of pollutants or toxins into water. The act makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a permit is obtained under the Clean Water Act.

## **A.2 Policy Guidance**

Programmatic guidance and policy documents provide additional direction for the management of the Refuge System. Much of the management direction described in this

comprehensive plan is influenced by general guidance from the programs and policies described in the next sections.

Several of these documents provide guidance that directs the Service to use an ecosystem approach in which the integrity of the entire ecosystem and its processes are considered when managing the refuges. This broad-scale approach requires close collaboration with others in the form of effective landscape-level partnerships and coordinated efforts to address climate change. We provide a brief description of ecosystem management in the context of partnering and summarize the influential programs, strategies, and national and regional management plans that were reviewed during the development of this comprehensive plan.

### **A.2.1 Ecosystem Management and Conservation Partnerships**

An ecosystem approach to refuge management was initiated by the Refuge System Improvement Act. Ecosystem management acknowledges that all living organisms (including people and their communities), the physical environment, and the ecological processes that sustain them are interconnected. A given ecosystem can be described as the intersection of natural forces, social relations, and the full range of meanings and values that people create for and attribute to the landscape (Williams and Patterson 1999).

Ecosystems are not limited by land ownership or the boundaries of conservation units and human communities. The Service recognizes the complex and interconnected relationships that are present within ecosystems and across landscapes and that ecosystems may not be confined within the boundaries of a refuge, a state, or even the nation. The Service also recognizes that people and their socio-cultural and economic systems are important components of ecosystems and working with people in conservation partnerships and other collaborative arrangements is necessary in applying ecosystem management. Refuge planning and management will always take into account surrounding public and private lands, striving to maintain existing conservation partnerships and seeking opportunities to work with new partners. All management direction in this comprehensive plan supports these principles of ecosystem management and contributes to maintaining the health of intact ecosystems in Alaska.

Creating and maintaining conservation partnerships across entire landscapes is crucial for reaching the goal of ecosystem management because fish, wildlife, and their habitats are not constrained by the administrative boundaries of specific protected areas. Without physical barriers, and with available habitat, fish and wildlife will freely move through ownerships and management jurisdictions. In the face of accelerating climate change and other environmental stressors, some species may shift their ranges into different ecosystems and political or administrative jurisdictions.

Conservation of biological diversity on refuge lands and outside refuge boundaries is an ambitious but fundamental goal of the Service's ecosystem approach to management. Through its refuge-specific, regional, national, and international programs, the Service contributes to the conservation of biological diversity by directly protecting habitats and managing for the recovery of fish and wildlife populations that are threatened or endangered. The Service also restores habitat, conducts environmental clean ups, monitors ecological integrity, and provides technical assistance to private landowners. The Service has learned that it cannot work alone to accomplish these efforts because conservation of biological diversity requires coordination among many public agencies, private organizations, landowners, and citizens across different landscapes, societies, and cultures.

## **A.2.2 Landscape Conservation Cooperatives**

Over two decades of ecosystem management combined with the realities of accelerating climate change have made it clear to the Service that conservation must be coordinated on a landscape-level basis. In September 2009, the Department of the Interior issued Secretarial Order No. 3289 (amended February 2010) to address the impacts of climate change on the nation's waters, lands, and other natural and cultural resources. Section 3(c) of the order states: "Interior bureaus and agencies, guided by the Energy and Climate Change Council, will work to stimulate the development of a network of collaborative 'Landscape Conservation Cooperatives'. These cooperatives ... will work interactively with the relevant DOI Climate Science Center(s) and help coordinate adaptation efforts [in response to accelerating climate change] in the region."

A Landscape Conservation Cooperative (LCC) is an applied conservation partnership that provides scientific and technical support for conservation at a landscape scale. The fundamental role of the LCC is to help address conservation science needs within a broad geographic area such as the entire range of a species, population, or groups of species of fish or wildlife. Although the LCC concept was initially motivated by climate change, the role of these partnerships is to help improve the collective ability of the conservation community to address a wide variety of environmental stressors and conservation challenges within entire landscapes, including management response to climate change.

Implementing the LCC concept includes bringing partners together to identify what they can collectively agree on in terms of conservation interests and science needs. Then, the partners will work toward collectively addressing those interests and needs. The intent of LCC partnerships is to accomplish a conservation mission that no single agency or organization could accomplish alone.

## **A.2.3 National Management Plans and Programs**

Next, we describe some of the influential plans and programs that we reviewed while working on this comprehensive plan to increase its consistency with national conservation directives and partnerships.

### ***A.2.3.1 Strategic Habitat Conservation Framework***

Published in 2006 with an implementation guide following in 2008, the Service's Strategic Habitat Conservation framework (SHC) is rooted in the principles of adaptive natural resource management. Adaptive management incorporates new information learned from research and monitoring into future management actions. The SHC framework provides a guiding tool for setting and achieving conservation objectives at multiple scales based on the best available information, data, and ecological models.

Implementation of SHC involves the integration of four elements that occur in an adaptive management feedback loop. These are biological planning, conservation design, delivery of conservation actions, and monitoring and research. Information learned from implementing SHC is used to help a refuge determine what contribution(s) it can make for meeting conservation priorities at the landscape level. Project leaders and planning teams consider SHC, together with other Federal policies and guidance, when developing goals and objectives for refuge comprehensive conservation plans.

### ***A.2.3.2 Strategic Plan for Responding to Accelerating Climate Change***

In 2010, the Service published a strategic plan for responding to the effects of accelerating climate change (see Chapter 2, Goal 8, Objective 1). The primary purpose of the Service's strategic plan is to provide a vision and direction for the agency by defining its role within the context of the larger conservation community as both respond to global climate change on a landscape-level basis (USFWS 2010). Another key component of the Service's strategic plan is close coordination with the regional Climate Science Centers that are being established by the U.S. Geological Survey and other Department of the Interior agencies as they implement Secretarial Order No. 3289, as amended.

Rooted in the mission of the Service, the strategic plan outlines goals, objectives, and actions organized under three major strategies: adaptation, mitigation, and engagement. Adaptation is helping fish, wildlife, and their habitats adapt to climate change. (The Service's strategic plan establishes applied science partnerships for conservation, such as Landscape Conservation Cooperatives, through the adaptation section of this document.) Mitigation is reducing levels of greenhouse gasses in the Earth's atmosphere. Engagement is reaching out to and communicating with existing partners and others to join forces with them in seeking solutions to the challenges and threats to fish and wildlife conservation posed by climate change. Project leaders and planning teams consider these strategies, together with other Federal policies and guidance, when developing goals and objectives for refuge comprehensive conservation plans.

### ***A.2.3.3 Strategic Plan for Inventories and Monitoring on National Wildlife Refuges: Adapting to Environmental Change***

This strategic plan summarizes and provides a long-term perspective for how the Refuge System will implement a nationally coordinated effort to support inventories and monitoring at the refuge, landscape, regional, and national scales. The objectives are to inform management and evaluate the effectiveness of strategies to support adaptation to climate change and other major environmental stressors.

### ***A.2.3.4 Centennial Legacy Plans***

These plans were developed for refuges nationwide to mark the centennial anniversary of the National Wildlife Refuge System. They are intended to serve as a vision to provide resources for the Refuge System during the next 100 years. These plans prioritize and address only the Refuge System's most pressing needs in three main categories: essential staff, mission-critical projects, and major maintenance.

### ***A.2.3.5 North American Waterfowl Management Plan***

This conservation plan was published in 1998 and seeks to restore waterfowl populations in Canada, the United States, and Mexico to the levels recorded in the 1970s. The international partnership has worked to identify priority habitats for waterfowl and has established goals and objectives for the waterfowl populations and habitats.

### ***A.2.3.6 Partners in Flight***

Partners in Flight is a cooperative effort involving partnerships between Federal, State, and local government agencies; philanthropic foundations; professional organizations; conservation groups; industry; universities; and private individuals. Partners in Flight was created in 1990 in response to growing concerns about declines in the populations of many land bird species

and to emphasize the conservation of birds not covered by existing conservation initiatives. Bird conservation plans are developed in each region to identify species and habitats most in need of conservation, establish objectives and strategies, and implement and monitor progress on the plans.

#### ***A.2.3.7 United States Shorebird Conservation Plan***

The United States Shorebird Conservation plan, published in 2000, seeks to stabilize populations of all shorebirds that are in decline due to factors affecting habitat in the United States. At a regional level, the plan's goal is to ensure that shorebird habitat is available in adequate quality and quantity to support shorebird populations in each region. Ultimately, the goal of the Shorebird Conservation Plan is to restore and maintain shorebird populations throughout the Western Hemisphere through an international partnership.

#### ***A.2.3.8 North American Water Bird Conservation Plan for the Americas***

This plan was published in 2002 and provides a continental-scale framework for the conservation and management of 210 species of water birds, including seabirds, coastal water birds, wading birds, and marsh birds that use aquatic habitats in 29 nations throughout North America, Central America, the islands and pelagic waters of the Caribbean Sea and western Atlantic, and the islands (U.S. territories) and pelagic waters of the Pacific Ocean.

#### ***A.2.3.9 Coastal Zone Management Act***

This law was passed in 1972 in recognition of the increasing and conflicting uses that were causing irreparable harm to both the biological and physical systems associated with coastal areas. The act directed states to complete comprehensive coastal management programs or plans. Once a state's plan received Federal approval, this law mandated that Federal actions must be consistent with that state's coastal management program if one exists.

### **A.2.4 Regional Management Plans**

For consistency in planning and communicating with its partners, the Service considers how lands neighboring the Selawik refuge are being managed. This is accomplished by reviewing conservation and land management plans and other goals for the region. This list is not intended to be exhaustive but demonstrates some of the major State and regional plans that were reviewed during the development of this comprehensive plan for the Selawik refuge.

#### ***A.2.4.1 Kobuk-Seward Peninsula Management Plan***

This regional management plan was published by the United States Department of the Interior, Bureau of Land Management (BLM) in 2008. The plan provides goals and objectives, monitoring strategies, land use allocations, and management actions established for public lands in the Kobuk-Seward Peninsula planning area, which is managed by the BLM, Central Yukon, and Anchorage field offices.

#### ***A.2.4.2 Our Wealth Maintained: A Strategy for Conserving Alaska's Diverse Wildlife and Fish Resources***

This strategic plan was published in 2006 by the Alaska Department of Fish and Game (ADF&G) and serves as the State's Comprehensive Wildlife Conservation Strategy, focusing on nongame species. The goal of this strategy is to conserve the diversity of Alaska's wildlife and fish resources, focusing on species with the largest need for conservation interventions. The strategy was designed with the intent to integrate new conservation actions and

strategies with existing State wildlife management and research programs to build upon earlier successes. The strategy outlines the conservation needs of hundreds of species and many species assemblages, highlighting a growing need in the State for initial inventorying studies for lesser known species. The strategy also provides detailed natural history information and specific and measurable objectives for species conservation in Alaska.

### ***A.2.4.3 Northwest Area Plan for State Lands***

The Alaska Department of Natural Resources published this plan in 1989 to describe how it will manage State land, including uplands, tide, shore, and submerged land in Northwest Alaska. The plan determines land classifications, land disposal locations, remote cabin areas, land selections, areas open to mineral entry, and guidelines for leases and permits on State lands.

### ***A.2.4.4 Land Bird Conservation Plan for Alaska***

The Land Bird Conservation plan for Alaska was developed in 1999 by the Boreal Partners in Flight Working Group through their national initiative. It uses a landscape approach and provides conservation priorities and objectives for land birds occurring in Bird Conservation Regions in Alaska. The Selawik refuge is located in both the Western and Northwest Interior regions as outlined by the plan.

### ***A.2.4.5 A Conservation Plan for Alaska Shorebirds***

This plan was published in 2000 by the Alaska Shorebird Working Group and identifies shorebird species of concern in Alaska and provides goals and objectives for their conservation throughout Alaska.

### ***A.2.4.6 Sea Duck Joint Venture Strategic Plan***

This plan was published in 2001 to guide the development of knowledge and understanding of sea ducks and their conservation in North America. The Sea Duck Joint Venture Strategic plan provides a proactive program that involves partners from industry, universities, and the conservation community, with their joint resources, to accomplish sea duck conservation.

### ***A.2.4.7 Blueprint for the Future of Migratory Birds***

This plan serves as the 10-year, strategic conservation plan for the Service's migratory bird program and was published in 2004. It outlines the future direction of the program and provides specific goals and objectives for sustainable conservation of migratory birds. Objectives include improving hunting, bird watching, and other bird-related experiences and opportunities on refuge lands.

### ***A.2.4.8 Western Arctic Caribou Herd Management Plan***

This cooperative management plan was first published in 2003 by the Western Arctic Caribou Herd Working Group (Working Group), of which the Selawik refuge is a signing member. The Working Group developed this plan with the purpose of allowing State, Federal, and Alaska Native organizations to work together to ensure the long-term conservation of the Western Arctic Caribou Herd and the ecosystem on which it depends to maintain traditional and other uses for the benefit of all people now and in the future. The plan provides broad principles to guide planning and management, as well as specific goals, strategies, and actions for seven key elements of caribou management in the region. These are cooperation, population management, habitat protection, consistent and clear

regulations, reindeer herding, scientific and traditional ecological knowledge, and education. The Working Group began revising the Western Arctic Caribou Herd Management Plan in 2010, and the new plan is scheduled to be published in 2012.

#### ***A.2.4.9 Alaska Natural Heritage Program***

This program was developed by the Nature Conservancy. The mission of the Alaska Natural Heritage Program is "to document the distribution and abundance of ecologically significant plant and animal species, ecological communities, and natural features, and to assist in maintaining an ecologically healthy environment, while promoting the development of a sustainable economy in Alaska." The program has developed a biological conservation database that provides information on species distribution, trends, and habitats for species in need for more than 1,300 plant and animal species in Alaska.

#### ***A.2.4.10 Alaska Interagency Wildland Fire Management Plan***

This plan was developed by the Alaska Wildland Fire Coordinating Group in the 1980s, amended in 1998, and revised in 2010. The plan specifies direction for responding to wildland fires. It provides a comprehensive planning framework for wildland fire management activities and decision making. The plan is used in conjunction with other approved fire management plans, and objectives therein, developed for specific conservation units or private landowners. The plan provides interagency goals, objectives, management options, and a range in responses to wildland fires occurring in Alaska.

### **A.3 References**

USFWS. 2010. Rising to the urgent challenge: Strategic plan for responding to accelerating climate change. U.S. Fish and Wildlife Service, Washington D.C. 32 pp.

Williams, D. R., and M. E. Patterson. 1999. Environmental psychology: Mapping landscape meanings for ecosystem management. In: H. K. Cordell, and J. C. Bergstrom (Eds.), Integrating social sciences with ecosystem management: Human dimensions in assessment, policy, and management (pp. 141-160). Sagamore. Champaign, IL.

**Appendix B:**  
**Coordination with the State of Alaska**



## **B. Coordination with the State of Alaska and Master Memorandum of Understanding with the Department of Fish and Game**

### **B.1 Introduction**

Consistent with the principles of ecosystem management and the laws and policies described in Appendix A, the Service manages the Selawik National Wildlife Refuge (Selawik refuge, refuge) in close coordination with the State of Alaska. This appendix is not an exhaustive list of State agencies or departments, but rather it describes the primary State agencies that share concern and responsibilities for fish, wildlife, and other natural resources and that may be directly involved on refuge planning teams.

### **B.2 Alaska Department of Fish and Game**

The Alaska Department of Fish and Game (ADF&G) has the primary responsibility for managing fish and resident wildlife populations. On refuge lands, the U.S. Fish and Wildlife Service (Service) and ADF&G share a mutual concern for all fish and wildlife resources and their habitats, and both are engaged in extensive fish and wildlife conservation, management, and protection programs. In 1982, the Service and ADF&G signed a Master Memorandum of Understanding (dated March 13, 1982) that defines the cooperative management roles of each agency (see Chapter 1, Section 1.3.3). This memorandum sets the framework for cooperation between the two agencies.

Through the direction of the Alaska Boards of Fisheries and Game, the State of Alaska establishes fishing, hunting, and trapping regulations throughout the State. These regulations apply to Federal public lands unless superseded by Federal subsistence regulations. The State is divided into 26 game management units (GMUs); most of these are further divided into subunits. State management objectives are developed for wildlife populations for each GMU. Selawik refuge lands are entirely located within GMU 23. Management objectives for fish and wildlife populations on the refuge are discussed in Chapter 2.

The State process for developing regulations involves substantial public input to the Alaska Boards of Fisheries and Game concerning changes in regulations and allocations. Input may be given directly to the boards through testimony and proposals or indirectly through participation in local fish and game advisory committees. The advisory committees assist the boards in assessing local fish and wildlife issues and proposed regulations. Biologists and other staff from ADF&G also provide data and analysis of proposals to the boards. Regulations may be changed by the boards at regular meetings, by emergency regulations, or by emergency order.

Although many biologists within ADF&G have law enforcement authority, most enforcement of fishing and hunting regulations is carried out by refuge law enforcement officers and officers of the Alaska Department of Public Safety.

The Division of Wildlife Conservation at ADF&G works to conserve and enhance Alaska's wildlife and to provide for a wide range of uses for the greatest benefit of current and future generations of people through management of wildlife populations, habitats, research, information transfer, regulatory activities, and public service. The Division of Wildlife

Conservation is responsible for overseeing development of management plans for a variety of wildlife populations throughout the State.

The Division of Sport Fish at ADF&G is responsible for the State's recreational fishery resources, including the conservation of self-perpetuating populations of fish, management of sport fisheries in both salt and fresh water, and hatchery production and release of fish for recreational fishing. The goals of this division are to conserve naturally reproducing populations of sport fish species, provide a diverse mix of recreational fishing opportunities, and optimize the social and economic benefits of Alaska's recreational fisheries.

The Division of Subsistence at ADF&G is the research branch of the department responsible for providing comprehensive information on the customary and traditional use of natural resources. Information is provided to meet management goals; aid in regulation development; facilitate collaborative agreements; assess environmental impacts; and describe the unique role of fish, wildlife, and other natural resources in the subsistence way of life for Alaska Native peoples.

### **B.2.1 Master Memorandum of Understanding**

MASTER MEMORANDUM OF UNDERSTANDING  
BETWEEN  
THE ALASKA DEPARTMENT OF FISH AND GAME  
Juneau, Alaska  
AND  
THE U.S. FISH AND WILDLIFE SERVICE  
DEPARTMENT OF THE INTERIOR  
Anchorage, Alaska

This Master Memorandum of Understanding between the State of Alaska, Department of Fish and Game, hereinafter referred to as the Department, and the U.S. Fish and Wildlife Service, hereinafter referred to as the Service, reflects the general policy guidelines within which the two agencies agree to operate.

WHEREAS, the Department, under the Constitution, laws, and regulations of the State of Alaska, is responsible for the management, protection, maintenance, enhancement, rehabilitation, and extension of the fish and wildlife resources of the State on the sustained-yield principle, subject to preferences among beneficial uses; and

WHEREAS, the Service, by authority of the Constitution, laws of Congress, and regulations of the U.S. Department of Interior, has a mandated management responsibility for certain species or classes of wildlife, and is responsible for the management of Service lands in Alaska, and the conservation of fish and wildlife resources on these lands; and

WHEREAS, the Department and the Service share a mutual concern for fish and wildlife resources and their habitats, and both are engaged in extensive fish and wildlife conservation, management, and protection programs and desire to develop and maintain a cooperative relationship, which will be in the best interests of both parties, the concerned fish and wildlife resources, and their habitats, and produce the greatest public benefit; and

WHEREAS, it has been recognized in the Alaska National Interest Lands Conservation Act and subsequent implementing Federal regulations that the resources and use of Service lands in Alaska are substantially different than those of other states; and

WHEREAS, the Department and the Service recognize the increasing need to coordinate resource planning and policy development;

NOW, THEREFORE, the parties hereto do hereby agree as follows:

**THE DEPARTMENT OF FISH AND GAME AGREES:**

1. To recognize the Service as the agency with the responsibility to manage migratory birds, endangered species, and other species mandated by Federal law, and on Service lands in Alaska to conserve fish and wildlife and their habitats and regulate human use.
2. To manage fish and resident wildlife populations in their natural species diversity on Service lands.
3. To consult with the regional director in a timely manner and comply with applicable Federal laws and regulations before embarking on enhancement or construction activities on Service lands.

**THE FISH AND WILDLIFE SERVICE AGREES:**

1. To recognize the Department as the agency with the primary responsibility to manage fish and resident wildlife within the State of Alaska.
2. To recognize the right of the Department to enter onto Service lands at any time to conduct routine management activities that do not involve construction, disturbance to the land, or alterations of ecosystems.
3. To cooperate with the Department in planning for enhancement or development activities on Service lands that require permits, environmental assessments, compatibility assessments, or similar regulatory documents by responding to the Department in a timely manner with requirements, timetables, and any other necessary input.
4. To manage the fish and wildlife habitat on Service lands so as to ensure conservation of fish and wildlife populations and their habitats in their natural diversity.
5. To consider carefully the impact of any proposed treaties or international agreements relating to fish and wildlife resources on the State of Alaska that could diminish the jurisdictional authority of the State and to consult freely with the State when these treaties or agreements have a primary impact on the State.
6. To review present U.S. Fish and Wildlife Service policies and any future proposed changes in those policies in consultation with the Department to determine if modified or special policies are needed for Alaska.
7. To adopt refuge management plans whose provisions—including provisions for animal damage control—are in substantial agreement with the Department's fish and wildlife management plans unless such plans are determined formally to be incompatible with the purposes for which the respective refuges were established.
8. To utilize the State's regulatory process to the maximum extent allowed by Federal law in developing new or modifying existing Federal regulations or proposing

changes in existing State regulations governing or affecting the taking of fish and wildlife on Service lands in Alaska.

**THE DEPARTMENT OF FISH AND GAME AND THE FISH AND WILDLIFE SERVICE MUTUALLY AGREE:**

1. To coordinate planning for management of fish and wildlife resources on Service lands so that conflicts arising from differing legal mandates, objectives, and policies either do not arise or are minimized.
2. To consult with each other when developing policy and legislation that affects the attainment of wildlife resource management goals and objectives or management plans.
3. To recognize that the taking of fish and wildlife by hunting, trapping, or fishing on Service lands in Alaska is authorized in accordance with applicable State and Federal law unless State regulations are found to be incompatible with documented Refuge goals, objectives, or management plans.
4. To develop such supplemental memoranda of understanding between the commissioner and the regional director as may be required to implement the policies contained herein.
5. That this Master Memorandum of Understanding shall become effective when signed by the Commissioner of the Alaska Department of Fish and Game and the Alaska Regional Director of the U.S. Fish and Wildlife Service and shall continue in force until terminated by either party by providing notice in writing 120 days in advance of the intended date of termination.
6. That amendments to this Master Memorandum of Understanding may be proposed by either party and shall become effective upon approval by both parties.

**STATE OF ALASKA  
INTERIOR**

Department of Fish and Game

/signed/ Ronald O. Skoog

Commissioner

March 13, 1982

Date

**U.S. DEPARTMENT OF THE**

Fish and Wildlife Service

/signed/ Keith M. Schreiner

Regional Director, Alaska

March 13, 1982

Date

**B.3 Alaska Department of Natural Resources**

The Alaska Department of Natural Resources (DNR) and its divisions are key management partners, coordinating with the Service and other Federal and State agencies in managing Federal and State lands in Alaska. DNR manages all State-owned lands, water, and surface and subsurface resources except for fish and game. The Division of Mining, Land and Water at DNR manages the State's water and land interests within national wildlife refuges. These interests will become increasingly significant in the next 10 to 15 years, especially in regard to water rights, navigable waters, ownership of submerged lands, and rights-of-way over refuge lands.

## **B.4 Alaska Department of Environmental Conservation**

The Alaska Department of Environmental Conservation (DEC) is also a key partner regarding refuge management efforts in light of its mission of “conserving, improving, and protecting Alaska’s natural resources and the environment.” For example, DEC has direct statewide responsibility for monitoring and maintaining air and water quality. Some of the interagency coordination agreements and mechanisms involving DEC also involve DNR and ADF&G; others are specific to DEC. Issues of interest to the Service and the Selawik refuge that may include authorizations from or cooperation with DEC include air and water quality monitoring, invasive species management, public health and safety, hazardous material spills, and chemical use.

# **Appendix C**

## **Consultation and Coordination**



## **C. Consultation and Coordination**

### **C.1 Consistency with Coastal Management Policy**

Section 307(c) of the Coastal Zone Management Act of 1972, as amended (P.L. 92-583), states that “each Federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved State coastal management programs.” Federal agency consistency requirements are addressed in 15 CFR 930.

The Alaska Coastal Management Program (ACMP) no longer exists and therefore a consistency evaluation with the State of Alaska was not necessary for the final version of the revised comprehensive plan for Selawik refuge. The U.S. Fish and Wildlife Service (Service) finds this comprehensive plan to be fully compliant with the Coastal Zone Management Act of 1972, as amended (P.L. 92-583).

### **C.2 Section 7 Compliance**

The management actions described in the Selawik National Wildlife Refuge’s final comprehensive plan are not likely to adversely affect listed species or designated critical habitat. The Service finds this comprehensive plan to be fully consistent with Section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 stat 884, as amended).

### **C.3 Consultation with Federally Recognized Tribes and ANCSA Corporations**

The obligation for Federal agencies to engage with Indian tribes, on a government-to-government basis, is based on the U.S. Constitution, treaties, statutes, Executive orders, and policies. Federal agencies meet that obligation through consultation with Indian tribes. The Service is committed to the directive of Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments).

In compliance with Congressional direction, the Service is also obligated to consult with ANCSA Corporations (i.e., those set up under the Alaska Native Claims Settlement Act of 1971). Congress required that “[t]he Director of the Office of Management and Budget [and all Federal agencies] shall hereafter consult with Alaska Native corporations on the same basis as Indian tribes” under Executive Order Number 13175 (P. L. 108-199 as amended by P. L. 108-447).

The Service distinguishes the role of ANCSA corporations from the tribal government-to-government relationship enjoyed by any Indian tribe. The government-to-government relationship with Indian tribes is held to a high priority, while also recognizing the statutory relationship between ANCSA corporations and the Federal government.

For the Selawik refuge comprehensive plan, the refuge manager sent letters of request for government-to-government consultations to the Native Villages (tribes) of Selawik, Noorvik, Kiana, Ambler, Shungnak, Kobuk, Buckland, and Kotzebue. In the letter, the Service asked the presidents of each tribal council if their tribe would like to consult with the Service about revising the refuge’s comprehensive plan. Each tribe was given approximately 30 days to provide a positive or negative response. A copy of the letter is provided in this appendix (Figure C-1).

## Appendix C: Consultation and Coordination

The Native Village of Kiana wished to consult, and the refuge worked with them to schedule a face-to-face meeting with the intent of providing an orientation by refuge staff, listening to tribal leaders about the action, and having open discussions. The meeting with Kiana was planned for January 2011 but was postponed.

The NANA Regional Corporation was invited to have a representative serve as a member of the core planning team for the Selawik refuge comprehensive plan. The Director of Lands for NANA Regional Corporation served on the planning team and attended the majority of planning meetings in which extensive discussions resulted in planning decisions. NANA Regional Corporation also provided a letter of comment on the draft plan and environmental assessment.



### United States Department of the Interior

FISH AND WILDLIFE SERVICE  
Selawik National Wildlife Refuge  
P.O. Box 270  
Kotzebue, Alaska 99752



December 3, 2010

Percy Ballot, Sr., President  
Native Village of Buckland  
P.O. Box 67  
Buckland, AK 99727

Dear President Ballot:

The U.S. Fish and Wildlife Service (Service) would like to extend an invitation to the Native Village of Selawik for a government-to-government consultation on the draft Comprehensive Conservation Plan (CCP) for the Selawik National Wildlife Refuge, a 2-million-acre refuge that includes most of the Selawik River valley and portions of the Kobuk River delta. This plan is a revision of the original 1987 plan.

The draft plan includes refuge goals, key planning issues, and management alternatives. The main topics addressed by the management alternatives are: guides/transporters on the Selawik Refuge; winter trail marking and shelter cabins; all-terrain vehicle use; Singauruk Bridge; dog sled and snowmachine racing; and the Selawik Hot Springs. A brief summary of the draft plan has been sent to all boxholders in the Northwest Arctic Borough.

Consultation between the Service and your Tribal Council could involve a face-to-face meeting to discuss the draft plan. It is the Tribe's decision whether or not to have this consultation. Please send me a letter, email, or fax with your decision to consult or not within 30 days of receiving this letter. If you have questions, please contact me at (907) 442-3799 or toll-free at (800) 492-8848.

Best wishes,

Lee Anne Ayres  
Refuge Manager  
Selawik National Wildlife Refuge  
[leeanne\\_ayres@fws.gov](mailto:leeanne_ayres@fws.gov)  
(907) 442-3124 fax

Figure C-1. Sample Letter of Request for Tribal Consultation.

**Appendix D**  
**Compatibility Determinations**



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## Compatibility Determination

**Use:** Subsistence Activities

**Primary Uses:** Fishing, natural resource gathering, hunting, trapping, and other subsistence.

**Supporting and Incidental Uses:** Boating (motorized and non-motorized), snowmobiling, snowshoeing, trapping, firewood cutting, natural resource gathering, camping, cross-country skiing, dog sledding, hiking and backpacking, picnicking, wildlife observation, fixed-wing aircraft landings, swimming, and beach use.

**Refuge Name:** Selawik National Wildlife Refuge

**Establishment and Acquisition Authority:** The Alaska National Interest Lands Conservation Act (ANILCA) established the 2.5-million-acre Selawik National Wildlife Refuge (Selawik refuge, refuge) as part of the U.S. Fish and Wildlife Service, National Wildlife Refuge System (Department of the Interior) on December 2, 1980.

**Selawik Refuge Purposes:** As stated in ANILCA Section 302 (7) (B), the purposes for which the Selawik refuge was established and shall be managed include:

- (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Western Arctic caribou herd (including participation in coordinated ecological studies and management of these caribou), waterfowl, shorebirds and other migratory birds, and salmon and sheefish;
- (ii) to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- (iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- (iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

The purpose of the congressionally designated Selawik Wilderness Area is to secure an enduring resource of wilderness, protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System (NWPS), and administer the area for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as designated wilderness.

### National Wildlife Refuge System Mission

The mission of the National wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

## Description of Uses

This is a re-evaluation of the compatibility of subsistence uses of Federal lands within Selawik refuge. Subsistence was found to be compatible, subject to reasonable regulation, in 1994. Subsistence activities in this determination include fishing, hunting, trapping, firewood gathering, berry picking, and gathering of other plant materials. Snowmobiles and motorboats are the primary means of surface transportation traditionally employed for such purposes, as allowed under ANILCA Section 811. Subsistence has also been historically supported by the occasional use of airplanes for access to remote locations surrounding some communities.

Residents of villages located in and near the Selawik refuge have ways of life and economies that depend on subsistence resources. Selawik and Noorvik are located within the refuge boundary. Ambler, Buckland, Shungnak, Kiana, Kobuk, and Kotzebue are less than 30 miles away from the refuge boundary—a short distances in this vast open region. Residents of the Athabaskan village of Huslia also use the refuge. Subsistence use by local residents accounts for the majority of public use on the refuge. On a per pound basis, caribou and fish (primarily salmon, sheefish, whitefish, and northern pike) are the most widely harvested subsistence foods in the nearby villages. Moose, bear, marine mammals, small game, and waterfowl are also taken. Salmonberries, blueberries, cranberries, sourdock, and many other plants are also gathered for food. Spruce and alder are cut for firewood, and birch bark is collected for basket making. Subsistence activities are not just a way of obtaining food but are an important mechanism for maintaining cultural values such as kinship, community, respect for elders, hospitality, sharing, and the passing of values to younger generations. In addition, many residents in the area prefer the taste of traditional wild foods to those commercially prepared.

Local trappers operate within the refuge harvesting wolves, lynx, marten, fox, river otter, beaver, and other small furbearers. The sale of these furs provides supplemental income to residents who depend on a subsistence way of life. Trapping is considered a subsistence activity for federally qualified subsistence users. The compatibility of trapping as a refuge use is considered in a separate determination.

## Availability of Resources

Adequate refuge personnel and base operational funds are available to manage subsistence activities at existing and projected levels. Management primarily includes the inventory and monitoring of fish and wildlife subsistence species; environmental education, such as steel shot clinics, culture camps, or other efforts aimed at improving public understanding of major conservation issues; and law enforcement patrols. During such patrols, refuge staff members opportunistically conduct outreach to increase subsistence user awareness of the status of local fish and wildlife populations, the relationship of regulations to sustainable yield, and the importance of knowing land ownership and regulatory boundaries. Refuge staff members spend considerable time participating in and supporting the regulatory development process with the Federal Subsistence Board, Alaska Migratory Bird Co-management Council, Regional Advisory Council, and the Western Arctic Caribou Herd Working Group to ensure harvest levels are sustainable.

## Anticipated Impacts of Uses

Fish and wildlife harvested by subsistence users at current and projected levels (and in accordance with established State and Federal regulations pertaining to seasons, bag limits, and methods of harvest) are not expected to have long-term impacts on the overall populations

of fish and wildlife resources within the refuge. State and Federal biologists monitor fish and game populations, and State and Federal regulatory bodies continually respond to management needs by adopting regulations to ensure the continued health of fish and wildlife populations. The combination of Alaska State hunting regulations (5AAC) and the Federal Subsistence regulations (50 CFR Part 100) are intended to provide a sustainable harvest over the long term. It is possible that localized or short-term population reductions may occur due to unanticipated changes in physical condition and distribution of animals, environmental conditions, predation, and harvest pressure.

Refuge habitats will remain largely unaffected by continuation of subsistence uses as outlined in the Revised Comprehensive Conservation Plan and Environmental Assessment for the Selawik refuge. Anticipated and unanticipated impacts to resident fish and wildlife populations and subsistence opportunities can be mitigated through further restrictions on methods, means, seasons of harvest, and bag limits by the Alaska Boards of Fisheries and Game and the Federal Subsistence Board, or through subsequent revisions of the Comprehensive Conservation Plan. Likewise, impacts related to availability of anadromous fish, particularly sheefish, and migratory birds can be mitigated through the Alaska Boards of Fisheries and Game and/or the Federal Subsistence Board allocation process and through Federal regulations. In summary, subsistence uses will not materially interfere with or detract from the purposes for which the Selawik refuge was established.

### **Public Review and Comment**

Public comments were solicited concurrently with the revision of the Selawik National Wildlife Refuge's Comprehensive Conservation Plan and Environmental Assessment (USFWS 2010). Public comments on compatibility determinations were accepted during the public review period for the draft plan and announced in the Federal Register. The public comment period was October 21, 2010, to March 15, 2011, which provided 145 days for public review. We mailed the full draft plan and a summary to the individuals and organizations on our mailing list. We invited public comments through an advertisement in a local newspaper and attended city council meetings in Selawik and Noorvik to receive comments on the draft plan. Planning team members met with the Citizens' Advisory Commission on Federal Areas to discuss the issues at Selawik refuge and alternatives that were proposed in the draft plan. The draft compatibility determinations were posted on the Service's Region 7 Web page.

We received no comments on the draft of this compatibility determination; however, the Northwest Arctic Borough emphasized the importance of the refuge being managed in accordance with ANILCA's subsistence priority.

### **Refuge Determination (check one below)**

Use is not compatible

Use is compatible

### **Stipulations Necessary to Ensure Compatibility**

Subsistence users will be required to comply with any regulations in place, such as seasonal closures for resource protection.

Management direction is provided in the Revised Comprehensive Conservation Plan. This direction includes implementation of applicable sections of the refuge's wildlife inventory plan

and adequate monitoring of public use activities. The Service will use the findings from wildlife, public use, and habitat monitoring efforts to determine what additional management actions, if any, are needed to ensure that subsistence activities remain compatible with refuge purposes.

### **Justification**

Ensuring the continuation of the subsistence uses listed previously was clearly the intent of Congress, providing that such uses are compatible, and is reflected in the enacting legislation. ANILCA established a preference for subsistence users, stating that the taking of fish and wildlife on public lands for non-wasteful subsistence use is given priority over other consumptive uses. Title 1 of ANILCA, Section 101(b), states in part: “It is the intent of congress in this Act to ... preserve wilderness resource values and related recreational opportunities including but not limited to hiking, canoeing, fishing, and sport hunting ...” Title 3 of ANILCA, Section 302 (7) (B) (iii), states in part: “The purposes for which the Selawik National Wildlife Refuge is established and shall be managed include ... the opportunity for continued subsistence uses by local residents; ...” Title 8 of ANILCA, Section 801 states in part: “The Congress finds and declares that ... (1) the continuation of the opportunity for subsistence uses by rural residents of Alaska, including both subsistence uses by rural residents of Alaska, including both Natives and non-Natives, on the public lands and by Alaska Natives on Native lands is essential to Native physical, economic, traditional, and cultural existence and to non-Native physical, economic, traditional, and social existence.” Section 811 of ANILCA ensures that subsistence users can access public lands by snowmobile, motorboat, and other traditionally used means of surface transportation, subject to reasonable regulation. After fully considering the impacts of this activity, as described in the “Anticipated Impacts of the Uses” section of this determination, it is my determination that subsistence activities within the refuge do not materially interfere with or detract from the purposes of the refuge or mission of the National Wildlife Refuge System, and that current management of fish, wildlife, and habitat is adequate to ensure that subsistence remains compatible.

### **Supporting Documents**

Subsistence Management for Federal Public Lands in Alaska, Final Environmental Impact Statement, and Record of Decision signed April 2, 1992.

U. S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan Final for the Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, Alaska. 378 pp.

U. S. Fish and Wildlife Service. 1987. Record of Decision: Selawik National Wildlife Refuge Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan. U. S. Fish and Wildlife Service, Anchorage, Alaska. 15 pp.

U. S. Fish and Wildlife Service. 2010. Draft Revised Comprehensive Conservation Plan and Environmental Assessment. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK. 285 pp (plus ten appendices).

U. S. Fish and Wildlife Service. 2011. Final Revised Comprehensive Conservation Plan. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK.

**Refuge Determination**

Refuge Manager/

Project Leader Approval     /signed/ Lee Anne Ayres     July 14, 2011  
Date

**Concurrence**

Regional Chief

National Wildlife     /signed/ Mitch Ellis     July 20, 2011  
Refuge System     Date

**Mandatory 10-year Re-evaluation Date: 2021**

**NEPA Compliance for Refuge Use Decision**

Categorical Exclusion without Environmental Action Memorandum

Categorical Exclusion and Environmental Action Memorandum

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

## Compatibility Determination

**Use:** Shelter Cabins

**Supporting and Incidental Uses:** Boating (motorized and non-motorized), snowmobiling, snowshoeing, firewood and natural resource gathering, hunting, fishing, camping, cross-country skiing, skijoring, dog sledding, hiking and backpacking, picnicking, wildlife observation, wildlife photography, videography, fixed-wing aircraft landings.

**Refuge Name:** Selawik National Wildlife Refuge

**Establishment and Acquisition Authority:** The Alaska National Interest Lands Conservation Act (ANILCA) established the 2.5-million-acre Selawik National Wildlife Refuge (Selawik refuge, refuge) as part of the U.S. Fish and Wildlife Service, National Wildlife Refuge System (Department of the Interior) on December 2, 1980.

**Selawik Refuge Purposes:** As stated in ANILCA Section 302 (7) (B), the purposes for which the Selawik refuge was established and shall be managed include:

- (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Western Arctic caribou herd (including participation in coordinated ecological studies and management of these caribou), waterfowl, shorebirds and other migratory birds, and salmon and sheefish;
- (ii) to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- (iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- (iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

The purpose of the congressionally designated Selawik Wilderness Area is to secure an enduring resource of wilderness, protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System (NWPS), and administer the area for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as designated wilderness.

### National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

### Description of Uses

This determination re-evaluates the compatibility of shelter cabins on Selawik refuge and the possibility for future cabins. These cabins are less than 400 square feet and facilitate safe winter access to the refuge. The cabins also provide temporary shelter to volunteers involved

with search and rescue activities on the refuge. Three cabins currently exist within the refuge boundary along marked winter rails. They are the: Paniksuvik Shelter Cabin located on the Kugarak River, the Shungnak Shelter Cabin located on the Rabbit River along the Selawik-Shungnak winter trail, and the Sinjiagruk River Shelter Cabin along the Sinjiagruk River. Potential sites for additional cabins have been identified in the upper Selawik River and along the winter trail systems between Selawik and Buckland. Volunteers maintain the cabins with limited assistance from the refuge. Cabins are located on sites that provide some protection from the wind and can be easily located from a winter snowmobile trail. They are not typically used during the summer or fall.

### **Availability of Resources**

Adequate refuge personnel and base operational funds are available to manage activities at existing and projected levels. Administrative staff time, an estimated five staff days every year, primarily involves meetings with search and rescue organizations, site visits, and assisting with cabin maintenance.

### **Anticipated Impacts of Uses**

Negligible impacts to habitats within the refuge from disturbance are anticipated. Possible adverse impacts to some plant and wildlife species could occur from trampling, refuse, and human waste in the immediate vicinity of the structures. At the current and predicted levels of use, these would not have long-term population-level impacts on refuge plants or wildlife. Use of public shelter cabins has been decreasing as the speed of snowmobiles has increased, reducing the time required to travel between villages. The construction of additional shelter cabins is possible in the future, during which a minimal amount of vegetation could be disturbed and some shrubs and small trees could be cleared. The existing cabins are in remote locations, which for all practical purposes limits use to winter, when vegetation is protected by overlying snow.

### **Justification**

Cooperative construction, maintenance, and use of shelter cabins by the public have a longstanding history in the region. The absence of buildings, cabins, or any other structures in most of the refuge, combined with severe winter weather conditions and open landscape, make these small shelter cabins essential to safe travel on the refuge. Refuge staff will monitor the resources around the cabins and work with local search and rescue organizations to ensure use of the cabins will not adversely affect resources within the refuge or the experiences of other visitors. After fully considering the impacts of these activities, as described previously in the “Anticipated Impacts” section of this document, it is my determination that shelter cabins used by the public in the refuge do not materially interfere with or detract from the purposes of the refuge or mission of the National Wildlife Refuge System.

### **Public Review and Comment**

Public comments were solicited concurrently with the revision of the Selawik National Wildlife Refuge’s Comprehensive Conservation Plan and Environmental Assessment (USFWS 2010). Public comments on compatibility determinations were accepted during the public review period for the draft plan and announced in the Federal Register. The public comment period was October 21, 2010, to March 15, 2011, which provided 145 days for public review. We mailed the full draft plan and a summary to the individuals and organizations on our mailing list. We invited public comments through an advertisement in a local newspaper and attended

city council meetings in Selawik and Noorvik to receive comments on the draft plan. Planning team members met with the Citizens' Advisory Commission on Federal Areas to discuss the issues at Selawik refuge and alternatives that were proposed in the draft plan. The draft compatibility determinations were posted on the Service's Region 7 Web page.

We received no comments on the draft of this compatibility determination; however, most reviewers supported partnering with local organizations to maintain a shared building for a variety of uses. NANA Regional Corporation requested that they be included in the discussion for site locations for any additional shelter cabins which may be built. An individual requested that minimum design and furnishing standards be established for shelter cabins. Another individual expressed skepticism that the villages could maintain facilities.

### Refuge Determination (check one below)

Use is not compatible

Use is compatible

### Stipulations Necessary to Ensure Compatibility

Visitors will be required to comply with any regulations in place, such as seasonal closures for resource protection. The following will be posted at public shelter cabins:

#### **PLEASE FOLLOW THESE RULES FOR USE OF THIS SHELTER CABIN**

1. Please respect the use of this cabin; do not use alcohol or drugs here.
2. Please leave a clean cabin for the next users. Sweep the floors and wash any dishes before you leave.
3. Firewood is important to survival. Please leave a supply of firewood for the next users. You may cut dead and down timber anywhere on public refuge lands, and live timber up to six inches in diameter at least ½ mile from the cabin.
4. Help keep the area clean. Haul your non-burnable trash back with you to your village dump. Burn your combustible trash so someone else doesn't have to do it.
5. Pots, pans, and dishes are here for your convenience. Please leave them for the next users.
6. The smell of trash may attract bears from a long distance. To avoid damage to the cabins from bears, keep the cabin and surroundings free of trash, perishable foods, or game parts.
7. Please help keep the bears out of the cabin. Before leaving, cover the windows and secure the doors (but do not lock them).
8. Garbage or wash water around the water holes will contaminate the drinking water and attract animals. Please help keep the drinking water holes clean.
9. Soap will soak into the ground. It will pollute water and kill fish in the stream and their eggs in the gravel. Wash dishes away from the water bodies (river, lakes, and ponds) and only in the wash holes or basins. Refrain from using soap. If you must use soap, please use it in small amounts.
10. Dog teams pollute, also, so please stake dog teams more than 150 feet from the cabin.

## Appendix D: Compatibility Determinations

11. Use the outhouse. If you fill it up, help dig a new hole at least 150 feet from the cabin and water bodies. Alternatively, you are encouraged to use a honey bucket and dispose of your waste in your village.
12. Be careful with fires in the wood stoves. Put your fires out before you leave.
13. Gasoline fumes are explosive, and gasoline and oil in the water will kill fish and their eggs. Refill gasoline containers outside of the cabins and away from water bodies.

### Supporting Documents

U. S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan Final for the Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, Alaska. 378 pp.

U. S. Fish and Wildlife Service. 1987. Record of Decision: Selawik National Wildlife Refuge Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan. U. S. Fish and Wildlife Service, Anchorage, Alaska. 15 pp.

U. S. Fish and Wildlife Service. 1989. Cabin Management Policy on National Wildlife Refuges in Alaska, RW-1, 9-12-89.

U. S. Fish and Wildlife Service. 2010. Draft Revised Comprehensive Conservation Plan and Environmental Assessment. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK. 285 pp (plus ten appendices).

U. S. Fish and Wildlife Service. 2011. Final Revised Comprehensive Conservation Plan. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK.

### Refuge Determination

Refuge Manager/ Project Leader Approval	<u>/signed/ Lee Anne Ayres</u>	<u>July 14, 2011</u> Date
Concurrence Regional Chief National Wildlife Refuge System	<u>/signed/ Mitch Ellis</u>	<u>July 20, 2011</u> Date

**Mandatory 10-Year Re-evaluation Date: 2021**

### NEPA Compliance for Refuge Use Decision

- Categorical Exclusion without Environmental Action Memorandum
- Categorical Exclusion and Environmental Action Memorandum
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

## Compatibility Determination

**Use:** Selawik Hot Springs Cabins

**Supporting and Incidental Uses:** Snowmobiling, snowshoeing, firewood and natural resource gathering, camping, cross-country skiing, skijoring, dog sledding, hiking and backpacking, picnicking, wildlife observation, wildlife photography, videography, environmental education and interpretation, trapping, and hunting.

**Refuge Name:** Selawik National Wildlife Refuge

**Establishment and Acquisition Authority:** The Alaska National Interest Lands Conservation Act (ANILCA) established the 2.5-million-acre Selawik National Wildlife Refuge (Selawik refuge, refuge) as part of the U. S. Fish and Wildlife Service, National Wildlife Refuge System (Department of the Interior) on December 2, 1980.

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- (ii) to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- (iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- (iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

The purpose of the congressionally designated Selawik Wilderness Area is to secure an enduring resource of wilderness, protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System (NWPS), and administer the area for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as designated wilderness.

### National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

### Description of Use

This determination re-evaluates the compatibility of public use cabins constructed at Selawik Hot Springs (also referred to as the Shungnak or Purcell Mountains Hot Springs). These cabins were found compatible in 1987 and 1994. In 1991, the refuge issued a five-year permit to the

Upper Kobuk River Elders Council for the construction of a new bath house and the ongoing maintenance of two other cabins. The cabins and associated facilities are limited to a small area (the area immediately adjacent to the hot springs). Use is seasonal, usually February through April, and limited to only those who can access the area by snowmobile. The primitive cabins were built and maintained as a cooperative effort between elders residing in upper Kobuk River communities and Huslia. They are open to the public and used mostly by local village residents. The cabins allow access to the hot springs, which are viewed as therapeutic and believed to contribute to the good health possessed by the elders who visit them. This non-consumptive, cultural use was practiced long before the refuge was established.

**Availability of Resources**

Adequate refuge personnel and base operational funds are available to manage activities at existing and projected levels. Administrative staff time, an estimated two staff days every five years, primarily involves phone conversations, written correspondence, and permit renewal.

**Anticipated Impacts of Uses**

Negligible impacts to habitats within the refuge from disturbance are anticipated. Possible localized adverse impacts to some plant and wildlife species could occur, but would not have long-term population-level impacts on refuge plants and wildlife. Regular use could result in refuse and human waste in the immediate vicinity of the structures. Special use permit conditions are designed to minimize the chances of adverse effects to resources within the refuge and visitors.

**Public Review and Comment**

Public comments were solicited concurrently with the revision of the Selawik National Wildlife Refuge's Comprehensive Conservation Plan and Environmental Assessment (USFWS 2010). Public comments on compatibility determinations were accepted during the public review period for the draft plan and announced in the Federal Register. The public comment period was October 21, 2010, to March 15, 2011, which provided 145 days for public review. We mailed the full draft plan and a summary to the individuals and organizations on our mailing list. We invited public comments through an advertisement in a local newspaper and attended city council meetings in Selawik and Noorvik to receive comments on the draft plan. Planning team members met with the Citizens' Advisory Commission on Federal Areas to discuss the issues at Selawik refuge and alternatives that were proposed in the draft plan. The draft compatibility determinations were posted on the Service's Region 7 Web page.

We received one comment on the draft of this compatibility determination. One reviewer correctly noted that although the special use permit is written to the elders, other people use the Hot Springs area in addition to those elders. Other reviewers supported a formal partnership with villages and organizations to maintain facilities at the Selawik Hot Springs. One individual inquired about the policy on aircraft landing at or near the Hot Springs.

**Refuge Determination (check one below)**

Use is not compatible

Use is compatible

### Stipulations Necessary to Ensure Compatibility

A special use permit with the following stipulations is required. Regular monitoring by staff will determine what additional management actions, if any, are needed to ensure compatibility.

#### **SPECIAL PERMIT CONDITIONS FOR THE SELAWIK HOT SPRINGS CABINS**

1. Failure to abide by any part of this special use permit; violation of any refuge related provision in Titles 43 (Part 36) or 50 (Sub-chapters B and C), Code of Federal Regulations; or violation of any pertinent State regulation (e.g., fish or game violation) will, with due process, be considered grounds for immediate revocation of this permit and could result in denial of future permit requests for lands administered by the U. S. Fish and Wildlife Service. This provision applies to all persons working under the authority of this permit (e.g., assistants). Appeals of decisions relative to permits are handled in accordance with Title 50 Code of Federal Regulations 36.41.
2. The permit holder is responsible for ensuring that all employees, party members, contractors, aircraft pilots, and any other persons working for the permit holder and conducting activities allowed by this permit are familiar with and adhere to the conditions of this permit.
3. This permit may be canceled or revised at any time by the refuge manager in case of emergency (e.g., unusual resource problems, high fire danger, flooding, etc.).
4. The permit holder does not have the exclusive use of the site(s) or lands covered by this permit.
5. Any problems with wildlife and/or animals taken in defense of life or property must be reported immediately to the refuge manager and Alaska Department of Fish and Game, and be salvaged in accordance with State regulations.
6. In accordance with the Archaeological Resources Protection Act (16 U.S. C. 470aa), the removal or disturbance of archeological or historic artifacts is prohibited. The excavation, disturbance, collection, or purchase of historical, recent, ethnological, or archaeological specimens or artifacts is prohibited.
7. Permit holder shall maintain the use area in a neat and sanitary condition; latrines must be located a minimum of 150 feet from springs, lakes, and streams to avoid contamination of water resources. All property must be removed from refuge lands upon completion or revocation of permitted activities, and permit holder will leave the surrounding grounds in a neat, clean, and orderly condition. If the permit holder fails to remove all property upon completion of authorized activities, he/she will be liable for the removal and restoration of the site.
8. The construction of permanent landing strips or pads is prohibited. Incidental hand removal of rocks and other minor obstructions may be permitted. Marking of a temporary ski plane airstrip is permitted, provided the markers used are temporary in nature.
9. The cabin must be single story and 400 square feet of floor space or less; materials used must be approved by the refuge manager.
10. Routine maintenance, minor remodeling, or improvements to the cabin, such as new floors, wood stoves, insulation, doors, windows, furniture, etc., are authorized, provided the size of the cabin does not exceed 400 square feet of floor area and materials are approved by the refuge manager. Any major exterior rehabilitation of or additions to existing structures must have the refuge manager's prior approval in writing.

11. Permit holder is responsible for keeping the area surrounding the cabin clean. All garbage must be burned or discarded in a dump off refuge lands. The area around the cabins will be kept clean and free of trash, human waste, and discarded animal parts. Combustible materials will be burned as they accumulate and not left for disposal by refuge staff or other visitors. Food, garbage, or other materials will not be kept to prevent attracting bears and other wildlife.
12. The permit holder acknowledges that he/she has no interest in the real property where the cabin and related structures are located.
13. The Service assumes no responsibility for the loss of any private property, damage, or injury associated with the exercise of the privileges authorized by this permit. The permit holder assumes all legal responsibilities for activities at the cabin and cabin area during the duration of the permit.
14. This permit may be renewed every five years. Revocation of the permit may be executed if the refuge manager determines, after notice and hearing on the basis of substantial evidence in the administrative record as a whole, that the uses under this permit have caused or may have caused significant damage to the principal purposes for which the refuge was established or that the permit holder has violated the conditions of the permit.
15. This permit is not marketable or transferable and is subject to renewal five years from the date of issuance.
16. Live timber up to six inches in diameter may be cut at distances beyond ½ mile of the cabin. The cutting of live timber is not permitted within ½ mile of the cabins. The gathering of dead or downed timber is allowed any where on the refuge. Please be careful not to gather wood on allotments.
17. The use of off-road vehicles is prohibited, except for snowmobiles, provided adequate snow cover is available to prevent scarring of the underlying vegetation.
18. Any action by a permit holder that unduly interferes with or harasses other refuge visitors or impedes access to any site is strictly prohibited.
19. Construction of tent platforms, cabins, or other permanent structures is limited to the number, size, and type agreed upon under this permit.
20. Fuel caches, such as gasoline, diesel, or oil, are prohibited; however, wood caches are authorized.
21. The use of helicopters for cabin maintenance or to fulfill other obligations under this permit is authorized with prior permission from the refuge manager for each flight.
22. Rules governing sanitation, safety, security, and use of the cabin and latrine (mutually agreed upon by the permit holder and the refuge staff) will be posted in the buildings to inform users. A copy of the proposed rules is appended to this permit as Attachment 1.
23. Where wildfire protection of the cabin and related structures involves significantly more fire suppression expense, or where fire suppression actions would present major conflicts with an approved fire plan, special fire protection efforts may not be carried out to protect the cabin or their contents.

## Justification

The use of the Selawik Hot Springs has a long-standing history in northwest Alaska. The construction of small cabins and an outhouse at the site has effectively minimized localized environmental damage that would occur if all use was based out of individual tent camps. The oversight provided by the current permit holder, the Upper Kobuk Elder's Council, ensures cultural values at the site are also protected. This use is cultural and traditional, rather than recreational, and is within the allowed activities of the Service's Cabin Management Policy and 50 CFR 36.33.

Refuge staff will monitor compliance with permit stipulations to ensure that the cabins and use of the cabins will not adversely affect resources within the refuge or affect other visitors. After fully considering the impacts of these activities, as described previously in the "Anticipated Impacts" section of this document, it is my determination that the Selawik Hot Springs cabins do not materially interfere with or detract from the purposes of the refuge or mission of the National Wildlife Refuge System.

## Supporting Documents

U. S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review and Wild River Plan Final for the Selawik National Wildlife Refuge. U. S. Fish and Wildlife Service, Anchorage, Alaska. 378 pp.

U. S. Fish and Wildlife Service. 1987. Record of Decision: Selawik National Wildlife Refuge Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan. U. S. Fish and Wildlife Service, Anchorage, AK. 15 pp.

U. S. Fish and Wildlife Service. 1989. Cabin management policy on National Wildlife Refuges in Alaska, RW-1, 9-12-89.

U. S. Fish and Wildlife Service. 2010. Draft Revised Comprehensive Conservation Plan and Environmental Assessment. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK. 285 pp (plus ten appendices).

U. S. Fish and Wildlife Service. 2011. Final Revised Comprehensive Conservation Plan. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK.

## Refuge Determination

Refuge Manager/ Project Leader Approval	<u>/signed/ Lee Anne Ayres</u>	<u>July 14, 2011</u> Date
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## Concurrence

Regional Chief National Wildlife Refuge System	<u>/signed/ Mitch Ellis</u>	<u>July 20, 2011</u> Date
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**Mandatory 10-Year Re-evaluation Date: 2021**

**NEPA Compliance for Refuge Use Decision**

- Categorical Exclusion without Environmental Action Memorandum
- Categorical Exclusion and Environmental Action Memorandum
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

## Compatibility Determination

**Use:** Recreational Hunting and Fishing

**Primary Uses:** Hunting (big game, waterfowl, other migratory birds, and upland game), fishing (general and other).

**Supporting and Incidental Uses:** Boating (motorized and non-motorized), snowmobiling, snowshoeing, firewood and natural resource gathering, camping, cross-country skiing, skijoring, dog sledding, pets, hiking and backpacking, picnicking, wildlife observation, wildlife photography, videography, fixed-wing aircraft landings, and swimming.

**Refuge Name:** Selawik National Wildlife Refuge

**Establishment and Acquisition Authority:** The Alaska National Interest Lands Conservation Act (ANILCA) established the 2.5-million-acre Selawik National Wildlife Refuge (Selawik refuge, refuge) as part of the U. S. Fish and Wildlife Service National Wildlife Refuge System (Department of the Interior) on December 2, 1980.

**Selawik Refuge Purposes:** As stated in ANILCA Section 302 (7) (B), the purposes for which the Selawik Refuge was established and shall be managed include:

- (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Western Arctic caribou herd (including participation in coordinated ecological studies and management of these caribou), waterfowl, shorebirds and other migratory birds, and salmon and sheefish;
- (ii) to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- (iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- (iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

The purpose of the congressionally designated Selawik Wilderness Area is to secure an enduring resource of wilderness, protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System (NWPS), and administer the area for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as designated wilderness.

### National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

## **Description of Uses**

This description addresses recreational hunting and fishing as a compatible use on Federal lands within Selawik refuge. Recreational hunting and fishing were found to be compatible when the refuge was established in 1980 and in 1994, subject to reasonable regulation. The primary means of access for recreational hunting and fishing on the refuge is by fixed-wing aircraft on wheels or floats. The majority of visitors utilize commercial transporters. Other means of access include snowmobiles, motorboats, non-motorized boats, dog sled, skiing, skijoring, and snowshoeing. Associated activities such as camping, backpacking, hiking, berry picking, and other incidental uses are considered part of recreational hunting and recreational fishing. Recreational hunting and fishing may occur year round but typically take place in the fall on the major tributaries and large lakes in the middle and upper Selawik River drainage. Most recreational hunting is for caribou, moose, and black and brown bears, but incidental take of wolf, wolverine, small game, and waterfowl may occur in conjunction with big game hunts as allowed under State of Alaska hunting regulations (5 AAC). Recreational fishing on the refuge occurs in conjunction with big game hunting and river floating, with few visitors coming to the refuge only to fish. Sheefish, northern pike, and grayling are popular species for recreational anglers.

During the fall, when the refuge is most heavily used by recreational hunters and anglers, refuge staff coordinates the sharing of surveillance information between refuge law enforcement officers, the Bureau of Land Management, National Park Service, Native villages, and Native Corporations having lands in and around the refuge. The number of recreational use-days for fishing, and small game and waterfowl hunting on the refuge is minimal. Levels of recreational hunting and fishing are estimated by staff observations and annual reports provided by air-taxi operators, big game guides, and transporters who transport most recreational users to the refuge. It is estimated that less than 200 people annually participate in recreational hunting and fishing on the refuge. The average length of stay is 7 to 10 days, representing an estimated 1,400–2,000 user days a year for these activities on the refuge.

## **Availability of Resources**

Adequate refuge personnel and base operational funds are available to manage recreational hunting and fishing activities at existing and projected levels. Management primarily includes the inventory and monitoring of fish and wildlife; research on harvested species; environmental education, such as steel shot clinics, culture and science camps, or other efforts aimed at improving public understanding of major conservation issues; and monitoring levels and locations of public use during law enforcement patrols.

Refuge staff members opportunistically conduct outreach to increase visitor awareness of the status of local fish and wildlife populations, the importance of knowing land ownership and regulatory boundaries, and how to minimize disruption of subsistence activities and other social conflicts. Refuge staff members spend considerable time participating in and supporting the regulatory development process with the Federal Subsistence Board, Alaska Migratory Bird Co-management Council, Regional Advisory Council (RAC), the GMU 23 Working Group, and the Western Arctic Caribou Herd Working Group to ensure harvest levels are sustainable and user conflicts prevented or minimized.

## Anticipated Impacts of Uses

Fish and wildlife harvested by recreational users at current and projected levels, in accordance with established State and Federal regulations pertaining to seasons, bag limits, and methods of harvest, are not expected to have long-term impacts on the overall populations of fish and wildlife resources within the refuge. State and Federal biologists monitor fish and game populations, and State and Federal regulatory bodies continually respond to management needs by adopting regulations to ensure the continued health of fish and wildlife populations. The combination of Alaska State regulations (5AAC) and the Federal Subsistence regulations (50 CFR part 100) are intended to provide a sustainable harvest over the long term. It is possible that localized or short-term population reductions may occur due to unanticipated changes in physical condition of animals, environmental conditions, distribution, predation, and harvest pressure.

Refuge habitats will remain largely unaffected by the continuation of recreational hunting and fishing on refuge lands as outlined in the draft revised comprehensive conservation plan and environmental assessment. With access by boat or plane, there is a potential for introduction of invasive plant species or contamination from fuel spills. The use of airplanes on wheels usually takes place on gravel bars below mean high-water mark, which does not typically affect vegetation or fish habitat. Use of airplanes on skis or wheel-skis occurs with adequate snow cover to protect underlying vegetation. Some specific sites may receive repeated use for camping due to their accessibility. Firewood collecting and littering could be a problem at these locations, but they would be localized and easily monitored during regular refuge patrols.

Temporary displacement and or disturbance to wildlife can occur with any form of motorized transport (Bouffard 1982; Calef et al. 1976; Ward et al. 1994). An increase in visitors engaged in this activity or a change in the current distribution pattern of recreational hunting and fishing on the refuge could interfere with users engaged in subsistence activities. Commercial permit holders who transport recreational users are encouraged to share refuge information packets designed to minimize these impacts with their clients. All pilots flying into the refuge to hunt big game are required to take a State of Alaska approved education course (5 AAC 92.003). This program is designed to minimize conflicts between local subsistence hunters and visiting hunters in GMU 23. Anticipated and unanticipated impacts to anadromous fish and resident fish and wildlife populations can be mitigated through further restriction on methods, means, seasons of harvest, and bag limits by the Alaska Boards of Fisheries and Game and Federal Subsistence Board.

## Public Review and Comment

Public comments were solicited concurrently with the revision of the Selawik National Wildlife Refuge's Comprehensive Conservation Plan and Environmental Assessment (USFWS 2010). Public comments on compatibility determinations were accepted during the public review period for the draft plan and announced in the Federal Register. The public comment period was October 21, 2010, to March 15, 2011, which provided 145 days for public review. We mailed the full draft plan and a summary to the individuals and organizations on our mailing list. We invited public comments through an advertisement in a local newspaper and attended city council meetings in Selawik and Noorvik to receive comments on the draft plan. Planning team members met with the Citizens' Advisory Commission on Federal Areas to discuss the issues at Selawik refuge and alternatives that were proposed in the draft plan. The draft compatibility determinations were posted on the Service's Region 7 Web page.

We received no comments on the draft of this compatibility determination. One individual asked for the Service’s definition of the “general public” as it pertains to hunting. Several reviewers expressed opposition to hunting in general. One individual mentioned that new regulations needed to be established and enforced regarding the removal of killed game.

**Refuge Determination (check one below)**

Use is not compatible

Use is compatible

**Stipulations Necessary to Ensure Compatibility**

Recreational hunters and anglers on the Selawik refuge lands will be required to comply with any regulations in place such as seasonal closures for resource protection. The Selawik Fishery Management Plan (1993) will be used to identify specific management actions to ensure that recreational fishing and related activities continue to remain compatible with refuge purposes. Permit conditions for commercial transporters and guides include stipulations to minimize associated impacts of recreational hunting and fishing.

**Justification**

All refuge lands within the boundary of the Selawik refuge are open to public access. The National Wildlife Refuge System Administration Act of 1966 (as amended by the Refuge Improvement Act of 1997) identifies recreational hunting and fishing as two of six priority public uses of the National Wildlife Refuge System. The law states “when managed in accordance with principles of sound fish and wildlife management, administration of this use has been and is expected to continue to be generally compatible and that priority public uses should receive enhanced consideration over other public uses in refuge planning and management.” The law also directs the Service to provide increased opportunities for families to experience compatible wildlife-dependent recreation, particularly opportunities for parents and their children to safely engage in traditional outdoor activities such as hunting and fishing.

Means of access by airplanes, motorboats, snowmobiles, and non-motorized means for traditional activities, as provided by ANILCA and as currently regulated by the Service, have not materially interfered with or detracted from refuge purposes. Should motorized transportation grow to levels where it interferes with refuge purposes, staff would work with hunters and State of Alaska to address impacts and resolve compatibility concerns. Recreational hunting and fishing are activities that Congress intended to preserve when the refuge was established by ANILCA. Recreational hunting and fishing on the Selawik refuge provides the public with quality, safe, and unique opportunities found few places elsewhere in the world. To ensure sustainability of harvest of wildlife resources, both the Federal Subsistence Board and State Board of Game regularly adopt regulations in response to wildlife population levels and management needs. These regulations provide adequate protection for fish and wildlife resources on refuge lands and other refuge purposes. After fully considering the impacts of these activities, as described previously in the “Anticipated Impacts” section of this document, it is my determination that recreational hunting and recreational fishing within the refuge do not materially interfere with or detract from the purposes of the refuge or mission of the National Wildlife Refuge System.

### Supporting Documents

- Bouffard, S. 1982. Wildlife values versus human recreation: Ruby Lake National Wildlife Refuge. Transactions of the North American Wildlife and Natural Resources Conference 47: 553-558.
- Calef, G. W., E. A. DeBock, and G. M. Lortie. 1976. The reaction of barren-ground caribou to aircraft. Arctic 29(4): 201-212.
- Miller, M. W. 1994. Route selection to minimize helicopter disturbance of molting Pacific black brant: A simulation. Arctic 47: 341-349.
- Ward, D. H., R. A. Stehn, D. V. Derksen. 1994. Response of staging brant to disturbance at the Izembek Lagoon, Alaska. Wildlife Society Bulletin 22: 220-228.
- U. S. Fish and Wildlife Service. 1993. Selawik National Wildlife Refuge Fishery Management Plan. U. S. Fish and Wildlife Service, Kotzebue, Alaska. 47 pp.
- U. S. Fish and Wildlife Service. 1987. Selawik National Wildlife Refuge Final Comprehensive Conservation Plan, Wilderness Review and Environmental Impact Statement. U. S. Fish and Wildlife Service, Anchorage, Alaska. 378 pp.
- U. S. Fish and Wildlife Service. 1987. Record of Decision: Selawik National Wildlife Refuge Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan. U. S. Fish and Wildlife Service, Anchorage, Alaska. 15 pp.
- U. S. Fish and Wildlife Service. 2010. Draft Revised Comprehensive Conservation Plan and Environmental Assessment. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK. 285 pp (plus ten appendices).
- U. S. Fish and Wildlife Service. 2011. Final Revised Comprehensive Conservation Plan. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK.

### Refuge Determination

Refuge Manager/ Project Leader Approval	<u>/signed/ Lee Anne Ayres</u>	<u>July 14, 2011</u> Date
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### Concurrence

Regional Chief National Wildlife Refuge System	<u>/signed/ Mitch Ellis</u>	<u>July 20, 2011</u> Date
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**Mandatory 15-Year Re-evaluation Date (for priority public uses): 2026**

### NEPA Compliance for Refuge Use Decision

<u>          </u>	Categorical Exclusion without Environmental Action Memorandum
<u>          </u>	Categorical Exclusion and Environmental Action Memorandum
<u>  X  </u>	Environmental Assessment and Finding of No Significant Impact
<u>          </u>	Environmental Impact Statement and Record of Decision

## Compatibility Determination

**Use:** Commercial Hunting Guide Services

**Primary Uses:** Hunting (big game guiding and outfitting)

**Supporting and Incidental Uses:** Fixed-wing aircraft landings, boating (motorized and non-motorized), snowmobiling, environmental education and interpretation (not conducted by refuge staff or authorized agents), fishing, hunting (non big game), firewood gathering, berry picking, camping, picnicking, hiking and backpacking, snowshoeing, pets, wildlife photography, wildlife observation tent frames and platforms, weather ports.

**Refuge Name:** Selawik National Wildlife Refuge

**Establishment and Acquisition Authority:** The Alaska National Interest Lands Conservation Act (ANILCA) established the 2.5-million-acre Selawik National Wildlife Refuge (Selawik refuge, refuge) as part of the U. S. Fish and Wildlife Service, National Wildlife Refuge System (Department of the Interior) on December 2, 1980.

**Selawik Refuge Purposes:** As stated in ANILCA Section 302 (7) (B), the purposes for which the Selawik refuge was established and shall be managed include:

- (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Western Arctic Caribou Herd (including participation in coordinated ecological studies and management of these caribou), waterfowl, shorebirds and other migratory birds, and salmon and sheefish;
- (ii) to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- (iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- (iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

The purpose of the congressionally designated Selawik Wilderness Area is to secure an enduring resource of wilderness, protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System (NWPS), and administer the area for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as designated wilderness.

### National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

## Description of Uses

This compatibility determination addresses commercial guiding and outfitting services provided to hunters in the refuge. Alaska regulations define the term “guide” ... to provide, for compensation or with the intent or with an agreement to receive compensation, services, equipment, or facilities to a big game hunter in the field by a person who accompanies or is present with the big game hunter in the field either personally or through an assistant. Regulations identify guiding “services” provided to big game hunters to include 1) contracting to guide or outfit hunts; 2) stalking, pursuing, tracking, killing, or attempting to kill game; 3) packing, preparing, salvaging, and caring for meat; 4) field preparation of trophies, including skinning and capping; 5) selling, leasing, or renting goods when the transaction occurs in the field; 6) using guiding or outfitting equipment, including spotting scopes and firearms for the benefit of the hunter; and 7) providing camping or hunting equipment or supplies that are already located in the field. The term “outfit” also applies to services, supplies, or facilities that are provided for compensation to hunters in the field. State regulations distinguish outfitting from guiding in that outfitters do not accompany or remain present with the hunter in the field, whereas guides or their assistants must be in the field with clients through the duration of a guided hunt. Outfitting services are often referred to as “drop-off hunts.” Big game guides and outfitters are required to obtain a guide license from the State of Alaska. Although the State’s regulatory definitions for guiding and outfitting apply to big game hunting, this compatibility determination includes commercial hunting services for all other wildlife species that may be hunted under Alaska hunting regulations as well (i.e., waterfowl, sandhill cranes, small game, upland game birds, etc.).

Commercial guided, big game recreational hunting was originally found to be compatible in 1994 subject to reasonable regulations as described by special use permit conditions. The refuge has one exclusive commercial big game guiding area, which encompasses the entire refuge. The big game guide for this area is selected through a competitive process, first established by regional policy in 1992 and later codified (50 CFR 36.41). Competitive selection is intended to limit or manage commercial guiding and outfitting to a level compatible with refuge purposes and to ensure that quality guiding services are available to the public. Guides must be qualified and licensed by the State of Alaska, Big Game Commercial Services Board. Each guide is required to submit and follow a written operations plan, which is evaluated by Service personnel during the selection process. These operations plans include 1) dates of field operations; 2) species to be hunted; 3) maximum and expected number of clients for each species hunted; 4) number and type of existing or new camps (i.e., tent, tent platform, or frame), including other needed facilities such as caches; 5) access points and mode(s) of transportation (e.g., airplanes, boats, snowmobiles, pack animals, and other non-motorized means); 6) fuel storage needs; and 7) services provided by others (e.g., contracts for transportation, food services). Big game guides are required to comply with all applicable State and Federal laws and regulations, including obtaining required State and Federal permits and authorizations related to their guiding activities.

This compatibility determination addresses the full spectrum of uses associated with commercially guided hunting of big game, including means of access, lodging and facilities, and other elements identified in a guide’s operations plan. Authorized modes of access within the refuge include fixed-wing aircraft, motor boats, snowmobiles, non-motorized boats, dog sled, foot, snowshoe, and cross-country skis. Lodging and facilities include tents, tent frames,

tent platforms, weather ports, and caches. The use of off-road vehicles by big game hunting guides and their clients is prohibited on the refuge.

Commercial services associated with hunting activities could occur throughout most of the refuge, depending on State regulated hunting seasons. All activities conducted under the current big game guide permit are limited to refuge lands east and up river from the village of Selawik to avoid large tracts of private land within the refuge boundary and areas of high use by other non-guided hunters.

### **Availability of Resources**

Permits are issued competitively for five years, with provision for automatic renewal for a second five years. The competitive process requires a significant level of time and effort for the applicants and for refuge and agency staff. Adequate refuge personnel and base operational funds are available to manage guided big game hunting activities at existing and projected levels.

During the initial competitive process, the refuge manager spends approximately one month reviewing the prospectus, conducting interviews, making a selection, writing decision documents, and addressing appeals and briefing the regional office on appeals. After initial selection, refuge staff may spend five days per year on oversight, permit compliance, and conducting related activities. Law enforcement officers from other refuges spend an average of 10 days per year monitoring permit and hunting regulation compliance.

The refuge manager issues and renews special use permits every five years, ensuring licenses and certificates are current; collects client use-day fees; and reports data on an annual basis. Field work for the program primarily involves patrolling during hunting seasons, which already takes place, and monitoring permit holders' compliance with permit conditions. An administrative fee of \$100 is assessed when each permit is issued. Client use-day fees are assessed for each day a guide has a client on the refuge. Fees collected are returned to the refuge for administering the program.

### **Anticipated Impacts of Uses**

The one commercial big game guiding and outfitting operation on the refuge may result in some competition or interference with subsistence users and/or other non-guided recreational hunters for the limited number of game animals and access points along river corridors. Other refuge resources possibly impacted by this activity include water quality, soil, and vegetation. Criteria in the competitive scoring and selection process attempts to minimize impacts to refuge resources and other visitors. As of 2011, the big game guide is allowed to provide guiding and outfitting services to 26 clients, with associated limits on specific game species (caribou 22, moose 12, and brown bears 4). Wildlife and resource impacts on the refuge will be minimal. Permit conditions and stipulations are further designed to minimize potential impacts.

Commercial big game hunting is also regulated by the State (AS 08.54 and 12 AAC 75) and the Big Game Commercial Services Board. Should game populations decline or allocation conflicts arise, the Service will work to address them through the Federal Subsistence Board and Alaska Board of Game. These boards establish regulations aimed at managing populations of animals at sustainable levels and to avoid conflicts between user groups. The refuge will remain engaged in tribal councils for communities within the refuge to monitor and develop ways to mitigate impacts on other users.

Based on the scale of this commercial activity, impacts to refuge habitats would be minimal and transitory. Fall access to the refuge would be primarily by landing float-equipped aircraft on lakes and rivers, wheel landing by fixed-wing aircraft on gravel bars, motor boat, or by floating into the refuge. Temporary displacement and/or disturbance to wildlife can occur in response to low level over-flights and during takeoffs and approaches to landing (Calef et al. 1976), but impacts would likely be short term and minimal. Base or spike camps will not be permitted in areas requiring landing on vegetated lowland tundra under the terms of the special use permit. The introduction of invasive species carried on boats and aircraft floats could affect refuge resources, although it's not known to have occurred via this transmission method within the refuge to date. Frequent motorboat or aircraft traffic could impact molting or staging birds (Bouffard 1982; Ward et al. 1994). However, most waterfowl have migrated through the refuge or utilize delta areas on the western refuge boundary where this activity is not permitted. Winter and spring access could be by dog sled, cross-country skis, snowmobile, or aircraft fitted with skis.

Refuge staff members are aware of these potential impacts and conflicts and monitor use levels during each hunting season. Compliance with regulations and permit conditions will be routinely checked by officers. Refuge officers and State wildlife protection officers would routinely patrol the refuge during hunting seasons.

### **Public Review and Comment**

Public comments were solicited concurrently with the draft revised Comprehensive Conservation Plan and Environmental Assessment for Selawik National Wildlife Refuge (USFWS 2010). Public comments on compatibility determinations were accepted during the public review period for the draft plan and announced in the Federal Register. The public comment period was October 21, 2010, to March 15, 2011, which provided 145 days for public review. We mailed the full draft plan and a summary to the individuals and organizations on our mailing list. We invited public comments through an advertisement in a local newspaper and attended city council meetings in Selawik and Noorvik to receive comments on the draft plan. Planning team members met with the Citizens' Advisory Commission on Federal Areas to discuss the issues at Selawik refuge and alternatives that were proposed in the draft plan. The draft compatibility determinations were posted on the Service's Region 7 Web page.

The only specific comments we received on the draft of this compatibility determination were from the State of Alaska. The State commented that it believes and expects that the permit stipulations already written in the compatibility determination (unrelated to the area not authorized for commercial use) will adequately address the majority of potential on-the-ground impacts of commercial hunting guides. The State referenced stipulations numbered 16 and 20 as examples. The Service agrees that the intent of these two stipulations is to minimize on-the-ground impacts, primarily to wildlife resources. These stipulations and the operator education program referenced by the State are important tools but are not adequate to minimize and essentially prevent social conflicts between commercial hunters and resident subsistence hunters on refuge lands. In accordance with the final decision (i.e., Finding of No Significant Impact) and the revised management direction in the final comprehensive plan, the Service has added permit stipulation number 21 to proactively manage commercial hunting and to prevent most, if not all, social conflicts related to big game hunting on refuge lands.

The Northwest Arctic Borough suggested general updates to the refuge permitting process for commercial uses. The Service has updated the permit stipulations for this commercial use and associated activities and has published new management direction for commercial hunting in the final comprehensive plan, including a map of the area not authorized for commercial use. The Borough also stated that the comprehensive plan should provide a process to revoke Service permits due to noncompliance with municipal ordinances. The Service has no authority to enforce municipal ordinances. However, the Service does have a process for denying applicants permits if they have been found to be in violation of the permit stipulations listed in this document (for example, see stipulation number 10) or other State and Federal regulations regarding big game hunting. The refuge manager is willing to discuss with city leaders how to best account for local laws and mores in relation to its permitting process for commercial hunting.

**Refuge Determination (check one below)**

Use is not compatible

Use is compatible

**Stipulations Necessary to Ensure Compatibility**

A special use permit with stipulations is required for commercially guided services for recreational hunting. The guide’s operating plan is incorporated into the special use permit and contains details about the operation. Site-specific, special use conditions related to maintenance of defensible space will be incorporated into permits on a case-by-case basis. Following are current special use permit stipulations necessary for big game guide compatibility on the Selawik refuge, which were updated with the last prospectus review in 2007.

**SPECIAL CONDITIONS FOR GUIDES/OUTFITTERS ON SELAWIK REFUGE**

1. Failure to abide by any part of this special use permit; violation of any refuge related provision in Titles 43 (part 36) or 50 (sub-chapters B and C) Code of Federal Regulations (CFR); or violations of any pertinent State regulation (e.g., fish or game violation) will, with due process, be considered grounds for immediate revocation of this permit and could result in denial of future permit requests for lands administered by the U. S. Fish and Wildlife Service. This provision applies to all persons working under the authority of this permit (e.g., assistants). Appeals of decisions relative to permits are handled in accordance with Title 50 CFR, Part 36.41.
2. The permit holder is responsible for ensuring that all employees, party members, aircraft pilots, and any other persons working for the permit holder and conducting activities allowed by this permit are familiar with and adhere to the conditions of this permit.
3. The permit holder may not sublet any part of the authorized use area and is prohibited from subcontracting clients with any other guide.
4. Any problems with wildlife and/or animals taken in defense of life or property must be reported immediately to the refuge manager and/or Alaska Department of Fish and Game and be salvaged in accordance with State regulations.
5. The permit holder and permit holder’s clients do not have exclusive use of the site(s) or lands covered by this permit, except for the authorized camp facilities.
6. This permit may be cancelled or revised at any time by the refuge manager in case of emergency (e.g., high fire danger, flooding, unusual resource problems, etc.).

7. The permit holder shall notify the refuge manager during refuge working hours in person or by telephone before beginning and upon completion of activities allowed by this permit.
8. Prior to beginning any activities allowed by this permit, the permit holder shall provide the refuge manager with (1) proof of comprehensive general liability insurance (\$300,000 each occurrence, \$500,000 aggregate) covering all aspects of operations throughout the annual use period; (2) aircraft and other vehicle types to be used, with identification information, if different from the original permit or the previous year; (3) changes in names of assistant guides and other employees; and (4) any other changes in information provided in the original permit/proposed operations plan.
9. The permit holder is responsible for accurate record keeping and will provide the refuge manager with a comprehensive summary report of the number of clients, and number of client days per activity type by December 31 for all uses during that calendar year unless stated otherwise in the permit. A legible copy of the State's "Hunt Record" for each client will be required in addition to the summary report.
10. Failure to report the actual number of client use-days per type of authorized activity by December 31 of each calendar year and annually pay the Service's established fees (client use-day and reserved land site) within 30 days after receiving a bill for collection will be grounds for revocation of this permit.
11. The permit holder will not be required to provide a letter of concurrence from the State of Alaska before the use of State selected lands can be authorized. However, if any of these selected lands are conveyed to the State during the term of the permit, the permit holder will be required to obtain permission from the State's Department of Natural Resources to continue operation on State land.
12. In accordance with the Archaeological Resources Protection Act (16 U.S.C. 470aa), the removal or disturbance of archaeological or historic artifacts is prohibited. The excavation, disturbance, collection, or purchase of historical or archaeological specimens or artifacts on refuge lands is prohibited.
13. Permit holder shall maintain their use areas in a neat and sanitary condition. Latrines must be located at least 150 feet from springs, lakes, and streams to avoid contamination of water resources. All property (except cabins and/or tent frames) of the permit holder must be removed from refuge lands upon completion of permitted activities.
14. The construction of landing strips or pads is prohibited. Incidental hand removal of rocks and other minor obstructions may be permitted.
15. The use of off-road vehicles (except snowmachines) is prohibited. Snowmachines may be used where there is adequate snow cover to prevent scaring of the underlying vegetation.
16. The operation of aircraft at altitudes and in flight paths resulting in the herding, harassment, hazing, or driving of wildlife is prohibited. It is recommended that all aircraft, except for takeoff and landing, maintain a minimum altitude of 2,000 feet above ground level.
17. All aircraft being used in a commercial guiding operation must have 12-inch identification numbers in contrasting colors that are readily visible.
18. Motorboat operators must possess a U. S. Coast Guard (USCG) license for all passenger-carrying operations, if required by USCG regulations.
19. Construction of cabins or other permanent structures is prohibited.

20. Any action by a permit holder or the permit holder's employees which unduly interferes with or harasses other refuge visitors or impedes access to any site is strictly prohibited. Examples of prohibited acts include, but are not limited to, low flights over camps or persons at less than 500 feet (unless landing) and parking aircraft or placing other objects (rocks, tents, etc.) on any area on which an aircraft might land so as to restrict use by other aircraft or persons.
21. Use of refuge lands in close proximity to or intermingled with, private lands in the northwest portion of the refuge (west and north of latitude 66 degrees 28.63 minutes and longitude 159 degrees 24.67) is not authorized. A map of the area is provided with the approved permit and a legal description of the area is available upon request.
22. All tent frames or structures must be disassembled and neatly stacked or removed at the end of each hunting season.
23. The permit holder's operations plan, as amended and accepted by the U.S. Fish and Wildlife Service, is hereby incorporated in its entirety as a special condition of the permit. All deviations from the operations plan must receive prior written approval by the refuge manager or their designee.

### Fees

Effective January 1, 2010, special use permit fees for all guiding and outfitting on refuges are:

Guiding-outfitting

Brown/Grizzly Bear - \$13.67/client use-day

Moose - \$13.67/client use-day

All Other Species - \$6.90/client use-day

Sport Fishing - \$2.75/client use-day

River/Floating - \$2.75/client use-day

Photography/Birding/Other - \$2.75/client use-day

The regional office will issue an adjustment to fees every three years (next adjustment in 2013) which will be based on the Implicit Price Deflator Index (IPDI). The IPDI is compiled each year by the Department of Commerce and is published in February as part of the *Economic Report of the President* for Congress.

### Administration

A non-refundable \$100 administrative fee will be charged upon issuance of the special use permit. Permit holders will be required to obtain special use permits from each refuge in which they operate, and full fees will be collected by each refuge. Client use-day fees will be based on actual client use-days and will be in addition to the \$100 administrative fee. A "client use-day" shall be defined as one calendar day (24 hours), or portion thereof, for each client using the refuge.

The permit holder is responsible for record keeping and reporting the actual number of use-days to the refuge manager and shall be required to report actual use within 30 days of the end of each authorized use period (December 31 of each year), unless otherwise stated in the

permit. The refuge manager is responsible for computing the actual fees owed and issuing a bill for collection to each permit holder within 30 days of receipt of the use report. Permit holders are responsible for paying the fees within 30 days after receipt of the bill for collection. A permit holder may not be issued a new special use permit nor will his/her existing permit be valid to operate on the refuge until all fees have been paid. Special use permits issued for several year terms may be revoked during the term of the permit if annual fees are not paid within the required 30-day period.

This permit may be immediately revoked as the result of successful administrative appeals by other applicants who were denied the privilege of receiving a permit in accordance with 50 CFR 36.41 (b).

### **Justification**

Recreational hunting has been found to be compatible with the purposes of the Selawik refuge and with the National Wildlife Refuge System Mission. Commercial big game guiding and outfitting services are necessary for some citizens to enjoy wildlife-dependent recreation. These commercial services support not only hunting, but also other activities including wildlife observation and photography, which are priority public uses of National Wildlife Refuges. Many people not living in Alaska would most likely not be able to hunt on the Selawik refuge if commercial guiding were not allowed.

Requirements placed on commercial hunting guides by the Service through the original selection process and the terms of special use permits and regulations of the State of Alaska ensure that these commercial operators provide safe, high-quality experiences for their clients and other users. These operations can help the refuge achieve its purposes of protecting fish and wildlife resources and meeting legal requirements to provide compatible opportunities for the public to use and enjoy these resources. After fully considering the impacts of this activity, as described previously in the “Anticipated Impacts” section of this document, it’s my determination that commercially guided recreational big game hunting activities on the refuge do not materially interfere with or detract from the purposes of the refuge or mission of the National Wildlife Refuge System.

### **Supporting Documents**

Bouffard, S. 1982. Wildlife values versus human recreation: Ruby Lake National Wildlife Refuge Transactions of the North American Wildlife and Natural Resources Conference 47: 553-558.

Calef, G. W., E. A. DeBock, and G. M. Lortie. 1976. The reaction of barren-ground caribou to aircraft. *Arctic* 29(4): 201-212.

Ward, D. H., R. A. Stehn, D. V. Derksen. 1994. Response of staging brant to disturbance at the Izembek Lagoon, Alaska. *Wildlife Society Bulletin* 22: 220-228.

U. S. Fish and Wildlife Service. 1987. Selawik National Wildlife Refuge Final Comprehensive Conservation Plan, Wilderness Review and Environmental Impact Statement. U. S. Fish and Wildlife Service, Anchorage, Alaska. 378 pp.

U. S. Fish and Wildlife Service. 1987. Record of Decision: Selawik National Wildlife Refuge Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan. U. S. Fish and Wildlife Service, Anchorage, Alaska. 15 pp.

**Appendix D: Compatibility Determinations**

U. S. Fish and Wildlife Service. 2010. Draft Revised Comprehensive Conservation Plan and Environmental Assessment. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK. 285 pp (plus ten appendices).

U. S. Fish and Wildlife Service. 2011. Decision and Finding of No Significant Impact: Environmental Assessment: Revised Comprehensive Conservation Plan. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK. 5 pp.

U. S. Fish and Wildlife Service. 2011. Final Revised Comprehensive Conservation Plan. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK.

**Refuge Determination**

Refuge Manager/  
Project Leader Approval      /signed/ Lee Anne Ayres      July 14, 2011  
Date

**Concurrence**

Regional Chief  
National Wildlife      /signed/ Mitch Ellis      July 20, 2011  
Refuge System      Date

**Mandatory 10-Year Re-evaluation Date: 2021**

**NEPA Compliance for Refuge Use Decision**

- Categorical Exclusion without Environmental Action Memorandum
- Categorical Exclusion and Environmental Action Memorandum
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

## Compatibility Determination

**Use:** Commercial Transporter Services

**Primary Uses:** Air-taxi, big game transporter, charter boat services

**Supporting and Incidental Uses:** Boating (motorized and non-motorized), fixed-wing aircraft landings, environmental education, interpretation, fishing (non-guided), hunting (guided and non-guided), trapping, natural resource gathering, camping, picnicking, cross-country skiing, dog sledding and skijoring, pets, hiking and backpacking, wildlife photography, videography and audio recording, snowshoeing, research, scientific collecting, surveys, and wildlife observation.

**Refuge Name:** Selawik National Wildlife Refuge

**Establishment and Acquisition Authority:** The Alaska National Interest Lands Conservation Act (ANILCA) established the 2.5-million-acre Selawik National Wildlife Refuge (Selawik refuge, refuge) as part of the U. S. Fish and Wildlife Service National Wildlife Refuge System (Department of the Interior) on December 2, 1980.

**Selawik Refuge Purposes:** As stated in ANILCA Section 302 (7) (B), the purposes for which the Selawik refuge was established and shall be managed include:

- (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Western Arctic caribou herd (including participation in coordinated ecological studies and management of these caribou), waterfowl, shorebirds and other migratory birds, and salmon and sheefish;
- (ii) to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- (iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- (iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

The purpose of the congressionally designated Selawik Wilderness Area is to secure an enduring resource of wilderness, protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System (NWPS), and administer the area for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as designated wilderness.

### National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

## **Description of Uses**

This is a re-evaluation of the compatibility of commercial transporter services as a use of Federal lands within Selawik refuge. Use of the refuge by commercial transporters was originally found to be compatible in 1987 during the development of the original Comprehensive Conservation Plan. It was again determined to be compatible in 1994, subject to reasonable regulation.

Commercial transporter services contribute to the fulfillment of refuge purposes and the National Wildlife Refuge System mission by providing access to visitors otherwise unable to reach refuge lands. These services facilitate priority public uses such as recreational hunting, fishing, wildlife observation, and other compatible uses and outdoor activities on the remote and largely inaccessible Selawik refuge. The Service authorizes and manages commercial transporter services in a responsible and proactive manner to ensure that visitors to the refuge and community residents continue to have high quality hunting experiences.

Most commercial transporting activities on the refuge are conducted by air-taxis with float-equipped aircraft. Transporters are required, as a condition of their permits, to provide information about their clients' trips such as primary activity, location, length of stay, group size, and other related items. These reports provide the most accurate and reliable information the Service has on refuge use by unguided visitors. Since establishment, the refuge has issued 2–6 special use permits annually to commercial air-taxi businesses and charter boat operators providing transportation services within the refuge. The number of people utilizing this service has been declining since 2000, when 154 clients were transported onto the refuge. Since 2000, commercial transporters provided services to 8–22 groups per year with an average group size of two. Their clients primarily hunted, fished, or floated rivers in the refuge. The lengths of these trips were typically 7–10 days, although shorter trips sometimes occurred. The trips took place June through October, with most coinciding with the fall hunting season in late August and September.

Commercial transporters are not authorized to drop clients on specified lands in the western portion of the refuge between the villages of Selawik and Noorvik. The affected area is composed of some refuge lands interspersed with conveyed Native corporation lands. There is currently no limit to the number of trips or clients air-taxi operators can take to the refuge, nor is there a limit to the number of air-taxi operators permitted to operate on the refuge; however, annual applications require a projected maximum number of clients and proposed area of operation. Two application periods are available for commercial transporters to request a permit: January 1 to March 15 and October 1 to November 30. This system allows refuge staff an opportunity to evaluate the potential impacts of permit applicants on refuge resources, including subsistence opportunity. It also allows a transporter time to appeal should his/her application be denied.

## **Availability of Resources**

Adequate refuge personnel and base operational funds are available to manage commercial transporter service activities at existing and projected levels. Administrative staff time primarily involves reviewing permit applications, responding to applicants, issuing and renewing special use permits, collecting client use fees, and interagency coordination. Field work associated with administering the program primarily involves patrolling during hunting and fishing seasons to monitor permit holders' compliance with permit terms and to determine

whether non-permitted operators are using the refuge. It is anticipated that this use will require three weeks of staff time for permit issuance and/or renewal, activity reporting, administration of use-day fees, and field compliance checks. An administrative fee of \$100 is assessed for each special use permit. Use-day fees are assessed for each day a transporter drops off and/or picks up a client on the refuge. Fees collected are returned to the refuge to administer the program.

### **Anticipated Impacts of Uses**

Impacts associated with the activities for which commercial transporters provide access (such as hunting and fishing) are addressed in the respective compatibility determinations for each activity.

Commercial transporter services could concentrate public use in the most accessible portions of the refuge and potentially compete or interfere with subsistence hunters in locations where user groups overlap. However, most hunting by Federally qualified subsistence hunters living in nearby communities occurs on private lands in the lower Selawik and Kobuk river drainages where transporter activities are not authorized. Refuge lands on the Kobuk delta and lower Selawik River interspersed with private lands are not authorized for use by commercial transporters to reduce conflicts between user groups. Most commercial transporter activity occurs on lakes and in the upper portions of major drainages (Selawik, Kugarak, and Tagagawik rivers) not readily accessible to local subsistence hunters.

The overall number of hunters transported into the refuge has been constrained by more restrictive State moose hunting regulations, which now require a registration permit (obtainable only in person during a limited period) for Alaska residents and a drawing permit for non-residents. If conflicts should arise, the Service will work to address them through permit conditions and through the regulatory process of the Federal Subsistence Board and Alaska Board of Game. These boards establish regulations aimed at managing populations of animals at sustainable levels and avoiding conflicts between user groups.

Commercial transporter services would have minimal and transitory impacts to refuge habitats because transporters primarily use float-equipped aircraft, which do little, if any, damage to vegetation. Transporters also occasionally use boats, which similarly have little impact on vegetation. Landings on lowland tundra and subsequent disturbance to vegetation would be limited under the stipulations of the special use permit. The introduction of invasive species carried on aircraft floats and boat hulls could affect refuge resources, although this is not known to have occurred within the refuge to date. Aircraft traffic could affect nesting, molting, or staging birds (Ward et al. 1994); however, most birds have molted by the time the majority of commercial transporter services takes place in the fall. Members of the refuge staff have reported that important staging areas are located along the coast and not in the inland areas favored by transporters. Disturbance to vegetation from spilled fuel would be minimal due to permit conditions requiring secondary containment for any fuel stored in the field.

Temporary displacement or disturbance to wildlife can occur in response to low level over-flights and during takeoffs and landings (Calef et al. 1976), but these impacts would likely be short term and minimal.

## **Public Review and Comment**

Public comments were solicited concurrently with the draft revised Comprehensive Conservation Plan and Environmental Assessment for Selawik National Wildlife Refuge (USFWS 2010). Public comments on compatibility determinations were accepted during the public review period for the draft plan and announced in the Federal Register. The public comment period was October 21, 2010, to March 15, 2011, which provided 145 days for public review. We mailed the full draft plan and a summary to the individuals and organizations on our mailing list. We invited public comments through an advertisement in a local newspaper and attended city council meetings in Selawik and Noorvik to receive comments on the draft plan. Planning team members met with the Citizens' Advisory Commission on Federal Areas to discuss the issues at Selawik refuge and alternatives that were proposed in the draft plan. The draft compatibility determinations were posted on the Service's Region 7 Web page.

The only comments we received on the draft of this compatibility determination were from the State of Alaska. The State commented that it believes and expects that the permit stipulations already written in the compatibility determination, (unrelated to the area not authorized for commercial use) will adequately address the majority of potential on-the-ground impacts of transporter use for big game hunting. For example, see stipulation number eight. The Service agrees that the intent of this stipulation is to minimize on-the-ground impacts, primarily to wildlife resources. This stipulation and the operator education program referenced by the State are important tools but are not adequate to minimize and essentially prevent social conflicts between commercial hunters and resident subsistence hunters on refuge lands. In accordance with the final decision (i.e., Finding of No Significant Impact) and the revised management direction in the final comprehensive plan, the Service has added permit stipulation number 25 to proactively manage commercial hunting and to prevent most, if not all, social conflicts related to big game hunting on refuge lands.

The State requested that the following be included in the 'Description of Uses' section: "...commercial transporting is 'a traditional activity that Congress intended to preserve when it established the Refuge with the enactment of ANILCA.'" This language was used in the case of the Togiak refuge's compatibility determination for commercial transporter services. The Service has observed that different levels and patterns of use were occurring when Congress established the refuges through enactment of ANILCA than occur today. Congress identified unique purposes for each refuge. Togiak refuge's enabling legislation and management goals differ significantly from those for Selawik refuge. Unlike Selawik refuge, Togiak refuge has a long history of the public utilizing commercial transporter services for river recreation and angling. This is a different context than commercial hunting of big game species in the Northwest Arctic region. In the case of Selawik refuge, the Service does not support this addition or believe it necessary to describe use by commercial transporters as a traditional activity to justify it as a compatible use at Selawik refuge. This is not standard language used to address compatibility of commercial transporters on refuges in Region 7 and was not adopted by the refuges near the Selawik refuge (e.g., Innoko and Koyukuk/Nowitna refuges).

The State requested that the following sentences be moved into a separate paragraph: "Commercial transporter services could concentrate public use in the most accessible portions of the refuge. This could lead to loss of opportunities for visitors seeking solitude and wilderness experiences on the refuge." In addition, the terms "solitude" and "wilderness experience" imply the discussion is about designated wilderness. The State recommended this be clarified in the final compatibility determination, using different terminology if the concern

applies to non-designated wilderness. The Service agreed, and we moved the sentence to the beginning of a different paragraph, deleted the reference to wilderness and solitude, and rearranged the section to start with general points and end with more specific details.

**Refuge Determination (check one below)**

- Use is not compatible  
 Use is compatible

**Stipulations Necessary to Ensure Compatibility**

A special use permit with stipulations is required for commercial transporter services. The permit includes the details of the services provided. The following section lists typical special use permit conditions, some of which are necessary for compatibility.

**SPECIAL USE PERMIT CONDITIONS**

1. Prior to beginning any activities allowed under this permit, the permit holder shall provide the land manager with a method of contact (including a local phone number) for the permit holder during the permit period; a list of aircraft, boats, and/or other vehicle types to be used, along with descriptions and registration numbers; and a list of employees.
2. Any changes or deviations from information provided in the original permit must be reported to and approved by the land manager prior to any activity or this permit will be invalid.
3. The permit holder is responsible for ensuring all employees, party members, contractors, aircraft pilots, or any other persons working for the permit holder and conducting activities allowed by this permit are familiar with and adhere to the conditions of this permit.
4. This permit may be canceled or revised at any time by the issuing official.
5. The permit holder and permit holder's clients do not have exclusive use of any site(s) or lands covered by this permit and are prohibited from blocking access to any point of ingress or egress (air strip, gravel bar that can be used as a landing site etc.) to them.
6. Permit holder may not sublet any part of this permit.
7. The permit holder must acquire all permits or licenses of State or local government, as applicable, necessary to provide the services described previously and must operate in compliance with all applicable Federal, State, and local laws and regulations.
8. State and Federal regulations prohibit harassing people and wildlife from aircraft. The operation of aircraft at altitudes and in flight paths resulting in the herding, harassment, hazing, or driving of wildlife is prohibited. It is recommended that all aircraft, except for takeoff and landing, maintain a minimum altitude of 2,000 feet above ground level to minimize disturbance to wildlife and other refuge visitors.
9. A big game transporter may only provide transportation services as defined by Alaska State law Title 8 Sec.08.54.650. Any additional services such as providing gear to hunters in the field is defined as guiding/outfitting by Alaska Statute Title 8 Sec. 08.54.790 and not allowed. Any rental of gear must take place out of the field, and gear must be transported out of the field after each transaction.

10. The permit holder will follow the professional ethics standards for transporters identified by the State of Alaska's Big Game Commercial Services Board (12AAC75.440) and allow appropriate buffer areas between hunters and camps transported by the same service to avoid disrupting hunts and hunter experience.
11. The permit holder shall maintain and provide proof of comprehensive general liability insurance throughout the use period specified on the permit.
12. Any problems with wildlife and/or animals taken in defense of life or property must be reported immediately to the permitting agency and Alaska Department of Fish and Game. Any animals taken in defense of life or property must be salvaged in accordance with State regulations.
13. The permit holder is required to report any illegal activity to the permitting agency or the Alaska State Troopers as soon as practical.
14. Tail numbers on aircraft operating under this permit must be at least 12 inches high and in contrasting colors that are readily visible.
15. The construction of landing strips or pads is prohibited. Incidental removal of rocks and other minor obstructions by hand is permitted.
16. The use of helicopters is prohibited.
17. Construction of tent platforms, cabins, or other permanent structures is prohibited.
18. The permit holder is responsible for accurate record keeping throughout the permit period and shall provide the permitting agency with a comprehensive report by February 1. The report will contain: (1) the phone number, names, and addresses of clients transported; dates; number of client days; and game animals taken. (2) The drop-off and pickup locations must include latitude and longitude along with description (e.g., 67 12.50' N 159 34.30 W, on the NE corner of unnamed lake). The permit holder may submit his/her State of Alaska Transporter Activity Report as long as longitude and latitude coordinates are included to meet this permit condition.
19. In accordance with the Archaeological Resources Protection Act (16 USC 470aa) and 50CFR36.31 (b), the removal or disturbance of archaeological or historical artifacts and collection of fossils is prohibited on Federal public lands. The excavation, disturbance, collection, or purchase of historical or archaeological specimens or artifacts on Federal public lands is also prohibited. If the permit holder finds an historical or archeological artifact or site, the permit holder should avoid affecting such materials and report all information to the permitting agency.
20. The Alaska Historic Preservation Act (AS 41.35.200) prohibits the appropriation, excavation, removal, injury, or destruction of any historic, prehistoric, or archaeological resources on State lands. The act also covers mammoth and mastodon ivory and prehistoric animal bone. The act applies to all land owned or controlled by the State, including tidal and submerged lands.
21. This permit does not authorize the use of Native conveyed lands, Native selected lands, or privately owned lands within refuge boundaries. It's the responsibility of the operator to be aware of land status and contact the appropriate landowner for permission prior to operating on private lands.
22. The use of off-road vehicles is prohibited with the exception of snowmobiles. Snowmobiles may be used when adequate snow cover exists to prevent scarring of underlying vegetation.

23. One fuel cache of up to 30 gallons for emergency use may be established on Federal lands. Secondary containment is required. The name, address, and contact phone number of the permit holder must be marked on each fuel container. Any deviations from this requirement must be pre-approved by the issuing official.
24. The permit holder is required to pay all fees to the permitting agency within 30 days of receiving a bill for collection.
25. Use of refuge lands in close proximity to or intermingled with, private lands in the northwest portion of the refuge (west and north of latitude 66 degrees 28.63 minutes and longitude 159 degrees 24.67) is not authorized. A map of the area is provided with the approved permit and the legal description of the area is available upon request.

### Justification

The objective of allowing commercial transporter services in national wildlife refuges is to make available a variety of quality opportunities for the public to hunt, fish, or otherwise enjoy outdoor activities where such activities are compatible with the refuge's purposes, resources, and management objectives. The Congressional Committee Report on the National Wildlife Refuge System Improvement Act of 1997 states: "It establishes as the policy of the United States that wildlife-dependent recreation, when it is compatible, is a legitimate and appropriate public use of the Refuge System, through which the American public can develop an appreciation for fish and wildlife."

Commercial transporter services provide the public with safe access to unique hunting, fishing, wildlife observation, wildlife photography, and environmental education opportunities found few places in the world. These are activities that the National Wildlife Refuge System Administration Act (as amended) identifies as priority public uses. These visitor services are a valuable benefit to a segment of the public that does not have other means of access to the extremely remote environment of the refuge. After fully considering the impacts of this activity, as described previously in the "Anticipated Impacts of the Use" section of this document, it is my determination that commercial transporter activities within the refuge do not materially interfere with or detract from the purposes of the refuge or mission of the National Wildlife Refuge System.

### Supporting Documents

Calef, G. W., E. A. DeBock, and G. M. Lortie. 1976. The reaction of barren-ground caribou to aircraft. *Arctic* 29(4): 201-212.

Ward, D. H., R. A. Stehn, D. V. Derksen. 1994. Response of staging brant to disturbance at the Izembek Lagoon, Alaska. *Wildlife Society Bulletin* 22: 220-228.

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U.S. Fish and Wildlife Service. 2010. Draft Revised Comprehensive Conservation Plan and Environmental Assessment. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK. 285 pp (plus ten appendices).

U. S. Fish and Wildlife Service. 2011. Decision and Finding of No Significant Impact: Environmental Assessment: Revised Comprehensive Conservation Plan. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK. 5 pp.

U. S. Fish and Wildlife Service. 2011. Final Revised Comprehensive Conservation Plan. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK.

**Refuge Determination**

Refuge Manager/ Project Leader Approval	<u>/signed/ Lee Anne Ayres</u>	<u>July 14, 2011</u> Date
Concurrence Regional Chief National Wildlife Refuge System	<u>/signed/ Mitch Ellis</u>	<u>July 20, 2011</u> Date

**Mandatory 10-Year Re-evaluation Date:** 2021

**NEPA Compliance for Refuge Use Decision**

           Categorical Exclusion without Environmental Action Memorandum  
           Categorical Exclusion and Environmental Action Memorandum  
  X   Environmental Assessment and Finding of No Significant Impact  
           Environmental Impact Statement and Record of Decision

## Compatibility Determination

### Use: Trapping

**Supporting and Incidental Uses:** Fixed-wing aircraft landings, snowmobiling, boating (motorized and non-motorized), fishing, hunting, natural resource gathering, camping, cross-country skiing, dog sledding and skijoring, hiking and backpacking, wildlife photography and videography, snowshoeing, swimming, wildlife observation, pets, and firewood cutting.

**Refuge Name:** Selawik National Wildlife Refuge

**Establishment and Acquisition Authority:** The Alaska National Interest Lands Conservation Act (ANILCA) established the 2.5-million-acre Selawik National Wildlife Refuge (Selawik refuge, refuge) as part of the U. S. Fish and Wildlife Service National Wildlife Refuge System (Department of the Interior) on December 2, 1980.

**Selawik Refuge Purposes:** As stated in ANILCA Section 302 (7) (B), the purposes for which the Selawik Refuge was established and shall be managed include:

- (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Western Arctic caribou herd (including participation in coordinated ecological studies and management of these caribou), waterfowl, shorebirds and other migratory birds, and salmon and sheefish;
- (ii) to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- (iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- (iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

The purpose of the congressionally designated Selawik Wilderness Area is to secure an enduring resource of wilderness, protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System (NWPS), and administer the area for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as designated wilderness.

### National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

### Description of Uses

Trapping on the refuge has occurred prior to and since refuge establishment in 1980 and was found to be a compatible use in 1994. This activity is a consumptive use involving the taking of furbearers within seasons established in the Federal subsistence harvest regulations and

Alaska trapping regulations and requires an Alaska trapping license. Trapping primarily involves the use of various types of leg hold traps or snares to catch furbearers, with some provisions to allow licensed trappers to take furbearers with firearms. In the open, treeless terrain in northwest Alaska, firearms are commonly used to harvest furbearers. Firearms are also sometimes used to dispatch animals caught in traps. Furbearers such as wolf, fox, beaver, mink, lynx, wolverine, ermine, muskrat, and river otter are occasionally trapped on Selawik refuge. Small game, such as snowshoe hares and squirrels, are also occasionally taken with traps or snares. Trapping predominantly occurs from late fall through mid-winter with the exception of muskrats and beaver, which are frequently taken with a firearm in the spring before and after ice break-up.

Low fur prices in recent decades have led to a decrease in trapping on the refuge since the late 1970s. The highest recorded harvest occurred in 1978 when 5,320 muskrat hides from the Selawik drainage and 5,849 from the Kobuk drainage were sold to fur buyers (Dau 1987). Today, trapping is not a major commercial venture as it once was. Most trapping activities can be characterized as an extension of subsistence activities (Georgette 2000), with much of the fur harvest used locally for clothing such as hats, parka ruffs, and gloves. Lynx and red fox are the primary species trapped for export. Some species, such as muskrat, are both sold and used locally. Other furbearers such as arctic fox, wolverine, and wolf are highly prized by residents in the region for their value as trim on winter clothing.

Snowmobiles and airplanes are the most common modes of access to and on refuge lands for trapping. Motorboats or non-motorized watercraft may occasionally be used for muskrat and beaver hunting in the spring after ice break-up. Cross-country skiing and snowshoeing occur infrequently and mostly in close proximity to villages. A number of local residents own sled dogs for competitive racing, but dog sled use as a means of access for trapping activities within the refuge is not common.

The annual number of trapping-related visits and the number of furbearers harvested on the refuge are unknown. The Alaska Department of Fish and Game (ADF&G) management goal for furbearers in Game Management Unit 23, which includes the refuge, is to maintain populations capable of sustaining 1986–1997 harvest levels, recognizing that populations fluctuate in response to environmental factors (Dau 2007).

### **Availability of Resources**

Adequate refuge personnel and base operational funds are available to manage trapping on Selawik refuge. The ADF&G administers most management activities associated with trapping. The refuge staff devotes only a minor amount of time to management of trapping activities. Field work associated with managing this use primarily involves surveys to monitor some furbearer populations such as beaver, whose increasing numbers have generated local concerns, and cooperative research projects on other species with the ADF&G, National Park Service, and Bureau of Land Management. A minor amount of staff time is spent answering questions, providing information to the public, and reviewing and commenting on proposed changes to State and Federal trapping regulations.

### **Anticipated Impacts of Uses**

At current and expected levels of use, the anticipated impacts of trapping on refuge wildlife resources and other users are minor. State and Federal trapping regulations are established to maintain harvest levels at sustainable levels, and the number of trappers using the refuge is

low. Incidental take of non-target wildlife inevitably occurs but not at substantial levels. Most trapping occurs during the winter, when snow cover and frozen conditions protect ground surface and vegetation and when other uses on the refuge are limited. There is minor localized destruction of vegetation associated with clearing trap line trails and collecting firewood and logs for temporary trapping shelters.

### **Public Review and Comment**

Public comments were solicited concurrently with the revision of the Selawik National Wildlife Refuge's Comprehensive Conservation Plan and Environmental Assessment (USFWS 2010). Public comments on compatibility determinations were accepted during the public review period for the draft plan and announced in the Federal Register. The public comment period was October 21, 2010, to March 15, 2011, which provided 145 days for public review. We mailed the full draft plan and a summary to the individuals and organizations on our mailing list. We invited public comments through an advertisement in a local newspaper and attended city council meetings in Selawik and Noorvik to receive comments on the draft plan. Planning team members met with the Citizens' Advisory Commission on Federal Areas to discuss the issues at Selawik refuge and alternatives that were proposed in the draft plan. The draft compatibility determinations were posted on the Service's Region 7 Web page.

We received no comments on the draft of this compatibility determination; however, several individuals expressed opposition in general to trapping in the refuge.

### **Refuge Determination (check one below)**

Use is not compatible

Use is compatible

### **Stipulations Necessary to Ensure Compatibility**

Visitors will be required to comply with any regulations in place such as seasonal closures for resource protection.

### **Justification**

Trapping has a long history on the refuge and played a vital role in the region's economic and social history. The majority of trapping effort on the refuge today may be characterized as a secondary activity occurring in conjunction with winter travel or other subsistence activities. The State of Alaska manages harvest of furbearers to ensure their long-term sustainability. Trapping can contribute to furbearer studies when biologists conduct trapper interviews and obtain carcasses from trappers that aid in determining population parameters such as productivity and reproductive history. Most trapping occurs at the time of year when there are few visitors on the refuge and migratory species such as waterfowl and caribou are absent. The current level of trapping, or even a moderate increase in trapping, would most likely have a negligible effect on refuge resources. After fully considering the impacts of this activity, as described previously in the "Anticipated Impacts" section of this document, it is my determination that trapping activities within the refuge do not materially interfere with or detract from the purposes of the refuge or mission of the National Wildlife Refuge System.

**Supporting Documents**

Dau, J. D. 1987. Unit 23 furbearer survey-inventory progress report. Pages 64-70 in B. Townsend, editor. Annual report of survey-inventory activities Part XIV. furbearers 1 July 1983 – 30 June 1984. Alaska Department of Fish and Game. Project W-22-3, Job 7.0. Juneau, Alaska.

Dau, J. D. 2007. Unit 23 furbearer survey-inventory progress report. Pages 291-300 in P. Harper, editor. Furbearer management report of survey and inventory activities 1 July 2003 – 30 June 2006. Alaska Department of Fish and Game. Project 7.0. Juneau, Alaska.

Georgette, S. 2000. Subsistence harvest in Northwest Alaska: Caribou, moose, bear, wolf and wolverine 1999-2000. Division of Subsistence, Alaska Department of Fish and Game, Juneau, Alaska. 22 pp.

U. S. Fish and Wildlife Service. 1987. Selawik National Wildlife Refuge Final Comprehensive Conservation Plan, Wilderness Review and Environmental Impact Statement. U. S. Fish and Wildlife Service, Anchorage, Alaska. 378 pp.

U. S. Fish and Wildlife Service. 1987. Record of Decision: Selawik National Wildlife Refuge Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan. U. S. Fish and Wildlife Service, Anchorage, Alaska. 15 pp.

U. S. Fish and Wildlife Service. 2010. Draft Revised Comprehensive Conservation Plan and Environmental Assessment. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK. 285 pp (plus ten appendices).

U. S. Fish and Wildlife Service. 2011. Final Revised Comprehensive Conservation Plan. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK.

**Refuge Determination**

Refuge Manager/  
Project Leader Approval      /signed/ Lee Anne Ayres      July 14, 2011  
Date

**Concurrence**

Regional Chief  
National Wildlife  
Refuge System      /signed/ Mitch Ellis      July 20, 2011  
Date

**Mandatory 10-Year Re-evaluation Date: 2021**

**NEPA Compliance for Refuge Use Decision**

- Categorical Exclusion without Environmental Action Memorandum
- Categorical Exclusion and Environmental Action Memorandum
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

## Compatibility Determination

**Uses:** Environmental Education, Interpretation, Wildlife Observation and Photography

**Supporting and Incidental Uses:** Boating (motorized and non-motorized), snowmobiling, snowshoeing, firewood cutting, natural resource gathering, camping, cross-country skiing, skijoring, dog sledding, hiking and backpacking, picnicking, birding, wildlife viewing, wildlife photography, videography, fixed-wing aircraft landings, swimming, and beach use.

**Refuge Name:** Selawik National Wildlife Refuge

**Establishment and Acquisition Authority:** The Alaska National Interest Lands Conservation Act (ANILCA) established the 2.5-million-acre Selawik National Wildlife Refuge (Selawik refuge, refuge) as part of the U. S. Fish and Wildlife Service, National Wildlife Refuge System (Department of the Interior) on December 2, 1980.

**Selawik Refuge Purposes:** As stated in ANILCA Section 302 (7) (B), the purposes for which the Selawik refuge was established and shall be managed include:

- (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Western Arctic caribou herd (including participation in coordinated ecological studies and management of these caribou), waterfowl, shorebirds and other migratory birds, and salmon and sheefish;
- (ii) to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- (iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- (iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

The purpose of the congressionally designated Selawik Wilderness Area is to secure an enduring resource of wilderness, protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System (NWPS), and administer the area for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as designated wilderness.

### National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

### Description of Uses

This determination re-evaluates the following activities: wildlife observation, wildlife and resource photography (and videography), environmental education, and interpretation. These

uses were found to be compatible in the 1987 Comprehensive Conservation Plan and in 1994. Some visitors come to the refuge specifically to engage in one or more of these non-consumptive activities. Many visitors include these activities as part of regular subsistence activities or hunting and fishing trips. Compatibility for these uses is evaluated separately. Associated activities such as camping, backpacking, dog sledding, hiking, boating, and other incidental uses are considered part of these activities in this evaluation. Wildlife observation and photography are the most common.

Interpretive and educational efforts occur primarily in and around the community of Selawik (within the refuge boundary). The refuge staff has formed a partnership with community and school organizations to provide culture and science camps that feature resources on refuge lands, sharing of traditional knowledge, and current subsistence practices. Occasionally groups conducting educational programs utilize the refuge's administrative field cabin on the Selawik River. Limited, informal interpretive and environmental education services are provided during contacts with visitors on the refuge by staff working on resource projects or on law enforcement related patrols.

Visitors take advantage of opportunities to view and photograph wildlife, plants, and landscapes within the refuge. Most of these activities predate the establishment of the refuge in 1980. These activities are concentrated along the Selawik or Tagagawik rivers or large lakes adjacent to them. These areas provide reliable access and opportunities for observing wildlife. Typical forms of access for all areas of the refuge include fixed-wing airplanes, motorboats, non-motorized boats, and snowmobiles. Most non-local visitors access the refuge by commercial air-taxis from Kotzebue or Galena. Private boats and airplanes are the most common means of access for local visitors. Day trips to the refuge are uncommon for visitors interested in wildlife observation, wildlife photography, and sightseeing but do occasionally occur. Camping on the refuge usually extends for 7–10 days and is often associated with hunting activities. Campers use tents ranging from small backpacking tents to larger multi-person tents that can be easily transported by air. People engage in these activities on the refuge year round with most use occurring in the fall months.

### **Availability of Resources**

Adequate refuge personnel and base operational funds are available to manage these activities at current and projected levels. Administrative staff time primarily involves phone conversations, written correspondence, and interaction with visitors, schools, and community and tribal organizations. Staff will also be involved with any subsequent step-down planning (visitor services plan) and recreational monitoring.

Field work associated with administering this use primarily involves conducting patrols to increase visitor compliance with State and Federal regulations. Refuge staff members opportunistically conduct outreach to visitors to minimize the impacts of camping and to improve understanding of subsistence activities and awareness of private property located within the refuge boundary.

For commercial videography, administrative staff time would involve issuing permits and establishing permit stipulations. Field work associated with administering the program would primarily involve monitoring permit holders' compliance with the terms of the permits. Estimated staff time to administer and monitor these permits is less than one week per year.

### Anticipated Impacts of Uses

Negligible impacts to habitats within the refuge from disturbance are anticipated. Possible localized adverse impacts to some plant and wildlife species could occur, but the proposed plan would not have any long-term population-level impacts on refuge plants and wildlife. The introduction of invasive plant species, perhaps from seeds carried on boats, airplane floats, snowmobiles, or straw used in conjunction with dog sledding could affect refuge resources. To date, no invasive species introduction is known to have occurred on the Selawik refuge. Refuge staff will be vigilant to prevent such introductions. Positive effects on the local economy, though small, are anticipated from these uses.

### Public Review and Comment

Public comments were solicited concurrently with the revision of the Selawik National Wildlife Refuge's Comprehensive Conservation Plan and Environmental Assessment (USFWS 2010). Public comments on compatibility determinations were accepted during the public review period for the draft plan and announced in the Federal Register. The public comment period was October 21, 2010, to March 15, 2011, which provided 145 days for public review. We mailed the full draft plan and a summary to the individuals and organizations on our mailing list. We invited public comments through an advertisement in a local newspaper and attended city council meetings in Selawik and Noorvik to receive comments on the draft plan. Planning team members met with the Citizens' Advisory Commission on Federal Areas to discuss the issues at Selawik refuge and alternatives that were proposed in the draft plan. The draft compatibility determinations were posted on the Service's Region 7 Web page.

We received no comments on the draft of this compatibility determination. The Northwest Arctic Borough commented that the comprehensive plan should support local and regional communities in creating jobs and developing the community through tourism.

### Refuge Determination (check one below)

Use is not compatible

Use is compatible

### Stipulations Necessary to Ensure Compatibility

Visitors will be required to comply with any regulations in place such as seasonal closures for resource protection.

Permits are required for all commercial videography, including filming of documentaries, travelogues, feature stories, and advertising. Liability insurance and bonding may be required, depending on the specific production activities proposed. Additionally, a \$100 fee may be required. News gathering organizations are exempt from fee, insurance, and bonding requirements but may be required to obtain a special use permit to ensure compatibility with refuge purposes; avoid conflict with established public uses or scientific research; or to protect fish, wildlife, and their habitats on refuge lands.

### Justification

All lands in the Selawik refuge are open to public access unless specifically closed. The proposed uses represent four of the six priority public uses identified in the National Wildlife

Refuge Administration Act (as amended). The law calls for the Service to ensure that opportunities are provided for these uses and requires that they receive enhanced consideration over other public uses in planning and management. Selawik refuge provides ample opportunity to those seeking to view and photograph wildlife, and it provides interpretive and educational experiences in nearby communities. The current and projected amount of these activities has been found to have insignificant adverse physical and biological effects in the draft revised comprehensive conservation plan for the refuge. After fully considering the impacts of these activities, as described previously in the “Anticipated Impacts of the Uses” section of this determination, it is my determination that wildlife observation, wildlife photography, environmental education, and interpretation activities within the refuge do not materially interfere with or detract from the purposes of the refuge or mission of the National Wildlife Refuge System.

**Supporting Documents**

U. S. Fish and Wildlife Service. 1987. Selawik National Wildlife Refuge Final Comprehensive Conservation Plan, Wilderness Review and Environmental Impact Statement. U. S. Fish and Wildlife Service, Anchorage, Alaska. 378 pp.

U. S. Fish and Wildlife Service. 1987. Record of Decision: Selawik National Wildlife Refuge Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan. U. S. Fish and Wildlife Service, Anchorage, Alaska. 15 pp.

U. S. Fish and Wildlife Service. 2010. Draft Revised Comprehensive Conservation Plan and Environmental Assessment. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK. 285 pp (plus ten appendices).

U. S. Fish and Wildlife Service. 2011. Final Revised Comprehensive Conservation Plan. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK.

**Refuge Determination**

Refuge Manager/  
Project Leader Approval      /signed/ Lee Anne Ayres      July 14, 2011  
Date

**Concurrence**

Regional Chief  
National Wildlife  
Refuge System      /signed/ Mitch Ellis      July 20, 2011  
Date

**Mandatory 15-Year Re-evaluation Date (for priority public uses): 2026**

**NEPA Compliance for Refuge Use Decision**

- Categorical Exclusion without Environmental Action Memorandum
- Categorical Exclusion and Environmental Action Memorandum
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

## Compatibility Determination

**Use:** Snowmobiling

**Supporting and Incidental Uses:** Hunting, fishing, trapping, natural resource gathering, firewood cutting, camping, picnicking, cross-country skiing, wildlife photography and videography, snowshoeing, pets, Willie Goodwin/Archie Ferguson Memorial Snowmachine Race, scientific research, wildlife observation.

**Refuge Name:** Selawik National Wildlife Refuge

**Establishment and Acquisition Authority:** The Alaska National Interest Lands Conservation Act (ANILCA) established the 2.5-million-acre Selawik National Wildlife Refuge (Selawik refuge, refuge) as part of the U. S. Fish and Wildlife Service National Wildlife Refuge System (Department of the Interior) on December 2, 1980.

**Selawik Refuge Purposes:** As stated in ANILCA Section 302 (7) (B), the purposes for which the Selawik refuge was established and shall be managed include:

- (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Western Arctic caribou herd (including participation in coordinated ecological studies and management of these caribou), waterfowl, shorebirds and other migratory birds, and salmon and sheefish;
- (ii) to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- (iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- (iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

The purpose of the congressionally designated Selawik Wilderness Area is to secure an enduring resource of wilderness, protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System (NWPS), and administer the area for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as designated wilderness.

### National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

### Description of Uses

This determination re-evaluates the compatibility of snowmobiles for access to the Selawik refuge. Snowmobiles were originally found to be compatible during the preparation of the

Comprehensive Conservation Plan for Selawik refuge in 1987. Snowmobiles were again found compatible, subject to reasonable regulation, in 1994. The Alaska refuge regulations define a snowmobile as “a self-propelled vehicle intended for off-road vehicle travel primarily on snow [and] having a curb weight of not more than 1,000 pounds driven by track or tracks in contact with the snow and driven by a ski or skis in contact with the snow” (50 CFR 36.32). Alaska refuge regulations also specify that snowmobiles are only allowed during periods of adequate snow cover. Adequate snow cover is defined as an amount of snow, distributed in a continuous manner, which will protect underlying vegetation from adverse effects. Selawik refuge staff considers adequate snow cover for this use to be at least six inches.

Snowmobiles are an important means of transportation for subsistence and local recreation activities on refuge lands. Snowmobiles are also used to access private lands within the refuge. Snowmobile use on the refuge may begin as early as October and continues through April. A system of marked winter trails cross the refuge, linking villages in the region. The majority of snowmobile use takes place on these well-established inter-village trails.

Snowmobiles are also used in community events within the refuge boundary. Most events (e.g., ice fishing, educational camps, and snowmobile races) occur on private land and river corridors under the jurisdiction of the State of Alaska. Between the villages of Noorvik and Selawik, small sections of refuge land are used when safe and practical alternatives are not available. The Willie Goodwin/Archie Ferguson Memorial Snowmachine Race is an example of a community event involving snowmobiles that occurs on both private and refuge lands. This race was established in the early 1970s when snowmobiles first became available to residents. The route is from Kotzebue to Noorvik, Kiana, Selawik, Noorvik, and returns to Kotzebue following existing inter-village winter trails. The one-day event has extensive support from all participating communities along its route and throughout the region. Most of the 220-mile race occurs on village or Native Corporation lands, frozen rivers, or the Kotzebue Sound. Less than 10 miles of the race route is on refuge land. This race requires a special use permit.

### **Availability of Resources**

Adequate refuge personnel and base operational funds are available to manage this use. Currently, monitoring is conducted by talking with local residents; meeting with local tribal, borough, and city councils; and during over-flights of the refuge conducted for other purposes.

### **Anticipated Impacts of Uses**

Potential impacts of snowmobile use include noise pollution and disturbance of wildlife and underlying vegetation. Because the majority of snowmobile use occurs on established trails, disturbance to vegetation is expected to be minor and localized. In instances where snowmobiles leave the established trails, there may be small amounts of damage to shrub branches above the snow level. Snow depths over the tundra can vary between several feet to bare ground due to the region’s high winds. Occasionally, there will be wind-blown areas traveled over by snowmobiles where snow depth is less than six inches. The ground in these areas will typically be frozen and the snow hard packed, providing protection to underlying vegetation. The impacts from snowmobile use will be minimal, allowing the vegetation to rejuvenate over the course of one growing season.

The possible introduction of invasive plant species, perhaps from seeds carried on snowmobiles or sleds, could affect resources on refuge lands. Given the refuge’s remote location, it is not common for snowmobiles to be transported or driven in from other areas of

the State or the continent. The source of invasive species would most likely be from areas immediately adjacent to the refuge, if potentially invasive species exist there. No introduction of invasive species is known to have occurred on refuge lands to date. Refuge staff will be vigilant to detect potential invasive species.

Snowmobile use on the refuge may temporarily disturb subsistence species, including moose and caribou (McTaggart 1981; Creel et al. 2002). Noise associated with snowmobile activity at high levels or during critical periods can have negative effects on moose and caribou energy budgets, reproductive success, and long-term survival (Fancy and White 1985). For moose, the presence of snowmobile trails in deep snow years can increase access to winter forage and greatly improve over winter survival. Such impacts, both positive and negative, would be higher near villages. In most of the refuge, such disturbances to moose and caribou would be infrequent given the anticipated level of use and numbers of the respective species in the area used by those traveling by snowmobile.

Denning bears are also known to be susceptible to disturbance by snowmobiles (Jonkel 1980). Brown bears on the refuge tend to den at higher elevations with limited snowmobile access. The character of the Selawik Wilderness Area could be altered by increased noise disturbance; this disturbance is expected to be minimal since this designated wilderness area is characterized by stands of spruce and deep snow, which are typically avoided by the public when traveling via snowmobile.

The Willie Goodwin/Archie Ferguson Memorial Snowmachine Race will have no biological impacts on the refuge since it occurs over existing trails, doesn't significantly add to the amount of overall snowmobile traffic and is of short duration (one day). During this one race event, there may be an increased risk of collision with other snowmobile users or individuals on dog sleds or skis using the trail. This risk is minimized by the widespread public notice prior to the race, which is required by permit stipulation, and presence of race monitors along the trail route during the event.

### **Public Review and Comment**

Public comments were solicited concurrently with the revision of the Selawik National Wildlife Refuge's Comprehensive Conservation Plan and Environmental Assessment (USFWS 2010). Public comments on compatibility determinations were accepted during the public review period for the draft plan and announced in the Federal Register. The public comment period was October 21, 2010, to March 15, 2011, which provided 145 days for public review. We mailed the full draft plan and a summary to the individuals and organizations on our mailing list. We invited public comments through an advertisement in a local newspaper and attended city council meetings in Selawik and Noorvik to receive comments on the draft plan. Planning team members met with the Citizens' Advisory Commission on Federal Areas to discuss the issues at Selawik refuge and alternatives that were proposed in the draft plan. The draft compatibility determinations were posted on the Service's Region 7 Web page.

We received no comments on the draft of this compatibility determination. Overall, there was wide support for the use of public lands for competitive events such as snowmobile races and cultural events that establish a positive relationship between visitors or area residents and the refuge.

**Refuge Determination (check one below)**

Use is not compatible

Use is compatible

**Stipulations Necessary to Ensure Compatibility**

Visitors will be required to comply with all regulations in place, such as seasonal closures for resource protection. The Archie Ferguson-Willie Goodwin Sr. Memorial Snowmobile Race organizers will be required to comply with the following special conditions:

Failure to abide by any part of this special use permit; violation of any refuge related provision in Titles 43 (Part 36) or 50 (Sub-chapters B and C), Code of Federal Regulations; or violation of any pertinent State regulation (e.g., fish or game violation) will, with due process, be considered grounds for immediate revocation of this permit and could result in denial of future permit requests for lands administered by the U.S. Fish and Wildlife Service. This provision applies to all persons working under the authority of this permit (e.g., assistants and volunteers). Appeals of decisions relative to permits are handled in accordance with Title 50 Code of Federal Regulations 36.41.

The permit holder is responsible for ensuring that all employees, party members, contractors, aircraft pilots, and any other persons working for the permit holder and conducting activities allowed by this permit are familiar with and adhere to the conditions of this permit; and possess at all times a signed copy of this permit while exercising these granted privileges.

This permit may be canceled or revised at any time by the refuge manager in case of emergency (e.g., unusual resource problems, lack of snow, flooding, etc.).

The permit holder and permit holder's clients do not have the exclusive use of the site(s) or lands covered by this permit.

Any problems with wildlife and/or animals taken in defense of life or property must be reported immediately to the refuge manager and Alaska Department of Fish and Game and be salvaged in accordance with State regulations.

In accordance with the Archaeological Resources Protection Act (16 USC 470aa), the removal or disturbance of archaeological or historical artifacts is prohibited. The excavation, disturbance, collection, or purchase of historical, recent, ethnological, or archaeological specimens or artifacts is prohibited.

The permit holder shall maintain his/her use areas in a neat and sanitary condition. If used, latrines must be located at least 150 feet from springs, lakes, and streams to avoid contamination of water resources. All property must be removed from refuge lands upon completion or revocation of permitted activities, and permit holder will leave the surrounding grounds in a neat, clean, and orderly condition. If the permit holder fails to remove all property upon completion of authorized activities, he/she will be liable for the removal and restoration of the site.

The use of off-road vehicles (except snowmobiles on established trails) is prohibited.

Any action by a permit holder or the permit holder's employees that unduly interferes with or harasses other refuge visitors or impedes access to any site is strictly prohibited.

Construction of tent platforms, cabins, or other permanent structures is prohibited.

Fuel caches are prohibited.

The operation of aircraft at altitudes and in flight paths resulting in the herding, harassment, hazing, or driving of wildlife is prohibited. It is recommended that all aircraft, except for takeoff and landing, maintain a minimum altitude of 2,000 feet above ground level.

The use of helicopters is prohibited.

Public notice will be given to all areas along the route of travel; at a minimum, notice must be given over the radio and on the OTZ scanner. The date, time, start and finish locations, and route of travel will be included. Notice must be available at least one week in advance of the race and continue to be available until the end of the race.

During the event, no participants shall travel on refuge lands outside the trail segment specified on the permit.

### **Justification**

ANILCA Section 811 provides for snowmobile access for subsistence purposes, and Section 1110 allows the use of snowmobiles for traditional activities and for travel to and from villages and home sites. Snowmobiles allow access for a majority of winter activities on refuge lands and, at current use levels, support many compatible refuge activities. Snowmobiles are an essential form of transportation for village residents residing within refuge boundaries. Regulations defining the size and weight of snowmobiles, coupled with the requirement that adequate snow cover be present, eliminate most potential for damage to habitat. The current level of snowmobile use on Selawik refuge, including the one identified race, would have negligible adverse effects on wildlife and habitat. If the intensity of snowmobile use increases greatly, disturbance to sensitive wildlife species and habitats, such as bears in dens and wind-scoured areas with insufficient snow cover, may occur. The refuge will continue to monitor snowmobile use levels and winter travel conditions and may take restrictive action if conditions warrant. After fully considering the impacts of this activity, as described previously in the “Anticipated Impacts of Use” section of this determination, it is my determination that snowmobile use within the refuge does not materially interfere with or detract from the purposes of the refuge or mission of the National Wildlife Refuge System but in fact contributes to them.

### **Supporting Documents**

Creel, S., J. E. Fox, A. R. Hardy, J. Sands, B. Garrot, and R. O. Peterson. 2002. Snowmobile activity and glucocorticoid stress responses in wolves and elk. *Conservation Biology* 16(3): 809.

Fancy, S. G., and R. G. White. 1985. Energy expenditures by caribou while cratering in snow. *Journal of Wildlife Management* 49(4): 987-993.

Jonkel, C. J. 1980. Black, brown, and polar bears. Pages 227-228 *in* Big game of North America: Ecology and management J. L. Schmidt and D. L. Gilbert, *eds.* Harrisburg, Pennsylvania: Stackpole Books.

McTaggart-Cowan, I. 1981. Wildlife conservation issues in northern Canada. Canadian Environmental Advisory Council Report, no. 11. University of Calgary, Canada.

**Appendix D: Compatibility Determinations**

U. S. Fish and Wildlife Service. 1987. Selawik National Wildlife Refuge Final Comprehensive Conservation Plan, Wilderness Review and Environmental Impact Statement. U.S. Fish and Wildlife Service, Anchorage, Alaska. 378 pp.

U. S. Fish and Wildlife Service. 1987b. Record of Decision: Selawik National Wildlife Refuge Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan. U. S. Fish and Wildlife Service, Anchorage, Alaska. 15 pp.

U. S. Fish and Wildlife Service. 2010. Draft Revised Comprehensive Conservation Plan and Environmental Assessment. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK. 285 pp (plus ten appendices).

U. S. Fish and Wildlife Service. 2011. Final Revised Comprehensive Conservation Plan. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK.

**Refuge Determination**

Refuge Manager/  
Project Leader Approval      /signed/ Lee Anne Ayres      July 14, 2011  
Date

**Concurrence**

Regional Chief  
National Wildlife      /signed/ Mitch Ellis      July 20, 2011  
Refuge System      Date

**Mandatory 10-year Re-evaluation Date: 2021**

**NEPA Compliance for Refuge Use Decision**

- Categorical Exclusion without Environmental Action Memorandum
- Categorical Exclusion and Environmental Action Memorandum
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

## Compatibility Determination

**Use:** State of Alaska Management Activities

**Primary Uses:** State of Alaska routine management and law enforcement activities.

**Supporting and Incidental Uses:** Boating (motorized and non-motorized), fixed-wing aircraft landings, helicopter landings (subject to Minimum Requirements Analysis before landing in the Selawik Wilderness Area), snowmobiling, environmental education and interpretation (not conducted by refuge staff or authorized agents), fishing, natural resource gathering, camping, cross-country skiing, hiking and backpacking, wildlife photography, videography and audio recording, snorkeling and scuba diving, snowshoeing, research, scientific collecting, surveys, and wildlife observation.

**Refuge Name:** Selawik National Wildlife Refuge

**Establishment and Acquisition Authority:** The Alaska National Interest Lands Conservation Act (ANILCA) established the 2.5-million-acre Selawik National Wildlife Refuge (Selawik refuge, refuge) as part of the U. S. Fish and Wildlife Service National Wildlife Refuge System (Department of the Interior) on December 2, 1980.

**Selawik Refuge Purposes:** As stated in ANILCA Section 302 (7) (B), the purposes for which the Selawik Refuge was established and shall be managed include:

- (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Western Arctic caribou herd (including participation in coordinated ecological studies and management of these caribou), waterfowl, shorebirds and other migratory birds, and salmon and sheefish;
- (ii) to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- (iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- (iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

The purpose of the congressionally designated Selawik Wilderness Area is to secure an enduring resource of wilderness, protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System (NWPS), and administer the area for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as designated wilderness.

### National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

**Description of Uses**

This compatibility determination addresses routine management activities conducted by the Alaska Department of Fish and Game (ADF&G) and Public Safety wildlife enforcement officers that are not cooperative projects with the Service. These projects may not be encompassed by the Master Memorandum of Understanding (or other specific cooperative agreements) between the ADF&G, Juneau, Alaska, and the U. S. Fish and Wildlife Service, Department of the Interior, Anchorage, Alaska, signed March 13, 1982, and/or law enforcement activities conducted by Alaska wildlife enforcement officers. This includes the following activities: fish and wildlife surveys conducted by boat, foot, or other means not restricted by regulation or policy; aircraft landings in support of aerial fish and wildlife surveys; vegetation and habitat classification and surveys; and law enforcement activities.

This compatibility determination does not address predator management, fish and wildlife control (with the exception of animals taken in defense of life or property), reintroduction of species, native fish introductions, non-native species introductions, non-native species management, pest management, disease prevention and control, fishery restoration, fishery enhancement, construction of facilities, or any other unpermitted activity that could alter ecosystems within the refuge. Separate compatibility determinations addressing specific proposals will be required for those activities. All management and research activities conducted by the ADF&G under a specific cooperative agreement with the Fish and Wildlife Service to fulfill one or more purposes of the Refuge or the National Wildlife Refuge System mission are not subject to a compatibility determination.

Potential means of access include fixed-wing aircraft, helicopter (subject to Minimum Requirements Analysis before landing in the Selawik Wilderness Area) motorboats, snowmobiles, non-motorized boats, foot, snowshoes, and cross-country skis. Potentially allowable lodging and other facilities include tents, tent frames, tent platforms, weather ports, and caches.

**Availability of Resources**

Adequate refuge personnel and base operational funds are available to manage activities at existing and projected levels. Administrative staff time (as many as 15 staff days per year) primarily involves phone conversations, written correspondence, and personal interaction with State personnel regarding ongoing activities. Field work associated with administering the program primarily involves monitoring (when applicable) the State's activities to ensure all activities remain compatible and informing the public of activities occurring on the refuge involving subsistence resources or areas used for subsistence activities.

**Anticipated Impacts of Uses**

Because ADF&G and Public Safety personnel are trained professionals, the Service anticipates that routine law enforcement and fish and wildlife monitoring and management activities would have positive overall impacts on wildlife resources, visitors, and other resources on refuge lands (such as water quality, soil, and vegetation). These positive impacts would support refuge purposes and goals and the mission of the Service.

### Public Review and Comment

Public comments were solicited concurrently with the revision of the Selawik National Wildlife Refuge's Comprehensive Conservation Plan and Environmental Assessment (USFWS 2010). Public comments on compatibility determinations were accepted during the public review period for the draft plan and announced in the Federal Register. The public comment period was October 21, 2010, to March 15, 2011, which provided 145 days for public review. We mailed the full draft plan and a summary to the individuals and organizations on our mailing list. We invited public comments through an advertisement in a local newspaper and attended city council meetings in Selawik and Noorvik to receive comments on the draft plan. Planning team members met with the Citizens' Advisory Commission on Federal Areas to discuss the issues at Selawik refuge and alternatives that were proposed in the draft plan. The draft compatibility determinations were posted on the Service's Region 7 Web page.

We received no comments on the draft of this compatibility determination.

### Refuge Determination (check one below)

Use is not compatible

Use is compatible

### Stipulations Necessary to Ensure Compatibility

Refuge staff will monitor State activities within the refuge. Findings from these monitoring efforts will be used to determine what additional management actions, if any, would be needed to ensure State activities remain compatible with refuge purposes and in compliance with established agreements.

### Justification

The State of Alaska and the Service are partners in the management of many resources on the refuge, especially those necessary for subsistence. Natural and social science information is necessary for the proper management of the National Wildlife Refuge System. It is the policy of the Service to encourage and support research and management studies to provide scientific data upon which decisions regarding management of units of the Refuge System may be based. State research, management, and law enforcement activities support achieving refuge purposes and goals, and the System mission and would have favorable impacts on resources within the refuge and wildlife-dependent priority public uses. After fully considering the impacts of these activities, as described previously in the "Anticipated Impacts" section of this document, it is my determination that State of Alaska management activities within the refuge do not materially interfere with or detract from the purposes of the refuge or mission of the National Wildlife Refuge System.

### Supporting Documents

Memorandum of Understanding for Coordinated Interagency Fish and Wildlife Management for Subsistence Uses on Federal Public Lands in Alaska between the Federal Subsistence Board and the State of Alaska. 2008.

**Appendix D: Compatibility Determinations**

U. S. Fish and Wildlife Service. 1987. Selawik National Wildlife Refuge Final Comprehensive Conservation Plan, Wilderness Review and Environmental Impact Statement. U. S. Fish and Wildlife Service, Anchorage, Alaska. 378 pp.

U. S. Fish and Wildlife Service. 1987b. Record of Decision: Selawik National Wildlife Refuge Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan. U. S. Fish and Wildlife Service, Anchorage, Alaska. 15 pp.

U. S. Fish and Wildlife Service. 2010. Draft Revised Comprehensive Conservation Plan and Environmental Assessment. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK. 285 pp (plus ten appendices).

U. S. Fish and Wildlife Service. 2011. Final Revised Comprehensive Conservation Plan. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK.

**Refuge Determination**

Refuge Manager/  
Project Leader Approval      /signed/ Lee Anne Ayres      July 14, 2011  
Date

**Concurrence**

Regional Chief  
National Wildlife      /signed/ Mitch Ellis      July 20, 2011  
Refuge System      Date

**Mandatory 10-Year Re-evaluation Date: 2021**

**NEPA Compliance for Refuge Use Decision**

- Categorical Exclusion without Environmental Action Memorandum
- Categorical Exclusion and Environmental Action Memorandum
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

## Compatibility Determination

**Use:** Scientific Research

**Primary Uses:** Research, inventory and monitoring

**Supporting and Incidental Uses:** Fixed-wing aircraft landings, helicopter landings (subject to Minimum Requirements Analysis before landing in the Selawik Wilderness Area), boating (motorized and non-motorized), snowmobiling, environmental education and interpretation (not conducted by refuge staff or authorized agents), fishing, firewood cutting, trapping, natural resource gathering, camping, cross-country skiing, hiking and backpacking, wildlife photography, videography and audio recording, snorkeling and scuba diving, snowshoeing, scientific collecting, and wildlife observation.

**Refuge Name:** Selawik National Wildlife Refuge

**Establishment and Acquisition Authority:** The Alaska National Interest Lands Conservation Act (ANILCA) established the 2.5-million-acre Selawik National Wildlife Refuge (Selawik refuge, refuge) as part of the U. S. Fish and Wildlife Service, National Wildlife Refuge System (Department of the Interior) on December 2, 1980.

**Selawik Refuge Purposes:** As stated in ANILCA Section 302 (7) (B), the purposes for which the Selawik Refuge was established and shall be managed include:

- (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Western Arctic caribou herd (including participation in coordinated ecological studies and management of these caribou), waterfowl, shorebirds and other migratory birds, and salmon and sheefish;
- (ii) to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- (iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- (iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

The purpose of the congressionally designated Selawik Wilderness Area is to secure an enduring resource of wilderness, protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System (NWPS), and administer the area for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as designated wilderness.

### National Wildlife Refuge System Mission

The mission of the National wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

**Description of Uses**

This compatibility determination addresses the full spectrum of uses associated with the scientific research and inventory and monitoring of fish, wildlife, habitat, and other resources on refuge lands. Scientific research may occur on the refuge throughout the year and employ a wide spectrum of methods from many disciplines of science.

This compatibility determination includes all means of access, lodging and facilities, and other uses identified in research proposals and protocols. Equipment for sampling may include both hand-powered and motorized instruments (tools). Logistical support for research activities may include temporary camps with tents, tent frames, spike camps, weather ports, removable floors, existing administrative cabins, satellite communication systems, human waste management, and temporary fuel and supply caches.

Potential means of access include fixed-wing aircraft, helicopter, motor boats, non-motorized boats, hiking, snowshoeing, dog sled, snowmobiles (providing there is adequate snow cover), and cross-country skiing. Requests for access by helicopter are anticipated and will be considered on a case-by-case basis with regard to refuge purposes. Helicopter use in designated wilderness areas is subject to the minimum requirements decision process used by the Service.

When justified to collect important data not otherwise available, lethal sampling may be allowed. All applicable State and Federal permits must be obtained prior to the start of lethal sampling. Any scientific research activity that involves an invasive procedure or that harms or materially alters the behavior of an animal under study must be reviewed and approved by a recognized Institutional Animal Care and Use Committee pursuant to the Animal Welfare Act before implementing field work.

All scientific research on the refuge requires a special use permit with stipulations to ensure compatibility. Since 1980, the refuge has issued one to four scientific permits annually to academic institutions, other Federal agencies, and environmental consulting firms employed by agencies or Native corporations with lands within the refuge boundary. Researchers are required to minimize impacts to natural resources, refuge visitors, residents of communities in and near the refuge, and other users of refuge lands, and to minimize negative encounters with wildlife. As a stipulation in their permit, researchers are encouraged, and in some cases required, to communicate research activities and findings to refuge staff, communities near the refuge, and the public.

The scope of this compatibility determination includes research conducted by all agencies or entities other than the Service. Scientific research done by the Service is a refuge management activity and thus is exempt from the compatibility determination process. Regulations at 50 CFR 25.12 define refuge management activities as any activity conducted by the Service or a Service-authorized agent to fulfill one or more purposes of the refuge or to meet the mission of the National Wildlife Refuge System. Service-authorized agents include contractors, cooperating agencies, cooperating associates, refuge support groups, and volunteers.

**Availability of Resources**

Adequate refuge personnel and base operational funds are available to manage research activities at existing and projected levels. Administrative staff time primarily involves phone conversations, written correspondence, proposal review, and interaction with researchers and

potentially effected publics. Field work associated with administering the program primarily involves monitoring researchers' compliance with the terms of the permit. Total staff time required is less than 15 days per year.

### **Anticipated Impacts of Uses**

Many factors will affect the extent of impacts from individual research projects. These factors include targeted resources, number of researchers, methods, duration and frequency of sampling activities, timing of field work in relation to subsistence activities on the refuge, transportation modes, fuel storage, garbage and human waste management, and type and location of lodging. Research activities require a special use permit from the refuge, which will contain provisions to minimize or avoid impacts on fish, wildlife, and plant resources, and on other refuge users. However, some minor impacts are unavoidable.

Some research projects may require or result in some fish or wildlife mortality. Temporary displacement and/or disturbance to fish and wildlife can occur during sampling efforts, motorized boat use, airplane takeoffs and landings, use of snowmachines, helicopters, and at campsites or other areas of concentrated human activities. There are no known long-term impacts to refuge fish and wildlife populations from such disturbance, and such impacts can be minimized by permit stipulation. Some research activities entail excavation and/or collection of soils and plant materials, which result in localized disturbances. The introduction of invasive species carried on boats, aircraft floats, or field supplies could affect resources on refuge lands. There have been no known invasive species introductions on Selawik refuge, and refuge staff will be vigilant to prevent future occurrences.

Frequency of this activity may rise in the next 10 years as interest in arctic and subarctic ecosystems and global climate change increases. Overall, scientific research and associated activities should have only minor impacts on the fish, wildlife, and other resources (e.g., water quality, soil, and vegetation), and on other refuge users, including subsistence users, because of the limited scope of such activities and the administrative scrutiny that the refuge maintains over such uses through the permitting process.

### **Public Review and Comment**

Public comments were solicited concurrently with the revision of the Selawik National Wildlife Refuge's Comprehensive Conservation Plan and Environmental Assessment (USFWS 2010). Public comments on compatibility determinations were accepted during the public review period for the draft plan and announced in the Federal Register. The public comment period was October 21, 2010, to March 15, 2011, which provided 145 days for public review. We mailed the full draft plan and a summary to the individuals and organizations on our mailing list. We invited public comments through an advertisement in a local newspaper and attended city council meetings in Selawik and Noorvik to receive comments on the draft plan. Planning team members met with the Citizens' Advisory Commission on Federal Areas to discuss the issues at Selawik refuge and alternatives that were proposed in the draft plan. The draft compatibility determinations were posted on the Service's Region 7 Web page.

We received no comments on the draft of this compatibility determination. However, a few reviewers suggested that the comprehensive plan recognize climate change and its effects on resources on refuge lands and the need for further studies on this topic.

**Refuge Determination (check one below)**

Use is not compatible

Use is compatible

**Stipulations Necessary to Ensure Compatibility**

Refuge staff will monitor all research being conducted on the refuge. Findings from monitoring will be used to determine what additional management actions, if any, are needed to ensure research activities remain compatible with refuge purposes.

A special use permit with stipulations is required for some scientific research on Selawik refuge. The permit includes details of the specific research. Typical special use permit stipulations are described here, some of which are necessary for compatibility. Site-specific special use conditions related to maintenance of defensible space will be incorporated into permits on a case-by-case basis. Other project-specific stipulations may be included in individual permits.

Researchers will be required to submit investigation plans or proposals, annual activity reports, and copies of publications resulting from the research. Proposed research and investigation plans for research on the refuge are expected to be peer reviewed. The type and level of review should be commensurate with the potential significance of the scientific information and its likely influence on policy and management actions.

Continued monitoring of all authorized research activities will be carried out to ensure compliance with specific terms and conditions tailored for each research project's permit and to ensure that the permit holder is following general conditions that are incorporated into all research permits to minimize impacts to resources on refuge lands.

**SPECIAL USE PERMIT CONDITIONS FOR CONDUCTING  
SCIENTIFIC RESEARCH AT SELAWIK REFUGE**

1. This permit is valid only on Selawik refuge lands and will be considered void if permission is not granted by adjacent private landowners and native village corporations.
2. Some activities may not be permitted in certain areas and/or during some sensitive time periods. Area closures and effective dates may be modified by the refuge manager as needed. Specific authorization to use localities within special areas may sometimes be obtained on a case-by-case basis, depending on the location of animal concentrations, high public use areas, access routes, proposed activity, and land management designation (i.e., wilderness, wild river, etc.).
3. The permit holder is responsible for ensuring that all employees, party members, contractors, aircraft pilots, and any persons working for the permit holder and conducting activities allowed by this permit are familiar with and adhere to the conditions of this permit.
4. Prior to beginning activities allowed by this permit, the permit holder shall provide the refuge manager with (1) the name and method of contact for the field party chief and/or supervisor; (2) the aircraft and other vehicle types to be used, including identification information; (3) names of research assistants, volunteers, and other helpers; and (4) any changes to information provided in the original permit application.

5. Prior to implementing field work, the permit holder must provide documentation that activities that involve an invasive procedure that harms or materially alters the behavior of an animal under study have been reviewed and approved by an Institutional Animal Care and Use Committee (IACUC) pursuant to the Animal Welfare Act. Approval of research methods and protocols used with refuge visitors or other human subjects must be obtained by a university Human Subjects Review Board or similar entity before data collection begins.
6. The permit holder or his/her designee shall notify the refuge manager during refuge working hours in person or by telephone before beginning and upon completing activities allowed by this permit.
7. This permit does not grant the permit holder and his/her employees or coworkers exclusive use of the site(s) or lands covered by the permit.
8. This permit may be canceled or revised at any time by the refuge manager for noncompliance or in case of emergency (e.g., high fire danger, flooding, unusual resource problems, etc.).
9. Any problems with wildlife and/or animals taken in defense of life or property must be reported immediately to the refuge manager and the Alaska Department of Fish and Game, and animals taken must be salvaged in accordance with State regulations.
10. In accordance with the Archaeological Resources Protection Act (16 U.S.C. 470aa), the removal or disturbance of archaeological or historical artifacts is prohibited. The excavation, disturbance, collection, or purchase of historical, ethnological, or archaeological specimens or artifacts is prohibited.
11. Permit holders shall maintain their research sites and camps in a neat and sanitary condition. Latrines must be located at least 150 feet from springs, lakes, and streams to avoid contamination of water resources. All property (except cabins and/or tent frames) of the permit holder must be removed from refuge lands upon completion of permitted research activities.
12. The construction of landing strips or pads is prohibited. Clearing vegetation for aircraft landing or takeoff areas is also prohibited. Incidental hand removal of rocks and other minor obstructions may be permitted.
13. The use of off-road vehicles (except snowmobiles with adequate snow cover) is prohibited unless specifically authorized in writing in this permit.
14. The operation of aircraft at altitudes and in flight paths resulting in the herding, harassment, hazing, or driving of wildlife is prohibited. It is recommended that all aircraft, except for takeoff and landing, maintain a minimum altitude of 2,000 feet above ground.
15. The use of helicopters may be authorized for the direct support of the research activity covered by this permit and emergencies (no recreational use of helicopters is permitted), and no clearing of vegetation for landing and/or takeoff is permitted. Use of a helicopter in the Selawik Wilderness Area is subject to the Minimum Requirements Analysis process used by the Service.
16. Fuel caches are allowed only in designated areas and must be approved by the refuge manager or his/her designate prior to caches being established. If caches are established, fuel containers must be clearly marked with the permit holder's name, address, local contact telephone number, and type of fuel.
17. Construction of cabins or other permanent structures is prohibited.

18. Any action by a permit holder or the permit holder's employees that unduly interferes with or harasses other refuge visitors or impedes access to any site is strictly prohibited.
19. The permit holder shall provide the refuge manager with a report of activities under this permit within 30 days of permit expiration.
20. All information, reports, photos, data, collections, and observations obtained as a result of this permit must be accessible from the permit holder at any time upon request by the Service at no cost unless specific arrangements are made to the contrary. The Service recognizes the proprietary nature of scientific data and will respect the researcher's privileged position regarding first publication within a reasonable and agreed upon time frame. These data may be used in resource management decisions by the Service prior to their publication, however. Proprietary data of commercial value will be treated confidentially upon request but may also be used in management decisions.
21. You may use specimens collected under this permit, any components of any specimens (including natural organisms, enzymes, genetic materials, or seeds), and research results derived from collected specimens for scientific or educational purposes only and not for commercial purposes unless you have entered into a Cooperative Research and Development Agreement (CRADA) with the Service. We prohibit the sale of collected research specimens or other transfers to third parties. Breach of any of the terms of this permit will be grounds for revocation of this permit and denial of future permits. Furthermore, if you sell or otherwise transfer collected specimens, any components thereof, or any products or research results developed from such specimens or their components without a CRADA, you will pay us a royalty rate of 20 percent of gross revenue from such sales. In addition to such royalty, we may seek other damages and injunctive relief against you.
22. The refuge manager, upon request, shall be afforded the opportunity and logistical support from the nearest commercial transportation site to accompany the permit holder for the purpose of inspection and monitoring permit holder activities. A final inspection trip provided by the permit holder of the areas of use may be required by the refuge manager to determine compliance with the terms of this permit.
23. Failure to abide by any part of this special use permit; violation of any refuge related provision in titles 43 (part 36) or 50 (subchapters B and C) Code of Federal Regulations; or violation of any pertinent State regulation (e.g., fish or game violation) will, with due process, be considered grounds for immediate revocation of this permit and could result in denial of future permit requests for lands administered by the U. S. Fish and Wildlife Service. This provision applies to all persons working under the authority of this permit (e.g., assistants). Appeals of decisions relative to permits are handled in accordance with 50 CFR 36.41.

### **Justification**

Section 101 of ANILCA states, in part, the intent of Congress to maintain opportunities for scientific research on conservation system units, including National Wildlife Refuges. The U. S. Fish and Wildlife Service supports research as described in the Refuge Manual (4 RM 6.1), which states:

“Natural and social science information is necessary for the proper management of the National Wildlife Refuge System. It is the policy of the Service to encourage and

support research and management studies in order to provide scientific data upon which decisions regarding management of units of the refuge system may be based. The Service will also permit the use of a refuge for other investigatory scientific purposes when such use is compatible with the objectives for which the refuge is managed. Priority will be given to studies that contribute to the enhancement, protection, use, preservation, and management of native wildlife populations and their habitats in their natural diversity.”

The refuge manager also may permit the use of a refuge for other investigatory purposes when such use is compatible with the purposes for which the refuge is managed. Priority will be given to studies that contribute to the enhancement, protection, use, conservation, and management of native wildlife populations and their habitats in their natural diversity. All proposed research conducted by other agencies or entities will be thoroughly evaluated prior to authorization and then monitored closely to ensure that the activities do not materially interfere with or detract from the purposes of the refuge or the mission of the National Wildlife Refuge System.

Scientific investigations of wildlife, other natural resources, and social interactions will support the refuge’s ability to provide for wildlife-dependent priority public uses and meet other refuge purposes. These investigations must be conducted safely. After fully considering the impacts of this activity, as described previously in the “Anticipated Impacts of the Use” section of this document, it is my determination that scientific research activities within the refuge do not materially interfere with or detract from the purposes of the refuge or mission of the National Wildlife Refuge System.

### Supporting Documents

U. S. Fish and Wildlife Service. 1987. Selawik National Wildlife Refuge Final Comprehensive Conservation Plan, Wilderness Review and Environmental Impact Statement. U. S. Fish and Wildlife Service, Anchorage, Alaska. 378 pp.

U. S. Fish and Wildlife Service. 1987. Record of Decision: Selawik National Wildlife Refuge Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan. U. S. Fish and Wildlife Service, Anchorage, Alaska. 15 pp.

U. S. Fish and Wildlife Service. Service Manual. No date. U.S. Fish and Wildlife Service, Washington D.C. Accessed February 4, 2010 at <http://www.fws.gov/policy/manuals/>.

U. S. Fish and Wildlife Service. 2010. Draft Revised Comprehensive Conservation Plan and Environmental Assessment. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK. 285 pp (plus ten appendices).

U. S. Fish and Wildlife Service. 2011. Final Revised Comprehensive Conservation Plan. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK.

### Refuge Determination

Refuge Manager/

Project Leader Approval

/signed/ Lee Anne Ayres

July 14, 2011

Date



## Compatibility Determination

**Use:** Trail Marking and Marker Maintenance

**Supporting and Incidental Uses:** Camping, dog sledding, photography, video, snowshoeing, gathering (subsistence), wildlife observation, fixed-wing aircraft, snowmobiling, and tree and firewood harvest.

**Refuge Name:** Selawik National Wildlife Refuge

**Establishment and Acquisition Authority:** The Alaska National Interest Lands Conservation Act (ANILCA) established the 2.5-million-acre Selawik National Wildlife Refuge (Selawik refuge, refuge) as part of the U. S. Fish and Wildlife Service National Wildlife Refuge System (Department of the Interior) on December 2, 1980.

**Selawik Refuge Purposes:** As stated in ANILCA Section 302 (7) (B), the purposes for which the Selawik refuge was established and shall be managed include:

- (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Western Arctic caribou herd (including participation in coordinated ecological studies and management of these caribou), waterfowl, shorebirds and other migratory birds, and salmon and sheefish;
- (ii) to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- (iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- (iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

The purpose of the congressionally designated Selawik Wilderness Area is to secure an enduring resource of wilderness, protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System (NWPS), and administer the area for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as designated wilderness.

### National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

### Description of Uses

A network of winter snowmobile trails is used by the public to travel between villages in and around Selawik refuge. The routes for these trails were established and marked prior to the refuge's creation and vary little year to year. Groups, including the Northwest Arctic Borough,

tribal governments, search and rescue organizations, and individuals, traveling on them periodically mark these trails to make travel safer in poor weather conditions. Markers are typically cut willows or wooden poles made into tripods with attached reflective material such as tape. In wooded areas, reflectors are attached directly to trees. Markers are generally located no more than 500 feet apart. Trails are marked in November through March by individuals using a snowmobile when there is adequate snow cover and weather permits. There are 271 miles of marked winter trails within the refuge boundary with 112 miles of those occurring on the refuge land. These trails link the villages of Noorvik and Selawik to Buckland, Shungnak, Kotzebue, and Ambler.

### **Availability of Resources**

Adequate refuge personnel and base operational funds are available to manage marking and maintenance activities at existing and projected levels. Management involves administrative staff time for partnerships and associated written agreements with interested parties, memorandums of understanding, review of permit stipulations and proposed activities. Field work associated with administering the program primarily involves monitoring compliance with the terms of the permit. Monitoring compliance of permit conditions is typically done in conjunction with non-related projects and travel between villages.

### **Anticipated Impacts of Uses**

Minimal impacts to habitats within the refuge are anticipated. Compaction of snow on regularly used trails may delay melting and cause some damage to vegetation due to breakage. There are no impacts to recreational or subsistence users anticipated due to trail markers or their associated activities. Because of the nature of the trails and location of villages, it is not expected that trails would be marked within the wilderness area. Moose and caribou have been known to have tripods temporarily caught on their antlers as a result of them rubbing against structures. Such incidents are rare. Necessary actions to minimize impacts of trail marking and markers in specific areas will be addressed on a case-by-case basis through special use permits. Poles used are biodegradable untreated wood; once the tripods collapse from natural degradation, they typically lay flat on the tundra and are covered by snow in the winter and pose no safety risk to snowmobile travelers. Reflective tape attached to the markers typically breaks down over time due to exposure to sunlight, and wire used to hold tripods upright eventually oxidizes; resulting impacts to the refuge are minimal.

### **Public Review and Comment**

Public comments were solicited concurrently with the revision of the Selawik National Wildlife Refuge's Comprehensive Conservation Plan and Environmental Assessment (USFWS 2010). Public comments on compatibility determinations were accepted during the public review period for the draft plan and announced in the Federal Register. The public comment period was October 21, 2010, to March 15, 2011, which provided 145 days for public review. We mailed the full draft plan and a summary to the individuals and organizations on our mailing list. We invited public comments through an advertisement in a local newspaper and attended city council meetings in Selawik and Noorvik to receive comments on the draft plan. Planning team members met with the Citizens' Advisory Commission on Federal Areas to discuss the issues at Selawik refuge and alternatives that were proposed in the draft plan. The draft compatibility determinations were posted on the Service's Region 7 Web page.

We received no comments on the draft of this compatibility determination. Reviewers supported a formal partnership with other organizations to mark and maintain winter trails. A few reviewers agreed that marking trails will improve the safety of local users. NANA requested more involvement in trail mapping so that trails can be accurately outlined in its GIS database.

**Refuge Determination (check one below)**

Use is not compatible

Use is compatible

Stipulations Necessary to Ensure Compatibility

Activities considered in this compatibility determination will only be allowed under the conditions of a valid special use permit, including the following stipulations. Permits are required only when initial trail marking is proposed on refuge land.

1. Failure to abide by any part of this special use permit; violation of any refuge related provision in Titles 43 (Part 36) or 50 (Subchapters B and C), Code of Federal Regulations (CFR); or violation of any pertinent State regulation (e.g., fish or game violation) will, with due process, be considered grounds for immediate revocation of this permit and could result in denial of future permit requests for lands administered by the U. S. Fish and Wildlife Service. This provision applies to all persons working under the authority of this permit (e.g., assistants). Appeals of decisions relative to permits are handled in accordance with 50 CFR 36.41.
2. The permit holder is responsible for ensuring that all employees, volunteers, party members, contractors, aircraft pilots, and any other persons working for the permit holder and conducting activities allowed by this permit are familiar with and adhere to the conditions of this permit.
3. Any problems with wildlife and/or animals taken in defense of life or property must be reported immediately to the refuge manager and Alaska Department of Fish and Game, and be salvaged in accordance with State regulations.
4. The permit holder and permit holder's clients do not have the exclusive use of the site(s) or lands covered by this permit.
5. This permit may be canceled or revised at any time by the refuge manager in case of emergency (e.g., unusual resource impacts or problems).
6. The permit holder or party chief shall notify the refuge manager during refuge working hours in person or by telephone before beginning and upon completion of activities allowed by this permit.
7. Prior to beginning any activities allowed by this permit, the permit holder shall provide the refuge manager with: (1) the name and method of contact for the field party chief or supervisor, (2) aircraft and other vehicle types to be used with vehicle/aircraft identification information, and (3) any changes in information provided in the original permit application.
8. In accordance with the Archaeological Resources Protection Act (16 USC 470aa), the removal or disturbance of archaeological or historical artifacts is prohibited. The excavation, disturbance, collection, or purchase of historical, recent, ethnological, or archaeological specimens or artifacts is prohibited.

9. The use of helicopters is prohibited without approval from the refuge manager and subject to a Minimum Requirements Analysis for designated wilderness.
10. The use of off-road vehicles is prohibited except for the use of snow machines during periods of adequate snow cover.
11. The operation of aircraft at altitudes and in flight paths resulting in the herding, harassment, hazing, or driving of wildlife is prohibited. It is recommended that all aircraft, except for takeoff and landing, maintain a minimum altitude of 2,000 feet above ground level.
12. Fuel caches are prohibited.
13. Permit holder shall maintain use areas in a neat sanitary condition. Latrines must be located at least 150 feet from springs, lakes, and streams when possible to avoid contamination of water resources. All property of the permit holder must be removed from refuge lands upon completion of permitted activities.
14. Trail markers will be free standing constructed tripods (not anchored with rebar) made of untreated timber.
15. Markers will be maintained in a manner providing safety for travelers using the trails. This includes inspection and replacement of tripods and reflectors on a periodic basis so as to prevent missing markers.
16. The approximate locations are identified on the maps included in the letter of request and a geo-referenced map or database of marked trails provided once completed.
17. The refuge office will be notified via letter or telephone when the trail marking is complete.
18. The permit holder shall indemnify, defend, and hold the United States, its agents, and employees harmless from any claim, loss, damage, penalty, death, or personal injury of whatever kind resulting from permit holder's activities on and use of the permitted area.
19. Permit holder waives any claim or right of action permit holder may have against the United States in the event of damage to property, and injury to or death of any person that arises due to the activities authorized by this permit.

### **Justification**

Ensuring the opportunity for continued subsistence uses by local residents is one of the purposes of the Selawik refuge as established by ANILCA, the Refuge Improvement Act, and the Wilderness Act. Winter trail marking will facilitate this, and other compatible public activities on the refuge, by improving the safety of winter travel between communities within the refuge boundaries. After fully considering the impacts of these activities as described previously in the "Anticipated Impacts" section of this document, it is my determination that trail marking activities on the refuge do not materially interfere with or detract from the purposes of the refuge or the mission of the National Wildlife Refuge System.

### **Supporting Documents**

U. S. Fish and Wildlife Service. 1987. Selawik National Wildlife Refuge Final Comprehensive Conservation Plan, Wilderness Review and Environmental Impact Statement. U. S. Fish and Wildlife Service, Anchorage, Alaska. 378 pp.

U. S. Fish and Wildlife Service. 1987. Record of Decision: Selawik National Wildlife Refuge Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan. U. S. Fish and Wildlife Service, Anchorage, Alaska. 15 pp.

U. S. Fish and Wildlife Service. 2010. Draft Revised Comprehensive Conservation Plan and Environmental Assessment. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK. 285 pp (plus ten appendices).

U. S. Fish and Wildlife Service. 2011. Final Revised Comprehensive Conservation Plan. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK.

**Refuge Determination**

Refuge Manager/ Project Leader Approval	<u>/signed/ Lee Anne Ayres</u>	<u>July 14, 2011</u>
		Date

**Concurrence**

Regional Chief National Wildlife Refuge System	<u>/signed/ Mitch Ellis</u>	<u>July 20, 2011</u>
		Date

**Mandatory 10-Year Re-evaluation Date: 2021**

**NEPA Compliance for Refuge Use Decision**

- Categorical Exclusion without Environmental Action Memorandum
- Categorical Exclusion and Environmental Action Memorandum
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

## Compatibility Determination

**Uses:** Dog Sled Racing

**Supporting and Incidental Uses:** Snowmobiling, snowshoeing, firewood cutting, natural resource gathering, camping, cross-country skiing, skijoring, dog sledding, picnicking, wildlife observation, wildlife photography, videography, fixed-wing aircraft landings.

**Refuge Name:** Selawik National Wildlife Refuge

**Establishment and Acquisition Authority:** The Alaska National Interest Lands Conservation Act (ANILCA) established the 2.5-million-acre Selawik National Wildlife Refuge (Selawik refuge, refuge) as part of the U. S. Fish and Wildlife Service, National Wildlife Refuge System (Department of the Interior) on December 2, 1980.

**Selawik Refuge Purposes:** As stated in ANILCA Section 302 (7) (B), the purposes for which the Selawik refuge was established and shall be managed include:

- (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Western Arctic caribou herd (including participation in coordinated ecological studies and management of these caribou), waterfowl, shorebirds and other migratory birds, and salmon and sheefish;
- (ii) to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- (iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- (iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

The purpose of the congressionally designated Selawik Wilderness Area is to secure an enduring resource of wilderness, protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System (NWPS), and administer the area for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as designated wilderness.

### National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

### Description of Uses

Dog sled races consist of individuals of all ages using teams of harnessed dogs to pull a sled along established winter trails, typically between villages. In the case of multi-day events, checkpoints and mandatory rest periods may occur in one or both of the villages within the

refuge's external boundary. Occasionally, weather or other conditions will require participants to camp in the refuge or use public shelter cabins. Snowmobiling and fixed-wing aircraft on skis are sometimes used to support participants and maintain trails; these have already been found compatible in other Selawik refuge compatibility determinations. The refuge has one annually permitted dog sled race, the historic Kobuk 440. Several other dog sled racing events, including those for youth and novice mushers, take place outside refuge boundaries and are associated with this race.

Dog sledding was found to be a supporting use for several other compatible activities, including subsistence, environmental education, and interpretation. While some visitors come to the refuge specifically to engage or observe in this activity from village checkpoints, many others follow the race through media coverage.

### **Availability of Resources**

Adequate refuge personnel and base operational funds are available to manage dog sledding and the Kobuk 440 activities at current and projected levels. Administrative staff time primarily involves phone conversations, written correspondence, and interaction with visitors at the office, providing information through commercial services on the refuge, or law enforcement contacts in the field.

In the case of the Kobuk 440 dog sled race, administration consists of the issuance of a special use permit and special conditions. Processing the permit takes less than one day; monitoring the impacts of the race is done incidental to other activities that involve the staff traveling by snowmobile between race checkpoints (villages). It's not anticipated that there will be requests for additional races; however, if there are, availability of resources and impacts to the refuge will be determined on a case-by-case basis and a special use permit will be required.

### **Anticipated Impacts of Uses**

Negligible impacts to habitats within the refuge from disturbance are anticipated. Possible localized adverse impacts to some wildlife species could occur in the form of short-term disturbance caused by supporting activities (snowmobiles and aircraft), but the proposed use would not have any long-term population-level impacts on refuge wildlife. The introduction of invasive plant species, perhaps from seeds carried on dog sleds or in bedding material for dogs, could affect refuge resources. Straw that contains no seeds is currently used at village checkpoints and would be required by permit condition in the future. To date, no invasive species introduction is known to have occurred on the Selawik refuge. Refuge staff will be vigilant to identify the possibility of potential introductions. Positive effects on the local economy, though small, are anticipated from these uses. Encouraging youth and local residents to engage in non-motorized outdoor activities and learn about the traditional practices and resource use of past generations is another positive and important impact.

Activities performed as part of dog sled racing already occur on the refuge. The trails used are already in use by regular refuge visitors; consequently, the additional use will have a negligible impact on the habitat. Regular refuge visitors using snowmobiles to travel between villages or to hunt or trap may have to exercise added caution do to the additional traffic on marked trails during these events. Such inconveniences are brief, and residents are accustomed to the trails being used by travelers with either snowmobiles or dog teams.

### Public Review and Comment

Public comments were solicited concurrently with the revision of the Selawik National Wildlife Refuge's Comprehensive Conservation Plan and Environmental Assessment (USFWS 2010). Public comments on compatibility determinations were accepted during the public review period for the draft plan and announced in the Federal Register. The public comment period was October 21, 2010, to March 15, 2011, which provided 145 days for public review. We mailed the full draft plan and a summary to the individuals and organizations on our mailing list. We invited public comments through an advertisement in a local newspaper and attended city council meetings in Selawik and Noorvik to receive comments on the draft plan. Planning team members met with the Citizens' Advisory Commission on Federal Areas to discuss the issues at Selawik refuge and alternatives that were proposed in the draft plan. The draft compatibility determinations were posted on the Service's Region 7 Web page.

We received no comments on the draft of this compatibility determination. However, one individual asked that the Service explain what is considered "appropriate" and what is considered "compatible uses" in regards to dog sled racing. Overall, there was wide support for the use of public lands for competitive events such as dog sled races and cultural events that establish a positive relationship between visitors or area residents and the refuge.

### Refuge Determination (check one below)

Use is not compatible

Use is compatible

### Stipulations Necessary to Ensure Compatibility

Visitors will be required to comply with any regulations in place such as seasonal closures for resource protection.

Permits are required for dog sled races. Liability insurance and bonding may be required, depending on the specific production activities proposed. Additionally, a \$100 fee may be required. News gathering organizations are exempt from fees, insurance, and bonding requirements but may be required to obtain a special use permit to ensure compatibility with refuge purposes, avoid conflict with established public use or research, or to protect refuge resources.

### **SPECIAL USE PERMIT STIPULATIONS** **FOR DOG SLED RACES AT SELAWIK REFUGE**

1. Failure to abide by any part of this special use permit; violation of any refuge related provision in Titles 43 (Part 36) or 50 (Sub-chapters B and C), Code of Federal Regulations (CFR); or violation of any pertinent State regulation (e.g., fish or game violation) will, with due process, be considered grounds for immediate revocation of this permit and could result in denial of future permit requests for lands administered by the U. S. Fish and Wildlife Service. This provision applies to all persons working under the authority of this permit (e.g., assistants, race monitors, volunteers, etc.). Appeals of decisions relative to permits are handled in accordance with Title 50 CFR 36.41.
2. The permit holder is responsible for ensuring that all employees, race participants, party members, contractors, aircraft pilots, and any other persons working for the

- permit holder and conducting activities allowed by this permit are: 1) familiar with and adhere to the conditions of this permit, and 2) possess at all times a signed copy of this permit while exercising these granted privileges.
3. This permit may be canceled or revised at any time by the refuge manager in case of emergency (e.g., unusual resource problems, high fire danger, flooding, etc.).
  4. The permit holder and permit holder's clients do not have the exclusive use of the site(s) or lands covered by this permit.
  5. Any problems with wildlife and/or animals taken in defense of life or property must be reported immediately to the refuge manager and Alaska Department of Fish and Game, and be salvaged in accordance with State regulations.
  6. Permit holders shall maintain their use areas in a neat and sanitary condition. Latrines must be located a minimum of 150 feet from springs, lakes, and streams to avoid contamination of water resources. All property must be removed from refuge lands upon completion or revocation of permitted activities, and permit holder will leave the surrounding grounds in a neat, clean, and orderly condition. If the permit holder fails to remove all property upon completion of authorized activities, he/she will be liable for the removal and restoration of the site.
  7. The construction of landing strips or pads is prohibited. Incidental hand removal of rocks and other minor obstructions may be permitted.
  8. The use of off-road vehicles is prohibited, except for snowmobiles, provided adequate snow cover is available to prevent scarring of the underlying vegetation.
  9. Any action by a permit holder or the permit holder's employees that unduly interferes with or harasses other refuge visitors or impedes access to any site is strictly prohibited.
  10. Construction of tent platforms and cabins or other permanent structures is prohibited.
  11. Fuel caches are prohibited.
  12. The operation of aircraft at altitudes and in flight paths resulting in the herding, harassment, hazing, or driving of wildlife is prohibited. It is recommended that all aircraft, except for takeoff and landing, maintain a minimum altitude of 2,000 feet above ground level.
  13. The use of helicopters is prohibited.
  14. Race participants and assistants must use seedless straw bedding for dogs.

### **Justification**

Long distance dog sled racing is a long standing tradition unique to the State of Alaska and has strong public support among the communities in the region. Dog sledding and associated racing activity inspires visitors to learn more about wildlife habitat, subsistence, and resource issues. By promoting activities that encourage visitors to participate in outdoor activities such as dog sledding, we foster wildlife and wildland stewardship. We also showcase a traditional subsistence practice that allowed communities to harvest and share resources.

The Kobuk 440, which crosses relatively small portions of Selawik refuge, is one of the few races long enough to be a qualifying race for Alaska's Iditarod dog sled race. It is difficult for a race to cover such length safely in the region and not cross public lands. Of the 440-mile race, 98 miles is on refuge land with the majority of the race taking place on Native and State lands.

This race replaced more informal races held between villages along the same route prior to the establishment of the Selawik refuge.

The current and projected amount of these activities has been found to have insignificant, adverse physical and biological effects in the draft refuge comprehensive conservation plan. After fully considering the impacts of these activities, as described previously in the “Anticipated Impacts of the Uses” section of this document, it is my determination that dog sled racing within the refuge does not materially interfere with or detract from the purposes of the refuge or mission of the National Wildlife Refuge System.

**Supporting Documents**

U. S. Fish and Wildlife Service. 1987. Selawik National Wildlife Refuge Final Comprehensive Conservation Plan, Wilderness Review and Environmental Impact Statement. U. S. Fish and Wildlife Service, Anchorage, Alaska. 378 pp.

U. S. Fish and Wildlife Service. 1987. Record of Decision: Selawik National Wildlife Refuge Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan. U. S. Fish and Wildlife Service, Anchorage, Alaska. 15 pp.

U. S. Fish and Wildlife Service. 2010. Draft Revised Comprehensive Conservation Plan and Environmental Assessment. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK. 285 pp (plus ten appendices).

U. S. Fish and Wildlife Service. 2011. Final Revised Comprehensive Conservation Plan. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK.

**Refuge Determination**

Refuge Manager/  
Project Leader Approval      /signed/ Lee Anne Ayres      July 14, 2011  
Date

**Concurrence**

Regional Chief  
National Wildlife      /signed/ Mitch Ellis      July 20, 2011  
Refuge System      Date

**Mandatory 10-Year Re-evaluation Date: 2021**

**NEPA Compliance for Refuge Use Decision**

- Categorical Exclusion without Environmental Action Memorandum
- Categorical Exclusion and Environmental Action Memorandum
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

**Appendix E**  
**Inventory and Monitoring Plan**  
**Executive Summary**



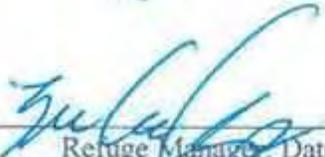
**SELAWIK NATIONAL WILDLIFE REFUGE  
INVENTORY AND MONITORING PLAN**

**U.S. Fish and Wildlife Service**

**June 2009**

Prepared by:  6-11-09  
Supervisory Biologist; Date

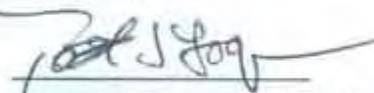
Reviewed by:  6/23/09  
Refuge Supervisor; Date

Submitted by:  6-11-09  
Refuge Manager; Date

Approved by:  
Initial; Year 1

Internal; Year 3

Internal; Year 5



Chief of Refuges; Date 7/5/09

\_\_\_\_\_  
Refuge Manager; Date

\_\_\_\_\_  
Refuge Manager; Date

## Executive Summary

The Inventory and Monitoring Plan (I & M plan) for Selawik National Wildlife Refuge (refuge) is a step-down management plan required by the 1987 Comprehensive Conservation Plan. This I & M plan describes the refuge's inventory and monitoring studies in the broader context of its resource management programs, as mandated by Service policy (Service Manual 701 FW 2).

This I & M plan contains three parts. Part I provides a narrative summary of the refuge's inventory and monitoring program, including program goals, objectives, study justification, prioritization, and administration. Part II provides the necessary peer-reviewed study protocols. Part III provides the United States Fish and Wildlife Service, Region 7, Refuge Inventory and Monitoring Directive (Directive). The formal protocols detail how a refuge-specific survey or project is executed. Where appropriate, protocols contain measurable thresholds for triggering specific management actions. The Directive outlines the driving policies for administering and prioritizing inventory and monitoring activities on Alaska refuges.

Inventory and monitoring activities at Selawik refuge are prioritized based on legal mandates (i.e., ANILCA), agency policies, and scientific principles. The refuge prioritizes work based on four elements: (1) the purposes for which the refuge was established, (2) issues of conservation concern, (3) issues and concerns of the Northwest Arctic Ecosystem Team, and (4) the 1995 Selawik Refuge Biological Review. Maintaining subsistence resources such as caribou, sheefish, and waterfowl is a purpose of the Selawik refuge. Many of the inventory and monitoring projects focus on the subsistence purpose and cover a wide variety of species and their habitats. Many priority projects focus on establishing baseline levels, tracking background variations, or monitoring population status for fish and wildlife species that are harvested on the refuge (e.g., caribou and moose).

Other priority projects are designed to monitor habitats, including terrestrial and aquatic habitats, which are vital for species existence. This culminates in projects prioritized by issues of conservation concern. Priorities shift due to emerging threats and new issues, such as the national avian influenza surveillance effort in which the refuge participated in 2006 and 2007. Another example of shifting priorities is the upper Selawik River retrogressive thaw slump that caused increased sedimentation in sheefish spawning habitat, which could potentially affect spawning for this species in negative ways.

To be responsive to rapidly changing conditions, the refuge undertakes annual work plan reviews, during which ongoing, planned, and newly proposed inventory and monitoring activities are reprioritized. The annual reviews consider sampling design; data collection; data management; data analysis; and synthesis, report writing, and dissemination of results for the inventory and monitoring projects.

The I & M plan will be reviewed by refuge personnel every two years, and every 5–8 years by staff in the Service's regional office. Protocols for current projects will be reviewed during the initial plan review and as new projects are implemented.

**Appendix F**  
**Easements and Rights-of-way**



## F. Trail and Site Easements and Rights-of-way within the Selawik National Wildlife Refuge

### F.1 17(b) Easements

Section 17(b) of the Alaska Native Claims Settlement Act of 1971 (ANCSA) authorizes the Secretary of the Interior to reserve easements on lands conveyed to Native corporations to guarantee access to public lands and waters (Chapter 3, Section 3.3.14.10). This appendix provides a description of the easements reserved by the Service over private lands under Section 17(b) of the ANCSA. These easements include linear easements across Native lands and site easements (Map F-1). Easements are listed by easement identification number (EIN).

#### **NANA REGIONAL CORPORATION, INC., SUCCESSOR IN INTEREST TO AKULIUK CORPORATION (THE VILLAGE OF SELAWIK)**

##### Existing Trails (25 feet in width)

- EIN 1, D1, D9 From Selawik (U. S. Survey Number 4492), Section 20, T. 14 N., R. 6 W., Kateel River Meridian (KRM), southwesterly to Selawik Lake. Interim Conveyance 552.
- EIN 2 C5 From the junction with trail EIN 3 C3, D1, D9 on Shogvik Lake in Section 1, T. 14 N., R. 7 W., KRM, westerly to public lands. Interim Conveyance 552.
- EIN 3 C3, D1, D9 From Selawik (U.S. Survey Number 4492), Section 20, T. 14 N., R. 6 W., KRM, northerly to public lands. Interim Conveyance 552 and 2190.
- EIN 4 D1 From the village of Selawik in Section 20, T. 14 N., R. 6 W., KRM, easterly to public lands. Patent 50-82-0141. Interim Conveyance 552 and 2160.

#### **NANA REGIONAL CORPORATION, INC., SUCCESSOR IN INTEREST TO KATYAAK CORPORATION (THE VILLAGE OF KIANA)**

##### Existing Trails (25 feet in width)

- EIN 3 C3, C5, D1, D9 From site EIN 3a E in Lot 2, Section 2, T. 18 N., R. 8 W., KRM, southerly to public lands. Patent 50-2000-0219.
- EIN 21 C5 From site EIN 14 C1, C3 on the left bank of Kobuk River in Lot 2, Section 11, T. 18 N., R. 7 W., KRM, southerly to public lands. Patent 50-2000-0219

##### Proposed Trails (25 feet in width)

- EIN 3 C3, C5, D1, D9 From site EIN 3a E in Lot 2, Section 2, T. 18 N., R. 8 W., KRM, southerly to public lands. Patent 50-2000-0219.

## Appendix F: Easements and Rights-of-Way

- EIN 19 C5 From site EIN 3 C3, C5, D1, D9 in Section 31, T. 17 N., R. 7 W., KRM, easterly to public lands in T. 17 N., R. 7 W., KRM, and westerly to public lands in T. 17 N., R. 8 W., KRM. Patent 50-2000-0219.
- EIN 21 C5 From site EIN 14 C1, C3 on the left bank of Kobuk River in Lot 2, Section 11, T. 18 N., R. 7 W., KRM, southerly to public lands. Patent 50-2000-0219.

### Sites (1 acre)

- EIN 3a E A one-quarter ( $\frac{1}{4}$ ) acre site upland of the ordinary high-water mark, in Lot 2, Section 25, T. 18 N., R. 8 W., KRM, on the left bank of Kobuk River. The uses allowed are limited to vehicle parking (e.g., aircraft, boats, ATV's snowmobiles, cars, trucks) and loading or unloading. Patent number 50-2000-0219.
- EIN 14 C1, C3 Upland of the ordinary high-water mark, in Lot 2, Section 11, T. 18 N., R. 7 W., KRM, on the left bank of Kobuk River. Patent number 50-2000-0219.

## NANA REGIONAL CORPORATION, INC., SUCCESSOR IN INTEREST TO PUTOO CORPORATION (THE VILLAGE OF NOORVIK)

### Existing Trails (25 feet in width)

- EIN 1 C3, C5, D1, D9 From the west boundary of Section 31, T. 16 N., R. 13 W., KRM, northeasterly to the east boundary of Section 25, T. 18 N., R. 10 W., KRM. Use will be limited to winter. Patent number 50-2001-0441 and 50-2002-0470. Interim Conveyance 436 and 500.
- EIN 2 C3, C5, D1 From U.S. Survey Number 5069 (Noorvik townsite) within Sections 27, 34, and 35, T. 17 N., R. 11 W., KRM, southwesterly to public lands. Use will be limited to winter. Patent number 50-2001-0441 and 50-2002-0470. Interim Conveyance 436 and 500.
- EIN 8 C5, D1 From U.S. Survey Number 5069 (Noorvik townsite) within Sections 27, 34, and 35, T. 17 N., R. 11 W., KRM, northwesterly to site EIN 8a C3, E located in Lot 1, Section 5, T. 17 N., R. 11 W., KRM. Use will be limited to winter. Patent number 50-2002-0470. Interim Conveyance 436.
- EIN 8b C4, C5, D1 From site EIN 8a C5, E in Lot 1, Section 5, T. 17 N., R. 11 W., KRM, westerly to public lands and site EIN 8c C5, D1 in Section 22, T.18N., R.13W., KRM. Patent number 50-2000-0254 and 50-2002-0470.
- EIN 14 C5, D9 From Robert Curtis Memorial Airstrip in Lot 2, Section 35, T. 17 N., R. 11 W., KRM, southeasterly to public lands. Use will be limited to winter. Patent number 50-2002-0470. Interim Conveyance 436 and 500.

**Proposed Trails (25 feet in width)**

EIN 12 C5 From existing winter trail EIN 1 C3, C5 D1 D9 in Section 35, T. 16 N., R. 13 W., KRM, southerly to public lands. Interim Conveyance 436.

**Sites (1 acre)**

EIN 8a C3, E Upland of the mean high tide mark, located in Lot 1, Section 5, T. 17 N., R. 11 W., KRM, on the right bank of Melvin Channel. Patent number 50-2002-0470. Interim Conveyance 436.

EIN 8c C5, D1 Upland of the mean high tide mark, located in Lot 1, Section 22, T. 18 N., R. 13W., KRM, on the east shore of Ekichuk Lake. Patent number 50-2000-0254.

**KIKIKTAGRUK INUPIAT CORPORATION (VILLAGE OF KOTZEBUE)****Existing Trails (25 feet in width)**

EIN 8 D1, D9 From of edge of State of Alaska submerged lands located in Section 11, T. 17 N., R. 18 W., KRM, southeasterly to Noorvik. Use will be limited to winter. Interim Conveyance 544.

**Sites (1 acre)**

EIN 57 M Upland of the mean high tide line, located in Section 18, T. 16 N., R. 14 W., KRM, on the right bank of Riley Channel. Interim Conveyance 544.

**NANA REGIONAL CORPORATION, INC.****Existing Trails (25 feet in width)**

EIN 1 C3, C5, D1, D9 From the west boundary of Section 31, T. 16 N., R. 13 W., KRM, northeasterly to the east boundary of Section 25, T. 18 N., R. 10 W., KRM. Use will be limited to winter. Interim Conveyance 435.

EIN 1, D1, D9 From Selawik (U.S. Survey Number 4492), Section 20, T. 14 N., R. 6 W., KRM, southwesterly to Selawik Lake. Interim Conveyance 2166.

EIN 2 C5 From the junction with trail EIN 3 C3, D1, D9 on Shogvik Lake in Section 1, T. 14 N., R. 7 W., KRM, northwesterly to public lands. Patent number 50-2000-0260

EIN 3 C3, D1, D9 From Selawik (U.S. Survey Number 4492), Section 20, T. 14 N., R. 6 W., KRM, northwesterly to public lands. Patent 50-2000-0260. Interim Conveyance 2166.

## Appendix F: Easements and Rights-of-Way

EIN 14 C5, D9 From Robert Curtis Memorial Airstrip in Lot 2, Section 35, T. 17 N., R. 11 W., KRM, southeasterly to public lands. Use will be limited to winter. Interim Conveyance 1676.

### Proposed Trails (25 feet in width)

EIN 25 C5 From trail EIN 3 C3, D1, D9 in Lot 1, Section 4, T. 15 N., R. 7 W., KRM, northeasterly to public lands. Patent 50-2000-0260.

### Sites (1 acre)

EIN 26 D1 Upland of the ordinary high-water mark in Section 7, T. 17 N., R. 9 W., KRM, on the left bank of the Oksik Channel of the Kobuk River. Interim Conveyance 2166.

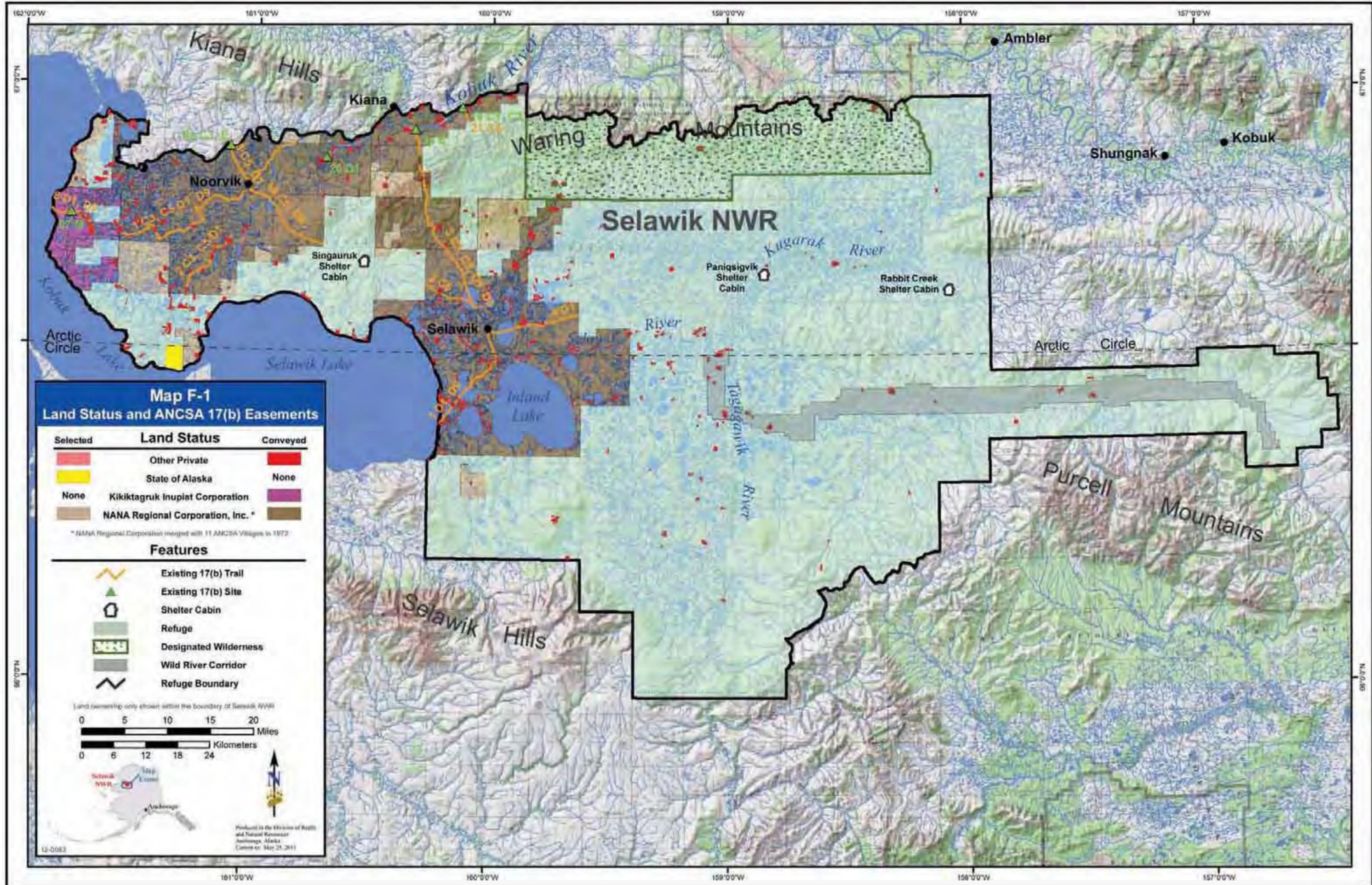
## F.2 RS 2477 Rights-of-way

The State of Alaska identifies numerous claims to roads, trails, and paths across Federal lands under Revised Statute 2477 (RS 2477), a section in the Mining Act of 1866 (Chapter 3, Section 3.3.14.9).

This appendix describes four routes within the Selawik refuge that the State of Alaska claims may be asserted as rights-of-way under RS 2477 (Table F-1; Map F-2).

Table F-1. Mileage of state-claimed RS-2477 rights-of-way within Selawik National Wildlife Refuge.

Number	Name	USFWS Administered	Native Conveyed	Private Patent	Total
115	Kiana-Selawik-Shungnak	57.62	40.76	0.58	98.96
117	Kiwalik-Noorvik	14.37	9.92	0.42	24.71
124	Nimiuk Point-Shungnak	8.25	28.59	0.39	37.23
639	Noorvik-Selawik	15.69	20.25	0.60	36.54
<b>Total</b>		<b>95.93</b>	<b>99.52</b>	<b>1.99</b>	<b>197.44</b>



**Map F-1**  
**Land Status and ANCSA 17(b) Easements**

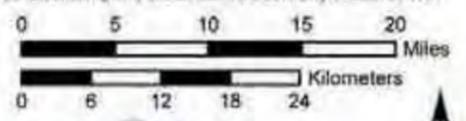
Selected	Land Status	Conveyed
<span style="color: red;">■</span>	Other Private	<span style="color: red;">■</span>
<span style="color: yellow;">■</span>	State of Alaska	None
None	Kikiktagrak Inupiat Corporation	<span style="color: purple;">■</span>
<span style="color: brown;">■</span>	NANA Regional Corporation, Inc. *	<span style="color: brown;">■</span>

\* NANA Regional Corporation merged with 11 ANCSA Villages in 1972

**Features**

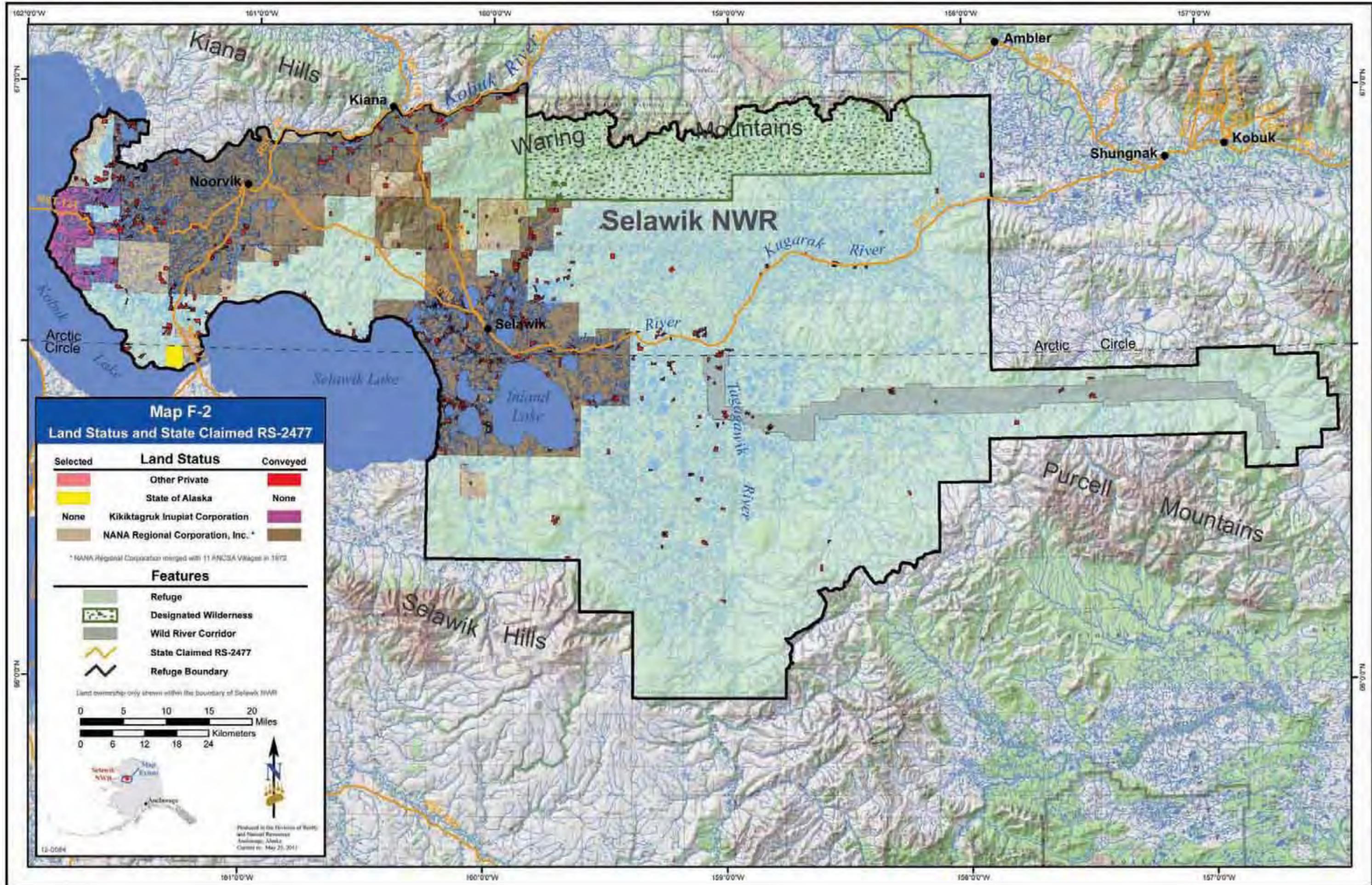
- Existing 17(b) Trail
- ▲ Existing 17(b) Site
- Shelter Cabin
- Refuge
- Designated Wilderness
- Wild River Corridor
- Refuge Boundary

Land ownership only shown within the boundary of Selawik NWR



Produced in the Division of Realty and National Resources  
 Anchorage, Alaska  
 Current as of: Mar 21, 2011

(Back of Map F-1)



**Map F-2**  
**Land Status and State Claimed RS-2477**

Selected	Land Status	Conveyed
	Other Private	
	State of Alaska	None
None	Kikiktavruk Inupiat Corporation	
	NANA Regional Corporation, Inc.*	

\* NANA Regional Corporation merged with 11 ANCSA Villages in 1972

**Features**

- Refuge
- Designated Wilderness
- Wild River Corridor
- State Claimed RS-2477
- Refuge Boundary

Land ownership only shown within the boundary of Selawik NWR

0 5 10 15 20 Miles  
 0 6 12 18 24 Kilometers

Produced in the Facilities of Wildlife and Natural Resources  
 Anchorage, Alaska  
 Control #: May 25, 2014

13-0084

(Back of Map F-2)

**Appendix G**  
**Members of the Planning Team and**  
**Preparers of the Plan**



## G. Preparers of the Revised Comprehensive Conservation Plan

<b>Name and Title</b>	<b>Expertise and Roles</b>	<b>Education/Professional Training</b>	<b>Years of Experience</b>
<b>Selawik National Wildlife Refuge</b>			
<b>Lee Anne Ayres</b> Refuge Manager	Wildlife Biology Compatibility Public Involvement Core Planning Team Author/Reviewer/Advisor	BS—Wildlife Biology MS—Range Ecology	9 Refuge Management 20 Wildlife Biology
<b>Tina Moran</b> Deputy Refuge Manager	Wildlife Biology Biophysical Environment Public Involvement Environmental Assessment Core Planning Team Author/Reviewer	BS—Wildlife Biology MS—Wildlife Biology	2 Refuge Management 19 Wildlife Biology
<b>Susan Georgette</b> Outreach Specialist	Human Environment/Subsistence Public Use Public Involvement Public Comment Analysis Environmental Assessment Core Planning Team Author//Reviewer/Editor	BA—Environmental Studies and American Studies	6 Outreach and Communications 25 Subsistence and Traditional Knowledge Research
<b>Patrick Snow</b> Refuge Specialist (until 10/09)	Compatibility Core Planning Team	BS—Wildlife Management	5 Wildlife Biology 10 Refuge Management
<b>Nathan Olson</b> Biologist/Pilot (until 02/09)	Wildlife/Fisheries Biology Core Planning Team	BS—Wildlife Biology	6 Wildlife Biology
<b>Brittany Sweeney</b> Environmental Education Specialist (since 09/10)	Summary of Draft Plan for Public Review Summary of Final Plan	BS—Biology Teaching	6 Environmental Education
<b>Northwest Arctic Borough</b>			
<b>Charlie Gregg</b> Lands Specialist	Liaison with NWAB, Department of Planning Subsistence Core Planning Team Reviewer/Advisor		18 Land Planning and Economics (NWAB) and Advisory Council Coordination (ADF&G)

**Appendix G: Members of the Planning Team and Preparers of the Plan**

<b>Name and Title</b>	<b>Expertise and Roles</b>	<b>Education/Professional Training</b>	<b>Years of Experience</b>
<b>NANA Regional Corporation</b>			
<b>Abraham Snyder</b> Director of Lands	Liaison with NANA, Lands and Natural Resources Department Subsistence Core Planning Team Reviewer/Advisor	Rights-of-Way Courses Basic Supervision Seminar Advance ArcView GIS Native Land Issues for Alaska Tribes Introduction to ArcView GIS Alaska Land and Law Course Multi-Agency NEPA Training English, Computer Business Application, Intensive Reading Communication	1 City Planning 5 Realty Officer/Specialist 9 Resource and Land Management
<b>State of Alaska</b>			
<b>Andrew Levi</b> Liaison with State of Alaska, ADF&G	Policy and ANILCA Compliance Core Planning Team Public Involvement Writer/Reviewer	BA—Philosophy/Political Science MA—Public Administration	3 Natural Resource Planning and Policy
<b>Joy Biedermann</b> Liaison with State of Alaska, DNR (until 04/09)	Policy Compliance Core Planning Team Public Involvement Writer/Reviewer	BS—Natural Resources/Wildlife Ecology JD—Law	1 Natural Resource Planning and Management 12 Law
<b>Kyle Smith</b> Liaison with State of Alaska, DNR (until 07/11)	Policy Compliance Core Planning Team Public Involvement Writer/Reviewer	BA—Political Science JD—Law	2 Natural Resource Planning and Management 2 Law 2 Non-profit Management 7 Energy Consulting

Name and Title	Expertise and Roles	Education/Professional Training	Years of Experience
<b>National Wildlife Refuge System, Region 7</b>			
<b>Jeffrey Brooks</b> Social Scientist	Leader, Core Planning Team Meeting Facilitator/Advisor Public Involvement Response to Public Comments Environmental Assessment Author/Reviewer/Editor	AS—Biology BS—Biology MS—Conservation Ecology and Sustainable Development PhD—Natural Resource Recreation	3 Natural Resource Planning and Policy 3 International Development (community health education) 4 Wildlife Biology 13 Social Science Research (outdoor recreation, visitor experience, human dimensions of natural resources)
<b>Helen Clough</b> Chief, Conservation Planning and Policy	NEPA, Policy, and ANILCA Compliance Trainer/Meeting Facilitator Reviewer/Advisor	BA—Anthropology	12 Natural Resource Management 21 Natural Resource Planning and Policy
<b>Mikel Haase</b> Natural Resource Planner (Until 07/10)	NEPA, Policy, and ANILCA Compliance Extended Team Reviewer/Advisor	BA—Environmental Design MS—Forest Resources/Landscape Architecture	30 Natural Resource Planning and Policy
<b>Rob Siciliano</b> Cartographer (Until 05/10)	Map Production Land Status Extended Team	BA—Environmental Science	10 Geographic Information Systems
<b>Melanie Jacobs</b> SCA Intern (10/09 - 04/10)	Assistant Planner Formatting and Editing	BA—Interdisciplinary Studies	1 Natural Resource Planning and Policy/ Social Science Research (public participation with Alaska Native communities)
<b>Minerva Dorantes</b> SCA Intern (02/11 – 08/11)	Assistant Planner Public Comments Analysis	BS—Natural Resources and Environmental Sciences	1 Natural Resource Planning and Policy/ Social Science Research (public participation with Alaska Native communities) 1 Soil Sciences

**Appendix G: Members of the Planning Team and Preparers of the Plan**

<b>Name and Title</b>	<b>Expertise and Roles</b>	<b>Education/Professional Training</b>	<b>Years of Experience</b>
<b>National Wildlife Refuge System, Region 7</b>			
<b>Robert Lambrecht</b> Fire Management Officer (Retired; until 12/08)	Wildland Fire Extended Team Writer	BS—Industrial Technology MS—Forestry	1 Natural Resource Planning and Policy 7 Wildland Fire Management 24 Forest Management
<b>Lisa Saperstein</b> Fire Ecologist (since 09/10)	Wildland Fire Extended Team Writer/Reviewer	BS—Botany BS—Wildlife Biology MS—Wildlife Biology	2 Fire Ecology 19 Wildlife Biology
<b>Doug Campbell</b> Realty Specialist	Land Status Extended Team Writer/Reviewer	BLA—Landscape Architecture MLA—Landscape Architecture	3 Landscape Design and Planning 31 Land and Natural Resource Planning and Management
<b>John Brewer</b> Cartographer	Map Revision Land Status Easements/Rights-of-way Extended Team Writer/Reviewer	BS—Geography	22 Geographic Information Systems
<b>Debbie Corbett</b> Archaeologist	Cultural/Historic Resources Extended Team Reviewer	BA— Anthropology/Archaeology MA— Anthropology/Archaeology	31 Archaeology/Anthropology
<b>Science Applications, Region 7</b>			
<b>Karen Murphy</b> Western Arctic LCC Coordinator	Landscape Conservation Climate Change Extended Team Reviewer	BS—Wildlife Biology MS—Resource Ecology	3 Natural Resource Planning 11 Ecology (Fire and Climate) 11 Wildlife Biology/Ecology
<b>Office of Subsistence Management, Region 7</b>			
<b>Polly Wheeler</b> Deputy ARD Office of Subsistence Management (Until 05/11)	Subsistence Extended Team Reviewer	BA—Sociology/Anthropology MA—Anthropology PhD—Anthropology	28 Social Science Research, Natural Resource Management and Policy

**Appendix H**  
**Species of the Selawik Refuge**



## H. Species Lists for the Selawik National Wildlife Refuge

This appendix was designed to accompany Chapter 4 of this comprehensive plan.

### H.1 Plants

Table H-1 provides a list of plants currently known to exist on Selawik refuge based on collections and field studies. Taxonomic order (Family level) and names follow the U.S. Department of Agriculture, Natural Resource Conservation Service, Plants Database (Foote 2002; Parker 2001; Talbot and Solomeschch 2006; Talbot et al. 2006a; Talbot et al. 2006b; Talbot et al. 2006c; Campa 2008).

Table H-1. Plant species of the Selawik National Wildlife Refuge

Family	Scientific Name	Common Name
<b>Adoxoaceae</b>	<i>Adoxa moschatellina</i>	Muskroot
<b>Alectoriaceae</b>	<i>Alectoria nigricans</i>	Witch's hair lichen
	<i>Alectoria ochroleuca</i>	Witch's hair lichen
<b>Apiaceae</b>	<i>Bupleurum americanum</i>	American thoroughwax
	<i>Cicuta virosa</i>	Mackenzie's water hemlock
	<i>Cnidium cnidiifolium</i>	Jakutsk snowparsley
	<i>Podistera macounii</i>	Macoun's woodroot
<b>Araceae</b>	<i>Calla palustris</i>	Water arum
<b>Aspidiaceae</b>	<i>Cystopteris fragilis</i>	Fragile fern
	<i>Dryopteris expansa</i>	Shield fern
	<i>Dryopteris fragrans</i>	Fragrant fern
	<i>Woodsia glabella</i>	Alpine woodsia
	<i>Woodsia ilvensis</i>	Rusty woodsia
	<b>Asteraceae</b>	<i>Antennaria friesiana</i>
<i>Antennaria monocephala</i>		Pygmy pussytoes
<i>Arnica angustifolia</i>		Narrowleaf arnica
<i>Arnica frigida</i>		Snow arnica
<i>Arnica lessingii</i>		Nodding arnica
<i>Artemisia arctica</i>		Boreal sagebrush
<i>Artemisia campestris ssp. borealis</i>		Field sagewort
<i>Artemisia furcata</i>		Forked wormwood
<i>Artemisia glomerata</i>		Pacific alpine wormwood
<i>Artemisia tilesii</i>		Tilesius' wormwood
<i>Chrysanthemum bipinnatum</i>		
<i>Erigeron hyperboreus</i>		Tundra fleabane
<i>Eurybia sibirica</i>		Arctic aster
<i>Packera ogorukensis</i>		Ogoruk Creek ragwort
<i>Petasites frigidus</i>		Arctic sweet coltsfoot

Appendix H: Species of the Selawik Refuge

Family	Scientific Name	Common Name
	<i>Saussurea angustifolia</i>	Narrowleaf saw-wort
	<i>Woodsia glabella</i>	Arctic groundsel
	<i>Senecio congestus</i>	Marsh fleabane
	<i>Senecio lugens</i>	Groundsel
	<i>Senecio ogtorukensis</i>	Ragwort
	<i>Senecio pseudo-arnica</i>	Sea beach senecio
	<i>Senecio tundricola</i>	Fuscate groundsel
	<i>Solidago multiradiata</i>	Goldenrod
	<i>Tanacetum bipinnatum</i>	Lake Huron tansy
	<i>Taraxacum ceratophorum</i>	Dandelion
	<i>Taraxicum lacerum</i>	Dandelion
	<i>Taraxacum kamschaticum</i>	Dandelion
	<i>Tephroseris frigida</i>	Holub
	<i>Tephroseris lindstroemii</i>	Fuscate groundsel
	<i>Tephroseris palustris</i>	
	<i>Tripleurospermum phaeocephalum</i>	Wild Chamomile
<b>Aulacomniaceae</b>	<i>Aulacomnium palustre</i>	Aulacomnium moss
	<i>Aulacomnium turgidum</i>	Turgid aulacomnium moss
<b>Baeomycetaceae</b>	<i>Icmadophila ericetorum</i>	Peppermint drop lichen
<b>Betulaceae</b>	<i>Alnus crispa</i>	Alder
	<i>Betula glandulosa</i>	Shrub Birch
	<i>Betula nana</i>	Dwarf birch
	<i>Betula papyrifera</i>	Paper birch
<b>Boraginaceae</b>	<i>Eritrichium splendens</i>	Showy alpine forget-me-not
	<i>Eritrichium aretiodes</i>	Arctic alpine forget-me-not
	<i>Merensia paniculata</i>	Tall bluebells
<b>Brachytheciaceae</b>	<i>Tomentypnum niten</i>	Tomentypnum moss
<b>Brassicaceae</b>	<i>Cardamine bellidifolia</i>	Alpine bittercress
	<i>Cardamine digitata</i>	Richardson's bittercress
	<i>Cardamine oligosperma</i>	Little western bittercress
	<i>Cardamine pratensis</i>	Cuckoo flower
	<i>Descurania sophioides</i>	Tansy mustard
	<i>Draba alpine</i>	Alpine draba
	<i>Draba fladnizensis</i>	Austrian draba
	<i>Draba glabella</i>	Smooth draba
	<i>Draba palanderiana</i>	Palander's draba
	<i>Draba stenopelata</i>	Anadyr draba
	<i>Parrya nudicaulis</i>	Nakedstem wallflower

Family	Scientific Name	Common Name
	<i>Rorippa islandica</i>	Northern marsh yellowcress
	<i>Rorippa palustris</i>	Hispid yellowcress
	<i>Smelowskia calycina</i>	Alpine smelowska
	<i>Subularia aquatica</i>	Waterarwort
	<i>Torularia humilis</i>	Low northern-rockcress
<b>Campanulaceae</b>	<i>Campanula lasiocarpa</i>	Mountain harebell
	<i>Campanula uniflora</i>	Arctic bellflower
<b>Caprifoliaceae</b>	<i>Linnaea borealis</i>	Twinflower
	<i>Viburnum edule</i>	Squashberry
<b>Caryophyllaceae</b>	<i>Arenaria capillaris</i>	Slender mountain sandwort
	<i>Arenaria longipedunculata</i>	Longstem sandwort
	<i>Cerastium beeringianum</i>	Mouse ears
	<i>Dianthus repens</i>	Carnation
	<i>Honckenja peploides</i>	Beach greens
	<i>Melandrium affine</i>	Arctic catchfly
	<i>Melandrium apetalum</i>	Apetalous catchfly
	<i>Minuartia arctica</i>	Arctic stitchwort
	<i>Minuartia elegans</i>	Elegant stitchwort
	<i>Minuartia macrocarpa</i>	Longpod stitchwort
	<i>Minuartia rubella</i>	Beautiful sandwort
	<i>Minuartia stricta</i>	Bog stitchwort
	<i>Moehringia lateriflora</i>	Grove sandwort
	<i>Phlox alaskensis</i>	Alaskan phlox
	<i>Silene acaulis</i>	Moss campion
	<i>Silene repens</i>	Pink campion
	<i>Silene uralensis</i>	Apetalous catchfly
	<i>Stelleria borealis</i>	Boreal starwort
	<i>Stelleria crassifolia</i>	Fleshy starwort
	<i>Stelleria dicranoides</i>	Matted starwort
	<i>Stelleria edwardsii</i>	Starwort
	<i>Stelleria longipes</i>	Longstalk starwort
	<i>Wilhelmsia physodes</i>	Wilhelmsia
<b>Chenopodiaceae</b>	<i>Corispermum ochotense</i>	Alaskan bugseed
<b>Cladoniaceae</b>	<i>Cladina alpestris</i>	Northern reindeer lichen
	<i>Cladina arbuscula</i>	Reindeer lichen
	<i>Cladina ciliata</i>	Ciliate reindeer lichen
	<i>Cladina portentosa</i>	Pacific reindeer lichen
	<i>Cladina rangiferina</i>	Gray reindeer lichen

**Appendix H: Species of the Selawik Refuge**

<b>Family</b>	<b>Scientific Name</b>	<b>Common Name</b>
	<i>Cladina stellaris</i>	Star reindeer lichen
	<i>Cladina stygia</i>	Reindeer lichen
	<i>Cladonia amaurocraea</i>	Cup lichen
	<i>Cladonia bellidiflora</i>	Cup lichen
	<i>Cladonia borealis</i>	Boreal cup lichen
	<i>Cladonia carneola</i>	Cup lichen
	<i>Cladonia cenotea</i>	Cup lichen
	<i>Cladonia cfr coniocraea</i>	Cup lichen
	<i>Cladonia cfr subfurcata</i>	Cup lichen
	<i>Cladonia chlorophaea</i>	Cup lichen
	<i>Cladonia coccifera</i>	Cup lichen
	<i>Cladonia coniocraea</i>	Cup lichen
	<i>Cladonia coccifera</i>	
	<i>Cladonia cornuta</i>	Cup lichen
	<i>Cladonia crispata</i>	Cup lichen
	<i>Cladonia cucullata</i>	
	<i>Cladonia cyanipes</i>	Cup lichen
	<i>Cladonia decorticate</i>	Cup lichen
	<i>Cladonia deformis</i>	Cup lichen
	<i>Cladonia ecmocyna</i>	Cup lichen
	<i>Cladonia fimbriata</i>	Cup lichen
	<i>Cladonia furcata</i>	Cup lichen
	<i>Cladonia gracilis ssp. elongata</i>	Brown cup lichen
	<i>Cladonia gracilis ssp. gracilis</i>	Cup lichen
	<i>Cladonia gracilis ssp. turbinata</i>	Cup lichen
	<i>Cladonia gracilis ssp. vulnerata</i>	Cup lichen
	<i>Cladonia metacorallifera</i>	Cup lichen
	<i>Cladonia ochrochlora</i>	Cup lichen
	<i>Cladonia phyllophora</i>	Cup lichen
	<i>Cladonia pleurota</i>	Cup lichen
	<i>Cladonia pyxidata</i>	Cup lichen
	<i>Cladonia singularis</i>	Cup lichen
	<i>Cladonia squamosa</i>	Cup lichen
	<i>Cladonia stricta</i>	Cup lichen
	<i>Cladonia subfurcata</i>	Cup lichen
	<i>Cladonia sulphurina</i>	Sulphur cup lichen
	<i>Cladonia uncialis</i>	Cup lichen

Family	Scientific Name	Common Name
	<i>Cladonia wainioi</i>	Wain's cup lichen
<b>Collemataceae</b>	<i>Leptogium saturninum</i>	Saturn skin lichen
<b>Cornaceae</b>	<i>Cornus Canadensis</i>	Bunchberry dogwood
<b>Crassulaceae</b>	<i>Rhodiola integrifolia</i>	Ledge stonecrop
<b>Cupressaceae</b>	<i>Juniperus communis</i>	Common juniper
<b>Cyperaceae</b>	<i>Carex aquatilis</i>	Water sedge
	<i>Carex bigelowii</i>	Bigelow sedge
	<i>Carex canescens</i>	Silvery sedge
	<i>Carex capillaris</i>	Hair-like sedge
	<i>Carex capitata</i>	Capitate sedge
	<i>Carex chordorrhiza</i>	Creeping sedge
	<i>Carex diandra</i>	Lesser paniced sedge
	<i>Carex fuliginosa</i>	Shortleaved sedge
	<i>Carex glacialis</i>	Glacial sedge
	<i>Carex glareosa</i>	Lesser saltmarsh sedge
	<i>Carex holostoma</i>	Arctic marsh sedge
	<i>Carex lapponica</i>	Lapland sedge
	<i>Carex limosa</i>	Mud sedge
	<i>Carex livida</i>	Livid sedge
	<i>Carex lyngbyei</i>	Lyngbye's sedge
	<i>Carex mackenziei</i>	Mackenzie's sedge
	<i>Carex membranacea</i>	Fragile sedge
	<i>Carex microchaeta</i>	
	<i>Carex podocarpa</i>	Shortstalk sedge
	<i>Carex rariflora</i>	Looseflower alpine sedge
	<i>Carex rostrata</i>	Beaked sedge
	<i>Carex rotundata</i>	Round sedge
	<i>Carex rupestris</i>	Curly sedge
	<i>Carex saxatilis</i>	Rock sedge
	<i>Carex scirpoidea</i>	Singlespike sedge
	<i>Carex subspathacea</i>	Hoppner's Sedge
	<i>Carex tenuiflora</i>	Sparseflower sedge
	<i>Carex utriculata</i>	Northwest Territory sedge
	<i>Carex vaginata</i>	Sheathed sedge
	<i>Carex williamsii</i>	William's sedge
	<i>Eleocharis acicularis</i>	Needle spikerush
	<i>Eriophorum angustifolium</i>	Tall cottongrass
	<i>Eriophorum brachyantherum</i>	Northland cottonsedge

**Appendix H: Species of the Selawik Refuge**

<b>Family</b>	<b>Scientific Name</b>	<b>Common Name</b>
	<i>Eriophorum callitrix</i>	Arctic cottongrass
	<i>Eriophorum chamissonis</i>	Chamisso's cottongrass
	<i>Eriophorum scheuchzeri</i>	White cottongrass
	<i>Eriophorum vaginatum</i>	Tussock cottongrass
	<i>Kobresia myosuroides</i>	Bellardi bog sedge
	<i>Trichophorum alpinum</i>	Alpine bulrush
	<i>Trichophorum caespitosum</i>	Tufted bulrush
<b>Diapensiaceae</b>	<i>Diapensia lapponica</i>	Pincushion plant
<b>Ditrichaceae</b>	<i>Ceratodon purpureus</i>	Ceratodon moss
<b>Droseraceae</b>	<i>Drosera anglica</i>	English sundew
	<i>Drosera rotundifolia</i>	Roundleaf sundew
<b>Elaeagnaceae</b>	<i>Shepherdia Canadensis</i>	Russet buffaloberry
<b>Equisetaceae</b>	<i>Equisetum arvense</i>	Field horsetail
	<i>Equisetum fluviatile</i>	Water horsetail
	<i>Equisetum palustre</i>	Marsh horsetail
	<i>Equisetum pratense</i>	Meadow horsetail
	<i>Equisetum scirpoides</i>	Dwarf scouringrush
	<i>Equisetum sylvaticum</i>	Woodland horsetail
	<i>Equisetum variegatum</i>	Alaskan scouringrush
<b>Ericaceae</b>	<i>Andromeda polifolia</i>	Bog rosemary
	<i>Arctostaphylos alpina</i>	Bearberry
	<i>Arctostaphylos rubra</i>	Red bearberry
	<i>Arctostaphylos uva-ursi</i>	Kinnickinick
	<i>Cassiope tetragona</i>	Lapland cassiope
	<i>Chamaedaphne calyculata</i>	Leatherleaf
	<i>Empetrum nigrum</i>	Crowberry
	<i>Ledum palustre</i>	Labrador tea
	<i>Loiseleuria procumbens</i>	Alpine azalea
	<i>Oxycoccus microcarpus</i>	Cranberry
	<i>Rhododendron lapponicum</i>	Lapland rosebay
	<i>Vaccinium oxycoccus</i>	Small cranberry
	<i>Vaccinium uliginosum</i>	Bog blueberry
	<i>Vaccinium vitis-idaea</i>	Ligonberry
<b>Fabaceae</b>	<i>Astragalus alpinus</i>	Milk vetch
	<i>Astragalus australis</i>	Indian milkvetch
	<i>Hedysarum alpinum</i>	Eskimo potato
	<i>Lathyrus maritimus</i>	Beach pea

Family	Scientific Name	Common Name
	<i>Lathyrus palustris</i>	Marsh pea
	<i>Lupinus arcticus</i>	Lupine
	<i>Lupinus kuschei</i>	Yukon lupine
	<i>Oxytropis bryophila</i>	
	<i>Oxytropis nigrescens</i>	Blackish locoweed
	<i>Oxytropis campestris</i>	Loco weed
	<i>Oxytropis kokrinensis</i>	Kokrines locoweed
<b>Fumariaceae</b>	<i>Corydalis pauciflora</i>	Fewflower fumewort
<b>Gentianaceae</b>	<i>Gentiana glauca</i>	Gentian
	<i>Gentianella propinqua</i>	Fourpart dwarf gentian
	<i>Menyanthes trifoliata</i>	Buckbean
<b>Grossulariaceae</b>	<i>Ribes triste</i>	Northern red currant
<b>Haloragaceae</b>	<i>Hippuris tetraphylla</i>	Fourleaf mare's-tail
	<i>Hippuris vulgaris</i>	Common mare's-tail
	<i>Myriophyllum sibiricum</i>	Shortspike watermilfoil
<b>Hylocomiaceae</b>	<i>Hylocomium splendens</i>	Splendid feather moss
	<i>Pleurozium schreberi</i>	Red stem moss
<b>Iridaceae</b>	<i>Iris setosa</i>	Wild iris
<b>Juncaceae</b>	<i>Juncus arcticus</i>	Arctic rush
	<i>Juncus castaneus</i>	Chestnut rush
	<i>Juncus triglumis</i>	Three-hulled rush
	<i>Luzula arcuata</i>	Curved woodrush
	<i>Luzula confusa</i>	Northern woodrush
	<i>Luzula kjellmaniana</i>	Tundra woodrush
	<i>Luzula multiflora</i>	Common woodrush
	<i>Luzula parviflora</i>	Smallflowered woodrush
	<i>Luzula rufescens</i>	Rufous woodrush
	<i>Luzula Wahlenbergii</i>	Wahlenberg's woodrush
<b>Juncaginaceae</b>	<i>Triglochin maritimum</i>	Seaside arrowgrass
	<i>Triglochin palustris</i>	Marsh arrowgrass
<b>Lemnaceae</b>	<i>Lemna mino</i>	Duckweed
	<i>Lemna trisulca</i>	Star duckweed
<b>Lentibulariaceae</b>	<i>Pinguicula villosa</i>	Carnivorous bladderwort
	<i>Pinguicula vulgaris</i>	Butterwort
	<i>Utricularia intermedia</i>	Bladderwort
	<i>Utricularia minor</i>	Lesser bladderwort
	<i>Utricularia macrorhiza</i>	Common bladderwort
<b>Liliaceae</b>	<i>Lloydia serotina</i>	Alp lily

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<b>Family</b>	<b>Scientific Name</b>	<b>Common Name</b>
	<i>Tofieldia coccinea</i>	Northern asphodel
	<i>Tofieldia pusilla</i>	Scotch false asphodel
	<i>Zygadenus elegans</i>	Death camass
<b>Lobariaceae</b>	<i>Lobaria linita</i>	Lung lichen
<b>Lycopodiaceae</b>	<i>Lycopodium alpinum</i>	Alpine clubmoss
	<i>Lycopodium annotinum</i>	Stiff clubmoss
	<i>Lycopodium clavatum</i>	Common clubmoss
	<i>Lycopodium selago</i>	Fir club moss
	<i>Huperzia haleakalae</i>	Pacific clubmoss
	<i>Lycopodium annotinum</i>	Stiff clubmoss
	<i>Lycopodium clavatum</i>	Running clubmoss
	<i>Lycopodium complanatum</i>	Groundcedar
<b>Marchantiaceae</b>	<i>Marchantia polymorpha</i>	Green-tongue liverwort
<b>Myricaceae</b>	<i>Myrica gale</i>	Sweetgale
<b>Nephromataceae</b>	<i>Nephroma arcticum</i>	Kidney lichen
	<i>Nephroma expallidum</i>	Kidney lichen
<b>Nympheaceae</b>	<i>Nuphar polysepalum</i>	Yellow Pond Lily
	<i>Nymphaea tetragona</i>	Dwarf Water Lily
<b>Onagraceae</b>	<i>Epilobium angustifolium</i>	Fireweed
	<i>Epilobium latifolium</i>	River beauty
	<i>Epilobium palustre</i>	Willow herb
<b>Orchidaceae</b>	<i>Corallorrhiza trifida</i>	Coral Root
	<i>Cypripedium passerinum</i>	Sparrowegg lady's slipper
	<i>Listera borealis</i>	Northern twayblade
	<i>Platanthera aquilonis</i>	Northern green orchid
	<i>Platanthera obtusata</i>	Bog orchis
	<i>Spiranthes romanzoffiana</i>	Lady's tresses
<b>Orobanchaceae</b>	<i>Boschniakia rossica</i>	Broomrape
<b>Pannariaceae</b>	<i>Psoroma hypnorum</i>	Bowl lichen
<b>Papaveraceae</b>	<i>Papaver alaskanum</i>	Alaska poppy
	<i>Papaver macounii</i>	Macoun's poppy
	<i>Papaver radicum</i>	Lapland poppy
<b>Parmeliaceae</b>	<i>Arctoparmelia incurva</i>	Arctoparmelia lichen
	<i>Arctoparmelia separata</i>	Arctoparmelia lichen
	<i>Asahinea chrysantha</i>	Gold asahinea lichen
	<i>Bromopsis pumpelliana</i>	Pumpelly's brome
	<i>Bryocaulon divergens</i>	Bryocaulen lichen
	<i>Bryoria fuscescens</i>	Horsehair lichen

Family	Scientific Name	Common Name
	<i>Bryoria nitidula</i>	Horsehair lichen
	<i>Bryoria trichoides</i>	Horsehair lichen
	<i>Cetraria aculeate</i>	Cetraria lichen
	<i>Cetraria andrejevii</i>	
	<i>Cetraria cucullata</i>	Curled snow lichen
	<i>Cetraria ericetorum</i>	Reticulate cetraria lichen
	<i>Cetraria inermis</i>	Tuckermannopsis lichen
	<i>Cetraria islandica</i>	Iceland moss
	<i>Cetraria kamezatica</i>	Kamachatka cetraria lichen
	<i>Cetraria laevigata</i>	Cetraria lichen
	<i>Cetraria nigricanescens</i>	Lichen
	<i>Cetraria nigricans</i>	Cetraria lichen
	<i>Cetraria odontella</i>	Cetraria lichen
	<i>Dactylina arctica</i>	Arctic dactylina lichen
	<i>Evernia mesomorpha</i>	Ring lichen
	<i>Flavocetraria cucullata</i>	
	<i>Flavocetraria nivalis</i>	
	<i>Hypogymnia bitteri</i>	Bitter tube lichen
	<i>Hypogymnia physodes</i>	Tube lichen
	<i>Masonhalea richardsonii</i>	Richardson's masonhalea lichen
	<i>Melanelia hepatizon</i>	Melanelia lichen
	<i>Melanelia stygia</i>	Melanelia lichen
	<i>Parmelia omphalodes</i>	Shield lichen
	<i>Parmelia skultii</i>	Skult's shield lichen
	<i>Parmelia sulcata</i>	Shield lichen
	<i>Usnea lapponica</i>	Lapland beard lichen
	<i>Vulpicida tilesii</i>	
<b>Peltigeraceae</b>	<i>Peltigera aphthosa</i>	Felt lichen
	<i>Peltigera Britannica</i>	British felt lichen
	<i>Peltigera canina/P. polydactyla</i>	Dog lichen
	<i>Peltigera "concinna"</i>	
	<i>Peltigera "conspersa"</i>	
	<i>Peltigera didactyla</i>	Felt lichen
	<i>Peltigera extenuate</i>	
	<i>Peltigera hymenina</i>	
	<i>Peltigera latiloba</i>	
	<i>Peltigera malacea</i>	Felt lichen
	<i>Peltigera neckeri</i>	Necker's felt lichen

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<b>Family</b>	<b>Scientific Name</b>	<b>Common Name</b>
	<i>Peltigera ponojenensis</i>	Felt lichen
	<i>Peltigera rufescens</i>	Felt lichen
	<i>Peltigera scabrosa</i>	Felt lichen
<b>Pertusariaceae</b>	<i>Ochrolechia bryophaga</i>	Crabseye lichen
	<i>Ochrolechia frigida</i>	Cold crabseye lichen
	<i>Pertusaria bryontha</i>	Pore lichen
<b>Pinaceae</b>	<i>Juniperus communis</i>	Common mountain juniper
	<i>Picea glauca</i>	White spruce
	<i>Picea mariana</i>	Black spruce
<b>Plumbaginaceae</b>	<i>Armeria maritime</i>	Thrift
<b>Poaceae</b>	<i>Agropyron boreale</i>	Wheat grass
	<i>Agrostis borealis</i>	Bent grass
	<i>Agrostis vinealis</i>	Brown bentgrass
	<i>Alopecurus aequalis</i>	Foxtail grass
	<i>Anthoxanthum monticola</i>	Alpine sweetgrass
	<i>Anthoxanthum nitens</i>	Sweetgrass
	<i>Arctagrostis latifolia</i>	Polar grass
	<i>Arctophila fulva</i>	Pendent grass
	<i>Beckmannia syzigachne</i>	American sloughgrass
	<i>Bromus pumelianus</i>	Brome grass
	<i>Calamagrostis canadensis</i>	Bluejoint
	<i>Calamagrostis lapponica</i>	Lapland reedgrass
	<i>Calamagrostis neglecta</i>	Reed bent grass
	<i>Calamagrostis purpurascens</i>	Purple reedgrass
	<i>Deschampsia caespitosa</i>	Tufted hairgrass
	<i>Dupontia fisheri</i>	Fisher's tundra grass
	<i>Elymus alaskanus</i>	Alaskan wheatgrass
	<i>Elymus arenarius</i>	Lyme grass
	<i>Elymus macrourus</i>	Tufted wheatgrass
	<i>Festuca altaica</i>	Fescue grass
	<i>Festuca brachyphylla</i>	Alpine fescue
	<i>Festuca lenensis</i>	Tundra fescue
	<i>Festuca rubra</i>	Richardson's fescue
	<i>Poa arctica</i>	Arctic bluegrass
	<i>Poa glauca</i>	Glaucous bluegrass
	<i>Poa pratensis</i>	Kentucky bluegrass
	<i>Trisetum spicatum</i>	Spike trisetum
<b>Polemoniaceae</b>	<i>Phlox alaskensis</i>	Alaskan phlox

Family	Scientific Name	Common Name
	<i>Polemonium acutiflorum</i>	Tall Jacob's ladder
	<i>Polemonium pulcherrimum</i>	Jacob's ladder
<b>Polygonaceae</b>	<i>Bistorta plumose</i>	Bistort
	<i>Bistorta vivipara</i>	Alpine bistort
	<i>Polygonum alpinum</i>	Alaska wild rhubarb
	<i>Rumex arcticus</i>	Arctic dock
	<i>Rumex lapponicus</i>	
<b>Polypodiaceae</b>	<i>Dryopteris fragrans</i>	Fragrant woodfern
	<i>Polypodium sibiricum</i>	Siberian polypody
<b>Polytrichaceae</b>	<i>Polytrichum juniperinum</i>	Juniper polytrichum moss
<b>Portulacaceae</b>	<i>Claytonia eschscholtzii</i>	Grassleaf springbeauty
	<i>Claytonia sarmentosa</i>	Spring beauty
<b>Potamogetonaceae</b>	<i>Potamogeton alpinus</i>	Alpine pondweed
	<i>Potamogeton gramineus</i>	Variableleaf pondweed
	<i>Potamogeton praelongus</i>	Whitestem pondweed
	<i>Potamogeton richardsonii</i>	Richardson's pondweed
<b>Primulaceae</b>	<i>Androsace chamaejasme</i>	Rock jasmine
	<i>Androsace septentrionalis</i>	Pygmyflower rockjasmine
	<i>Dodecatheon frigidum</i>	Western arctic shootingstar
	<i>Primula borealis</i>	Primrose
	<i>Primula incana</i>	Silvery primrose
	<i>Trientalis europaea</i>	Starflower
<b>Pyrolaceae</b>	<i>Moneses uniflora</i>	Single delight
	<i>Orthilia secunda</i>	Sidebells wintergreen
	<i>Pyrola asarifolia</i>	American wintergreen
	<i>Pyrola grandiflora</i>	Large flowered wintergreen
<b>Physciaceae</b>	<i>Phaeophyscia kairamoi</i>	Kihlman's wreath lichen
	<i>Physcia stellaris</i>	Starry rosette lichen
<b>Ramalinaceae</b>	<i>Ramalina roesleri</i>	Roesler's cartilage lichen
<b>Ranunculaceae</b>	<i>Aconitum delphiniifolium</i>	Larkspurleaf monkshood
	<i>Anemone drummondii</i>	Drummond's anemone
	<i>Anemone narcissiflora</i>	Narcissus anemone
	<i>Anemone parviflora</i>	Smallflowered anemone
	<i>Anemone richardonii</i>	Yellow thimbleweed
	<i>Caltha natans</i>	Floating marsh marigold
	<i>Caltha palustris</i>	Yellow marsh marigold
	<i>Delphinium brachycentrum</i>	Northern larkspur
	<i>Delphinium glaucum</i>	Sierra larkspur

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<b>Family</b>	<b>Scientific Name</b>	<b>Common Name</b>
	<i>Ranunculus gmelinii</i>	Gmelin's buttercup
	<i>Ranunculus lapponicus</i>	Lapland buttercup
	<i>Ranunculus nivalis</i>	Snow buttercup
	<i>Ranunculus pallasii</i>	Pallas' buttercup
	<i>Ranunculus pygmaeus</i>	Pygmy buttercup
	<i>Ranunculus trichophyllus</i>	Threadleaf crowfoot
	<i>Thalictrum sparsiflorum</i>	Meadow-rue
<b>Rosaceae</b>	<i>Dasiphora floribunda</i>	Shrubby cinquefoil
	<i>Diapensia lapponica</i>	Pincushion plant
	<i>Dryas integrifolia</i>	Mountain-avens
	<i>Dryas octapetala</i>	Alaska mountain-avens
	<i>Novosieversia glacialis</i>	Glacial avens
	<i>Potentilla Egedii</i>	Silverweed
	<i>Potentilla gorodkovii</i>	Oneflower cinquefoil
	<i>Potentilla hookeriana</i>	Hooker's cinquefoil
	<i>Potentilla nivea</i>	Snow cinquefoil
	<i>Potentilla norvegica</i>	Norwegian cinquefoil
	<i>Potentilla palustris</i>	Purple marshlocks
	<i>Potentilla villosa</i>	Villous cinquefoil
	<i>Rosa acicularis</i>	Prickly rose
	<i>Rubus arcticus</i>	Arctic blackberry
	<i>Rubus chamaemorus</i>	Cloudberry
	<i>Spiraea stevenii</i>	Beauverd spirea
<b>Rubiaceae</b>	<i>Galium boreale</i>	Northern bedstraw
	<i>Galium trifidum</i>	Threepetal bedstraw
<b>Salicaceae</b>	<i>Populus balsamifera</i>	Balsam poplar
	<i>Populus tremuloides</i>	Quaking aspen
	<i>Salix alaxensis</i>	Alaska willow
	<i>Salix arbusculoides</i>	Littletree willow
	<i>Salix arctica</i>	Arctic willow
	<i>Salix arctolitoral</i>	Arctic seashore willow
	<i>Salix barclayi</i>	Barclay's willow
	<i>Salix bebbiana</i>	Bebb willow
	<i>Salix brachycarpa</i>	Shortfruit willow
	<i>Salix chamissonis</i>	Chamisso's willow
	<i>Salix depressa</i>	Long-beaked willow
	<i>Salix alaxensis</i>	Feltleaf willow
	<i>Salix fuscescens</i>	Alaska bog willow

Family	Scientific Name	Common Name
	<i>Salix glauca</i>	Grayleaf willow
	<i>Salix hastata</i>	Halberd willow
	<i>Salix indet</i>	
	<i>Salix niphoclada</i>	Barrenground willow
	<i>Salix padophylla</i>	Park willow
	<i>Salix phlebophylla</i>	Skeletonleaf willow
	<i>Salix planifolia</i>	Diamondleaf willow
	<i>Salix polaris</i>	Polar willow
	<i>Salix pulchra</i>	Tealeaf willow
	<i>Salix reticulate</i>	Netleaf willow
	<i>Salix richardsonii</i>	Richardson's willow
	<i>Salix rotundifolia</i>	Least willow
<b>Saxifragaceae</b>	<i>Boykinia richardsonii</i>	Richardson's brookfoam
	<i>Chrysopenium tetrandrum</i>	Northern golden saxifrage
	<i>Parnassia kotzebuei</i>	Kotzebue's grass of Parnassus
	<i>Parnassia palustris</i>	Marsh grass of Parnassus
	<i>Ribes triste</i>	Red currant
	<i>Saxifraga bronchialis</i>	Yellowdot saxifrage
	<i>Saxifraga cernua</i>	Nodding saxifrage
	<i>Saxifraga eschscholtzii</i>	Ciliate saxifrage
	<i>Saxifraga flagellaris</i>	Whiplash saxifrage
	<i>Saxifraga hieraciifolia</i>	Stiffstem saxifrage
	<i>Saxifraga hirculus</i>	Yellow marsh saxifrage
	<i>Saxifraga nelsoniana</i>	Hearleaf saxifrage
	<i>Saxifraga nivlalis</i>	
	<i>Saxifraga reflexa</i>	Reflexed saxifrage
	<i>Saxifraga spicata</i>	Spiked saxifrage
	<i>Saxifraga tricuspidata</i>	Three toothed saxifrage
<b>Scrophulariaceae</b>	<i>Castilleja caudata</i>	Port Clarence Indian paintbrush
	<i>Castilleja hyperborea</i>	Northern Indian paintbrush
	<i>Castilleja pallida</i>	Port Clarence Indian paintbrush
	<i>Lagotis glauca</i>	Weaselsnout
	<i>Pedicularis albolabiata</i>	Sudetic lousewort
	<i>Pedicularis capitata</i>	Capitate lousewort
	<i>Pedicularis labradorica</i>	Labrador lousewort
	<i>Pedicularis lanata</i>	Woolly lousewort
	<i>Pedicularis langsdorfii</i>	Langsdorf's lousewort
	<i>Pedicularis oederi</i>	Oeder's lousewort

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<b>Family</b>	<b>Scientific Name</b>	<b>Common Name</b>
	<i>Pedicularis pacifica</i>	Pacific lousewort
	<i>Pedicularis parviflora</i>	Smallflower lousewort
	<i>Pedularis sudetica</i>	Sudetic lousewort
	<i>Pedularis verticillata</i>	Whorled lousewort
<b>Selaginellaceae</b>	<i>Selaginella selaginoides</i>	Club spikemoss
	<i>Selaginella sibirica</i>	Siberian spikemoss
<b>Sparganiaceae</b>	<i>Sparganium angustifolium</i>	Narrowleaf bur-reed
	<i>Sparganium hyperboreum</i>	Northern bur-reed
	<i>Sparganium minimum</i>	Small bur-reed
	<i>Sparganium multipedunculatum</i>	Narrowleaf bur-reed
<b>Sphaerophorus</b>	<i>Sphaerophorus fragilis</i>	Fragile ball lichen
	<i>Sphaerophorus globosus</i>	Globe ball lichen
<b>Sphagnaceae</b>	<i>Sphagnum angustifolium</i>	Sphagnum
	<i>Sphagnum aongstroemii</i>	Aongstroem's sphagnum
	<i>Sphagnum balticum</i>	Baltic sphagnum
	<i>Sphagnum compactum</i>	Low sphagnum
	<i>Sphagnum fimbriatum</i>	Sphagnum
	<i>Sphagnum fuscum</i>	Sphagnum
	<i>Sphagnum girgensohnii</i>	Girgensohn's sphagnum
	<i>Sphagnum kenaiense</i>	
	<i>Sphagnum lenense</i>	Sphagnum
	<i>Sphagnum lindbergii</i>	Lindberg's sphagnum
	<i>Sphagnum magellanicum</i>	Magellan's sphagnum
	<i>Sphagnum obtusum</i>	Sphagnum
	<i>Sphagnum orientale</i>	Oriental sphagnum
	<i>Sphagnum riparium</i>	Streamside sphagnum
	<i>Sphagnum russowii</i>	Russow's sphagnum
	<i>Sphagnum squarrosum</i>	Sphagnum
	<i>Sphagnum steerei</i>	Steere's sphagnum
	<i>Sphagnum subfulvum</i>	Sphagnum
	<i>Sphagnum talbotianum</i>	Sphagnum
	<i>Sphagnum tenellum</i>	Sphagnum
	<i>Sphagnum tescorum</i>	
	<i>Sphagnum warnstorffii</i>	Warnstorffii sphagnum
<b>Stereocaulaceae</b>	<i>Stereocaulon alpinum</i>	Snow lichen
	<i>Stereocaulon capitellatum</i>	Snow lichen
	<i>Stereocaulon paschale</i>	Snow lichen
	<i>Stereocaulon tomentosum</i>	Tomentose snow lichen

Family	Scientific Name	Common Name
Teloschistaceae	<i>Caloplaca ahtii</i>	Orange lichen
Valerianaceae	<i>Valeriana capitata</i>	Captiate valerian
Violaceae	<i>Viola biflora</i>	Arctic yellow violet
	<i>Viola epipsila</i>	Dwarf marsh violet
Umbilicariaceae	<i>Umbilicaria arctica</i>	Arctic navel lichen
	<i>Umbilicaria krascheninnikovii</i>	Krascheninnikov's navel lichen
Unknown	<i>Thamnolia vermicularis</i>	Whiteworm lichen

## H.2 Vegetation Type and Plant Communities

Table H-2 provides a list of communities and vegetation types currently known to exist on Selawik refuge based on collections and field studies (Talbot and Solomeschch 2006).

Table H-2. Table H-2. Community and vegetation types of the Selawik National Wildlife Refuge

Vegetation Type	Community
<b>I. Alpine tundra</b>	1.1 Dryas tundra on open rocks ( <i>Dryas octopetala</i> )
	1.2 Potentilla tundra on open rock ( <i>Potentilla gorodkovii</i> )
	1.3 Alpine heath ( <i>Arctostaphylos alpina</i> , <i>Loiseleuria procumbens</i> , <i>Diapensia lapponica</i> , <i>Empetrum nigrum</i> )
	1.4 Early melting snow beds on rock ( <i>Cassiope tetragona</i> , <i>Cladina stellaris</i> )
<b>II. Low elevation tundra</b>	2.1 Tussock tundra and polygon ridges ( <i>Eriophorum vaginatum</i> , <i>Carex bigelowii</i> , <i>Betula glandulosa</i> , <i>Ledum decumbens</i> , <i>Vaccinium uliginosum</i> )
	2.2 Tussock tundra in alpine zone ( <i>Eriophorum vaginatum</i> , <i>Betula glandulosa</i> , <i>Ledum decumbens</i> , <i>Vaccinium uliginosum</i> )
	2.3 Shrub tundra ( <i>Alnus viridis</i> , <i>Betula glandulosa</i> , <i>Ledum decumbens</i> , <i>Vaccinium uliginosum</i> )
	2.4 Wet centers of oligotrophic polygons ( <i>Sphagnum balticum</i> , <i>S. compactum</i> , <i>S. fuscum</i> , <i>S. kenaiense</i> , <i>S. lenense</i> , <i>S. steerei</i> , <i>Andromeda polifolia</i> , <i>Drosera rotundifolia</i> , <i>D. anglica</i> , <i>Vaccinium oxycoccos</i> , <i>Carex limosa</i> )
	2.5 Wet centers of oligo-mesotrophic polygons ( <i>Carex chordorrhiza</i> , <i>C. rotundata</i> , <i>C. limosa</i> , <i>Andromeda polifolia</i> , <i>Sphagnum compactum</i> , <i>S. orientale</i> , <i>Scorpidium scorpioides</i> )
	2.6 Wet centers of mesotrophic polygons ( <i>Carex chordorrhiza</i> , <i>C. rotundata</i> , <i>Scorpidium scorpioides</i> , <i>Campylium stellatum</i> )
	2.7 Cracks between polygons ( <i>Eriophorum angustifolium</i> , <i>Drepanocladus fluitans</i> , <i>Sphagnum balticum</i> , <i>S. compactum</i> , <i>S. kenaiense</i> )
<b>III. Upland forests and woodlands</b>	3.1 Subalpine birch-white spruce-lichen woodland ( <i>Picea glauca</i> , <i>Betula papyrifera</i> , <i>Arctostaphylos alpina</i> , <i>Cladina</i> spp., <i>Cladonia</i> spp., <i>Stereocaulon paschale</i> )
	3.2 Upper slope white spruce forests ( <i>Picea glauca</i> , <i>Hylocomium splendens</i> , <i>Vaccinium uliginosum</i> )

Vegetation Type	Community
	3.3 Birch forests of middle slopes ( <i>Betula papyrifera</i> , <i>Picea glauca</i> , <i>Rosa acicularis</i> , <i>Petasites frigidus</i> ) - probably secondary forests
IV. Lowland forests and woodlands	4.1 White spruce forests on high river terraces on rich alluvial soils ( <i>Picea glauca</i> , <i>Hedysarum alpinum</i> , <i>Cypripedium passerinum</i> , <i>Listera borealis</i> )
	4.2 White and black spruce - green moss - lichen forests on old levees and river terraces on sandy and loamy mineral soils ( <i>Picea glauca</i> , <i>P. mariana</i> , <i>Hylocomium splendens</i> , <i>Vaccinium vitis-idaea</i> , <i>Cladina</i> , <i>Mertensia paniculata</i> , <i>Hedysarum alpinum</i> , <i>Wilhelmsia physodes</i> )
	4.3 Birch -willow successional stage after forest type 5 ( <i>Betula papyrifera</i> , <i>Salix</i> , <i>Calamagrostis canadensis</i> )
	4.4 White and black spruce forests on oxbow lake banks on peat ( <i>Picea glauca</i> , <i>P. mariana</i> , <i>Vaccinium uliginosum</i> , <i>Rubus chamaemorus</i> , <i>Sphagnum angustifolium</i> )
	4.5 White spruce woodland on rich peat, which is flooded and silted by rivers ( <i>Picea glauca</i> , <i>Alnus viridis</i> , <i>Equisetum arvense</i> , <i>Vaccinium uliginosum</i> , <i>Dasiphora fruticosa</i> )
	4.6 Alder eutrophic swamp ( <i>Alnus viridis</i> , <i>Comarum palustre</i> , <i>Equisetum arvense</i> , <i>Ranunculus lapponicus</i> )
V. Riparian forests and shrublands (intensive alluvial process)	5.1 Willow scrub on river bars and young levees on sand ( <i>Salix alaxensis</i> , <i>Equisetum arvense</i> )
	5.2 Poplar forests on levees and low river terraces on sandy soil ( <i>Populus balsamifera</i> , <i>Viburnum edule</i> , <i>Equisetum arvense</i> , <i>Hedysarum alpinum</i> , <i>Eurybia sibirica</i> , <i>Calamagrostis canadensis</i> )
	5.3 Alder forests and scrub on sandy alluvial soil ( <i>Alnus viridis</i> , <i>Equisetum arvense</i> , <i>Mertensia paniculata</i> , <i>Anemone richardsonii</i> )
	5.4 Alder scrub on steep river banks with mineral silty soil ( <i>Alnus viridis</i> , <i>Betula papyrifera</i> , <i>Calamagrostis canadensis</i> , <i>Polygonum alpinum</i> )
	5.5 Willow scrub on salt water shoreline ( <i>Salix</i> sp., <i>Calamagrostis canadensis</i> )
	5.6 Willow scrub on flat banks of lakes on sandy silt ( <i>Salix pulchra</i> , <i>Carex aquatilis</i> , <i>Arctophila fulva</i> )
VI. Aquatic and semiaquatic vegetation	6.1 Inland lake shoreline ( <i>Arctophila fulva</i> )
	6.2 Inland lake shoreline ( <i>Carex aquatilis</i> , <i>C. rostrata</i> , <i>Arctophila fulva</i> )
	6.3 Inland lake shoreline ( <i>Eleocharis acicularis</i> )
	6.4 Floodplain lake shoreline ( <i>Equisetum fluviatile</i> , <i>Carex rostrata</i> , <i>Hypnum</i> mosses)
	6.5 Floodplain lake shoreline ( <i>Equisetum fluviatile</i> , <i>Potamogeton perfoliatus</i> ) aquatic submerged stage
	6.6 Various lakes shorelines including saltwater ( <i>Carex aquatilis</i> , <i>Comarum palustre</i> )
	6.7 Inland lake shoreline ( <i>Eriophorum angustifolium</i> )
	6.8 Streams in tussock tundra ( <i>Carex aquatilis</i> , <i>Comarum palustre</i> , <i>Eriophorum angustifolium</i> , <i>Chamaedaphne calyculata</i> , <i>Alnus viridis</i> )

Vegetation Type	Community
	6.9 Coastal shoreline ( <i>Carex lyngbyaei</i> )
	6.10 Coastal shoreline ( <i>Carex mackenziei</i> )
VII. Other vegetation types (not well-studied at Selawik refuge)	7.1 Red-yellow strips within riparian complex ( <i>Comarum palustre</i> )
	7.2 Pioneer communities on river banks ( <i>Equisetum arvense</i> , <i>Salix alaxensis</i> - juvenile)
	7.3 Ombrotrophic bogs ( <i>Sphagnum fuscum</i> )
	7.4 Dry coastal ( <i>Leymus mollis</i> )
	7.5 Mesic alpine meadows ( <i>Boykinia richardsonii</i> )

### H.3 Land Cover Classes

Table H-3 provides a list of land cover classes for the Selawik refuge, including definitions for each class developed by Kirk and Markon (1989).

Table H-3. Definitions of land cover classes in the Selawik refuge (Kirk and Markon 1989)

Class	Definition
<b>Barren</b>	These classes include scarcely vegetated floodplains, scree, and dunes. In the western part of the refuge, a broad swath of this group of classes occurs sporadically over much of the Kobuk River delta between Melvin Channel along the northern boundary of the refuge and the Nazuruk Channel, which empties into Hotham Inlet. A second major area of the barrens is a large western-facing arc that occupies much of the central interior of the refuge. Additional locations include the western end of the Purcell Mountains and where the Sheklukshuk and Kiliovilik ranges cross the refuge boundary and the parts of the Waring Mountains and Selawik Hills that are in the refuge.
<b>Graminoid tussock/dwarf shrub</b>	These classes, which are nearly ubiquitous in the refuge, include the wet graminoid, wet/moist graminoid tundra, and a mosaic. The mosaic is comprised of wet graminoid/erect dwarf shrub, dry prostrate, and dwarf shrub-lichen. This group is characterized by a series of compositions that range from nearly pure graminoid to dwarf shrub, and may be located in very wet to very dry habitats. Sites for these classes have poorly developed organic soils. Vertical locations of these communities range from sandy river banks and terraces near sea level to well-developed mountain slopes with altitudes of a few thousand feet. These types occur on the refuge in the north along the Hockley Hills and the Waring Mountains and easterly to about 159° W latitude, in the south where the Selawik Hills and Western Purcell Mountains lie within the refuge boundary, and to the east where the Purcell Mountains, the Zane Hills, and the Kiliovilik Range enter the panhandle of the refuge.
<b>Low and medium shrub</b>	These classes are also widely distributed as a group on the refuge and include the low shrub, medium shrub, and the erect dwarf shrub. The shrub vegetation of these classes is 0.5 to 3.5 meters tall and may occur as nearly pure stands to mixed conditions with the graminoid tussock/dwarf shrub classes. Major areas where the low and medium shrub classes are not present in the refuge include north of Selawik Lake, along the northern refuge boundary, and in the southeast corner of the refuge near the western end of the panhandle.

<b>Class</b>	<b>Definition</b>
<b>Forest</b>	<p>The forest classes are comprised of evergreen and deciduous species and have not been distinguished by degrees of openness or closedness, nor by the degree of mixing of tree species. With the similarity of the appearance of shorter trees and taller shrub species on the land cover maps, there is overlap in this representation of forest types with certain shrub types. The greatest density of the deciduous forest is found along the drainages and lower hill slopes of the Hockley Hills and Waring Mountains. Patchy tree cover occurs to the north and east of Selawik Lake and throughout most of the eastern half of the refuge. A band of forest vegetation runs along much of the northern border of the refuge in the Waring Mountains and the Kobuk River drainage. The occurrence of the needle leaf forest is similar to that of the deciduous forest, but slightly less abundant in the eastern half of the refuge. There is a mixed (deciduous/evergreen) component in the forest data that is part of the two classes mentioned above (i.e., forest/tall shrub groups); however, this type of forest cover cannot be easily broken out as a separate class with the current information.</p>
<b>Water and aquatic vegetation</b>	<p>The aquatic class grouping comprises those communities that are often dominated by graminoid species (grasses and sedges) and are perennially or seasonally influenced by a sheet of standing water or wet soils. This grouping is very common in the refuge, and virtually half of the land area demonstrates the wet character expected of aquatic classes.</p>

## H.4 Fishes

Table H-4 provides a list of fish species currently known to exist on Selawik refuge and/or in the Selawik area.

Table H-4. Fishes of the Selawik Refuge and surrounding area

Family	Common Name	Species	Iñupiaq Name*
<b>Catostomidae</b>			
	Longnose sucker	<i>Catostomus catostomus</i>	Kaviqsuaq, Milugiaq
<b>Clupeidae</b>			
	Pacific herring	<i>Clupea pallasii</i>	Uqsruqtuuq
<b>Cottidae</b>			
	Coastrange sculpin	<i>Cottus aleuticus</i>	Kanayuq
	Fourhorn sculpin	<i>Myoxocephalus quadricornus</i>	Kanayuq
	Slimy sculpin	<i>Cottus cognatus</i>	Kanayuq
<b>Esocidae</b>			
	Northern pike	<i>Esox lucius</i>	Siulik
<b>Gadidae</b>			
	Arctic cod	<i>Boreogadus saida</i>	Qaluaq
	Burbot	<i>Lota lota</i>	Tittaaliq
	Saffron cod	<i>Eleginus gracilis</i>	Uugaq
<b>Gasterosteidae</b>			
	Ninespine stickleback	<i>Pungitius pungitius</i>	Kakilisaq
<b>Osmeridae</b>			
	Capelin	<i>Mallotus villosus</i>	Paɲmagraq
	Pond smelt	<i>Hypomesus olidus</i>	Ihhuāñiq
	Rainbow smelt	<i>Osmerus mordax</i>	Ihhuāñiq
<b>Petromyzontidae</b>			
	Arctic lamprey	<i>Lampetra camtschatica</i>	
<b>Pleuronectidae</b>			
	Alaska plaice	<i>Pleuronectes quadrituberculatus</i>	
	Arctic flounder	<i>Pleuronectes glacialis</i>	Ipqaqnailiaq
	Starry flounder	<i>Platichthys stellatus</i>	Nataaḡnaq
<b>Salmonidae</b>			
	Arctic char	<i>Salvelinus alpinus</i>	Qalukpik, Aqalukpik
	Arctic grayling	<i>Thymallus arcticus</i>	Sulukpaugaq
	Bering cisco	<i>Coregonus laurettae</i>	Tipuk
	Broad whitefish	<i>Coregonus nasus</i>	Qausriluk, Siyyuilaq
	Chinook salmon	<i>Oncorhynchus tshawytscha</i>	Qaluaqpuk, Iqalusugruk
	Chum salmon	<i>Oncorhynchus keta</i>	Qalugruaq

Family	Common Name	Species	Iñupiaq Name*
	Coho salmon	<i>Oncorhynchus kisutch</i>	Qalugruaq
	Dolly Varden	<i>Salvelinus malma</i>	Qalukpik, Aqalukpik
	Humpback whitefish	<i>Coregonus pidschian</i>	Qaalgiq, Ikkuiyiq
	Lake trout	<i>Salvelinus namaycush</i>	Qalukpik
	Least cisco	<i>Coregonus sardinella</i>	Qalusraaq, Añuutituuq, Qalutchiaq
	Pink salmon	<i>Oncorhynchus gorbuscha</i>	Amaqtuq
	Round whitefish	<i>Prosopium cylindraceum</i>	Quptik
	Sheefish (Inconnu)	<i>Stenodus leucichthys</i>	Sii
	Sockeye salmon	<i>Oncorhynchus nerka</i>	Qalugruaq
<b>Umbridae</b>			
	Alaska blackfish	<i>Dallia pectoralis</i>	Iñiqiñiq

\*There are many local and regional variations of these terms.

## H.5 Birds

Table H-5 provides a list of bird species currently known to exist on Selawik refuge and/or in the Selawik area.

Table H-5. Birds of the Selawik refuge and surrounding area

Common Name	Scientific Name	Iñupiaq Name	Abundance-Status
<b>Loons</b>	<b><i>Gaviiformes</i></b>		
Pacific loon	<i>Gavia pacifica</i>	Malgi	C-B
Red-throated loon	<i>G. stellata</i>	Qaqsraraq	C-B
Yellow-billed loon	<i>Gavia adamsii</i>	Tuutlik	U-B
Common loon	<i>G. immer</i>	Taatchiqiq	R-S
<b>Grebes</b>	<b><i>Podicipediformes</i></b>		
Horned grebe	<i>Podiceps auritus</i>	Sugliq	R-B
Red-necked grebe	<i>P. griseqena</i>	Suglitchauraq	C-B
<b>Waterfowl</b>	<b><i>Anseriformes</i></b>		
Tundra swan	<i>Cygnus columbianus</i>	Qugruk	C-B
Trumpeter swan	<i>Cygnus buccinator</i>		R-V
Greater white-fronted goose	<i>Anser albifrons</i>	Kigiyuk	C-B
Snow goose	<i>Chen caerulescens</i>	Kaṅuq	C-M
Emperor goose	<i>Chen canagica</i>	Ligliqpak	+ -V
Brant	<i>Branta bernicla</i>	Nigliqnaq	U-M
Canada goose (taverneri)	<i>B. canadensis taverneri</i>	Iqsraqutilik	C-B
Canada goose (minima)	<i>B. canadensis minima</i>		+ -V
Green-winged teal	<i>Anas crecca</i>	Qaiñiq	C-B
Blue-winged teal	<i>A. discors</i>		+ -V

Common Name	Scientific Name	Iñupiaq Name	Abundance-Status
Mallard	<i>A. platyrhynchos</i>	Ivugasrugruk	C-B
Northern pintail	<i>A. acuta</i>	Ivugaq, Kurugak	C-B
Northern shoveler	<i>A. clypeata</i>	Aluutaq	C-B
American wigeon	<i>A. americana</i>	Ugihiq	C-B
Eurasian wigeon	<i>A. Penelope</i>		R-M
Gadwall	<i>A. strepera</i>		+V
Canvasback	<i>Aythya valisineria</i>		C-B
Greater scaup	<i>A. marila</i>	Qaqlutuuq	C-B
Lesser scaup	<i>A. affinis</i>		U-V
Steller's eider	<i>Polysticta stelleri</i>	Igñiqauqtuq	*
Spectacled eider	<i>Somateria Fischeri</i>	Qavaasuk	*
Common eider	<i>S. Mollissima</i>	Mitiq, Amauligruaq	R-B
King eider	<i>S. spectabilis</i>	Qiqalik	U-M
Harlequin duck	<i>Histrionicus histrionicus</i>	Saġvam tiñmiaq	R-S
Long-tailed duck	<i>Clangula hyemalis</i>	Aahaaliq	C-B
Black scoter	<i>Melanitta nigra</i>	Uviñauyuk	C-B
Surf scoter	<i>M. perspicillata</i>	Tuungaaġruk	U-B
White-winged scoter	<i>M. fusca</i>	Killalik	U-B
Common goldeneye	<i>Bucephala clangula</i>		R-B
Bufflehead	<i>B. albeola</i>	Nunuqsiġiilaq	R-B
Red-breasted merganser	<i>M. serrator</i>	Paisugruk	C-B
<b>Eagle, hawks, and falcons</b>	<b>Falconiformes</b>		
Osprey	<i>Pandion haliaetus</i>	Qaluksiiġayuk	U-B
Bald eagle	<i>Haliaeetus leucocephalus</i>	Tiñmiaqpak	R-B
Northern harrier	<i>Circus cyaneus</i>	Papiktuuq	C-B
Sharp-shinned hawk	<i>Accipiter striatus</i>		R-S
Northern goshawk	<i>A. gentilis</i>	Kirgavik	R-B
Rough-legged hawk	<i>B. laqopus</i>	Qilġik	R-S
Golden eagle	<i>Aquila chrysaetos</i>	Tiñmiaqpak	R-P
American kestrel	<i>Falco sparverius</i>		R-V
Merlin	<i>F. columbarius</i>	Tiñmiaġruum kirgavia	R-S
Peregrine falcon	<i>F. peregrinus</i>	Kirgavich kariat	R-V
Gyrfalcon	<i>F. rusticolus</i>	Kiliagvik	R-P
<b>Gallinaceous birds</b>	<b>Galliformes</b>		
Spruce grouse	<i>Dendragapus canadensis</i>	Napaaqtum aqargiq	R_P
Willow ptarmigan	<i>Laqopus laqopus</i>	Aqargiq	C-P
Rock ptarmigan	<i>L. mutus</i>	Niqsaaqtunġiq	U-P

**Appendix H: Species of the Selawik Refuge**

Common Name	Scientific Name	Iñupiaq Name	Abundance-Status
<b>Cranes</b>	<b><i>Gruiformes</i></b>		
Sandhill crane	<i>Grus canadensis</i>	Tatirgaq	C-B
<b>Shorebirds, Gulls</b>	<b><i>Charadriiformes</i></b>		
Black-bellied plover	<i>Pluvialis squatarola</i>	Tullikpak	U-M
American golden plover	<i>P. dominica</i>	Tullik	C-B
Pacific golden plover	<i>P. fulva</i>	Tullik	U-B
Semipalmated plover	<i>Charadrius semipalmatus</i>	Qurraquraq	R-B
Greater yellowlegs	<i>Tringa melanoleuce</i>		U-S
Lesser yellowlegs	<i>T. flavipes</i>	Tiqmiam qipmia	U-B
Solitary sandpiper	<i>T. solitaria</i>		R-B
Wandering tattler	<i>Heteroscelus incanua</i>		R-S
Spotted sandpiper	<i>Actitis macularia</i>	Iksriktaayuuq	R-B
Upland sandpiper	<i>Bartramia longicauda</i>		U-B
Whimbrel	<i>Numenius phaeopus</i>	Siituvak	A-B
Bristle-thighed curlew	<i>Numenius tahitiensis</i>		R-V
Bar-tailed godwit	<i>Limosa lapponica</i>	Turraaturaq	C-M
Hudsonian godwit	<i>L. haemastica</i>		R-S
Ruddy turnstone	<i>Arenaria interpres</i>	Tullignaq	C-M
Black turnstone	<i>A. melanocephala</i>		C-S
Surfbird	<i>Aphriza vigrata</i>		U-B
Red knot	<i>Calidris canutus</i>		C-M
Sanderling	<i>C. alba</i>	Aqpaqsruayuuq	U-M
Semipalmated sandpiper	<i>C. pusilla</i>	Livilivillakpak	C-B
Western sandpiper	<i>C. mauri</i>	Kipiluguksiuyuk	U-B
Least sandpiper	<i>C. minutilla</i>	Livilivillauraq	C-B
Baird's sandpiper	<i>C. bairdii</i>	Puvviaqtuuq	R-B
Pectoral sandpiper	<i>C. melanotos</i>	Puvviaqtuuq	C-M
Dunlin	<i>C. alpina</i>	Siyyukpaligauraq	R-B
Sharp-tailed sandpiper	<i>C. acuminata</i>		U-M
Rock sandpiper	<i>C. ptilocnemis</i>		+
Stilt sandpiper	<i>C. himantopus</i>		R-M
Buff-breasted sandpiper	<i>Tryngites subruficollis</i>	Puvviaqtuuq	M-R
Long-billed dowitcher	<i>Limnodromus scolopaceus</i>	Siyyukpalik	U-B
Ruff	<i>Rynchops niger</i>		+ -V
Wilson's snipe	<i>Gallinago delicata</i>	Kuukukiaq	C-B
Red-necked phalarope	<i>Phalaropus lobatus</i>	Qayyiiġun	C-B
Pomarine jaeger	<i>Stercorarius pomarinus</i>	Isujaagluk	U-M
Parasitic jaeger	<i>S. parasiticus</i>	Miġiaqsaayuk	U-S

Common Name	Scientific Name	Iñupiaq Name	Abundance-Status
Long-tailed jaeger	<i>S longicaudus</i>	Isuñaq	C-B
Bonaparte's gull	<i>Larus philadelphia</i>	Nasaiñaruagruk	U-B
Mew gull	<i>L. canus</i>	Nauyatchiaq	C-B
Herring gull	<i>L. argentatus</i>	Qigitigiaq	U-S
Slaty-backed gull*	<i>L. schistisagus</i>		R-V
Glaucous-winged gull*	<i>L. glaucescens</i>		R-V
Glaucous gull	<i>L. hyperboreus</i>	Nauyasugruk,	C-B
Black-legged kittiwake	<i>Rissa tridactyla</i>		R-V
Ross' gull	<i>Rhodostethia rosea</i>		R-M
Sabine's gull	<i>Xema sabini</i>	Aqargigiaq	R-M
Ross's gull	<i>Rhodostethia rosea</i>		R-M
Ivory gull	<i>Pagophila eburnea</i>		R-M
Arctic tern	<i>Sterna paradisaea</i>	Mitqutailaq	A-B
Aleutian tern*	<i>S. aleutica</i>		U-B
Common murre	<i>Uria aalge</i>	Akpaliq	+
Thick-billed murre	<i>U. lomvia</i>	Akpaluuraq	+
Black guillemot*	<i>Cephus guillemot</i>	Iñañaq	R-P
Kittlitz's murrelet*	<i>Brachyramphus brevirostris</i>		R-B
Horned puffin	<i>Fratercula corniculata</i>	Qilañak	+
Tufted puffin	<i>F. cirrhata</i>		+
<b>Owls</b>	<b>Strigiformes</b>		
Great horned owl	<i>Bubo virginianus</i>	Nukisagaq	U-P
Snowy owl	<i>Nyctea scandiaca</i>	Ukpik	U-W
Northern hawk owl	<i>Surnia ulula</i>	Niaqugruagruk	U-P
Great gray owl	<i>Strix nebulosa</i>	Naataq	R-P
Short-eared owl	<i>Asio flammeus</i>	Nipaiñuktaq	U-B
Boreal owl	<i>Aegolius funereus</i>	Takpiilaagruk	R-P
<b>Kingfishers</b>	<b>Coraciiformes</b>		
Belted kingfisher	<i>Ceryle alcyon</i>	Nukuutchiq	U-B
<b>Woodpeckers</b>	<b>Piciformes</b>		
Downy woodpecker	<i>Picoides pubescens</i>	Tuuyuq	R-V
Three-toed woodpecker	<i>P. tridactylus</i>	Tuuyuq	U-P
Hairy woodpecker	<i>P. villosus</i>	Tuuyuqpak	
Northern flicker	<i>Colaptes auratus</i>	Tuuyusrugruk	R-P
<b>Passerines</b>	<b>Passeriformes</b>		
Olive-sided flycatcher	<i>Contopus borealis</i>		R-B
Alder flycatcher	<i>Empidonax alnorum</i>		A-P
Horned lark	<i>Eremophila alpestris</i>	Nagrulik	U-S

**Appendix H: Species of the Selawik Refuge**

Common Name	Scientific Name	Iñupiaq Name	Abundance-Status
Tree swallow	<i>Tachycineta bicolor</i>	Tulugañnauraq	C-B
Bank swallow	<i>Riparia riparia</i>	Tulugañnaq	C-B
Barn swallow	<i>Hirundo rustica</i>	Tulugañnasrugruk	C-V
Cliff swallow	<i>H. pyrrhonota</i>	Tulugañnaq	R-V
Gray jay	<i>Perisoreus canadensis</i>	Kiiriq	C-B
Common raven	<i>Corvus corax</i>	Tulugaq	C-B
Black-capped chickadee	<i>Parus atricapillus</i>	Misikaagaq	C-B
Boreal chickadee	<i>P hudsonicus</i>	Iknisailaq	C-S
Gray-headed chickadee	<i>Poecile cincta</i>		U-M
American dipper	<i>Cinclus mexicanus</i>	Aanaruiñ kiviruq	R-B
Arctic warbler	<i>Phylloscopus borealis</i>		R-B
Ruby-crowned kinglet	<i>Regulus calendula</i>		R-S
Bluethroat	<i>Luscinia svecica</i>		R-V
Northern wheatear	<i>Oenanthe oenanthe</i>	Tiñmiaqpauraq	U-B
Gray-cheeked thrush	<i>Catharus minimus</i>	Piiġaq	A-B
Swainson's thrush	<i>C ustulatus</i>		U-S
American robin	<i>Turdus migratorius</i>	Kanayuuraq	A-B
Varied thrush	<i>Ixoreus naevius</i>	Sijutluluuq	C-B
Northern waterthrush	<i>Seiurus noveboracensis</i>		C-B
Yellow wagtail	<i>Motacilla flava</i>	Iksriktaayuuq	C-B
White wagtail	<i>Motacilla alba</i>		R-V
American pipit	<i>Anthus rubescens</i>	Qapałuk	U-S
Bohemian waxwing	<i>Bombycilla garrulus</i>	Suluktaatchialik	U-B
Northern shrike	<i>Lanius excubitor</i>	Iraiyyuuq	U-S
Orange-crowned warbler	<i>Vermivora celata</i>		U-S
Yellow warbler	<i>Dendroica petechia</i>	Suñaqpaluktunijq	C-B
Yellow-rumped warbler	<i>D. coronata</i>	Silaluksiigauraq	U-V
Blackpoll warbler	<i>D. striata</i>		C-B
Wilson's warbler	<i>Wilsonia Pusilla</i>		U-B
American tree sparrow	<i>Spizella arborea</i>	Pisiqpisiqpiisrhaq	C-B
Savannah sparrow	<i>Passerculus Sandwichensis</i>	Aanaruiñ suliuqpa	U-B
Fox sparrow	<i>Passerella iliaca</i>	Ikligvik	C-B
Lincoln's sparrow	<i>Melospiza lincolni</i>		U-S
Golden-crowned sparrow	<i>Zonotrichia atricapilla</i>	Qianaratuuq	U-M
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	Nuñaktuaġruk	C-B
Dark-eyed junco	<i>Junco hyemalis</i>	Taatchiñiraq	U-S
Lapland longspur	<i>Calcarius lapponicus</i>	Putukiiłuk	U-B
Smith's longspur	<i>C. pictus</i>	Putukiiłukpak	U-B

Common Name	Scientific Name	Iñupiaq Name	Abundance-Status
Snow bunting	<i>Plectrophenax nivalis</i>	Amautlikkauraq	C-M
McKay's bunting			U-W
Rusty blackbird	<i>Euphagus carolinus</i>	Tulukkatun ittuq	C-B
Pine grosbeak	<i>Pinicola enucleator</i>	Qayuutaaq	U-P
White-winged crossbill	<i>Loxia leucoptera</i>	Siyyuum kipinjaruq	U-P
Common redpoll	<i>Carduelis flammea</i>	Saksakiq	U-B
Hoary redpoll	<i>C. hornemanni</i>	Saksakiq	C-B
Say's phoebe	<i>Sayornis saya</i>		+
Purple martin <sup>*</sup>	<i>Progne subis</i>		+
<p><b>Abundance Codes:</b>  A = Abundant; species is abundant in all proper habitat with all available habitat heavily utilized. C = Common; species occurs regularly in most proper habitat with some available habitat sparsely utilized. B = Breeding in summer.  U = Uncommon; species occurs in relatively small numbers or is unevenly distributed in higher numbers; sighting likelihood poor. R = Rare. P = Resident all year round, breeding.  + = Casual or accidental; species is beyond normal range. * = Observed in local area, but not on Selawik refuge.</p>			
<p><b>Status Codes:</b>  B = Breeding in summer. P = Resident all year round, breeding. W = Winter resident, non-breeding. S = Summer resident species occurs in the region during summer but may breed elsewhere. M = Migrant, V = Vagrant; species occurs casually or accidentally.</p>			
<p><sup>1</sup> Never sighted but thought to occur in or near the refuge.</p>			

## H.6 Birds Species of Special Concern

Table H-6 provides a list of bird species of special concern that have been documented, or are very likely to occur, at Selawik refuge.

Table H-6. Bird species of potential concern at Selawik refuge and surrounding area

Species <sup>a</sup>	Reviewing Organization									
	BPIF <sup>1</sup>	USFWS <sup>2</sup>	ADFG <sup>3</sup>	Natl. Audubon <sup>4</sup>	AK Audubon <sup>5</sup>	ABC <sup>6</sup>	BPIF <sup>7</sup>	ARWG <sup>8</sup>	ASG <sup>9</sup>	NAWCP <sup>10</sup>
Long-tailed duck				X	X					
Red-throated loon					X					
Yellow-billed loon		X		X	X					
Horned grebe						X				
Northern goshawk								X		
Gyrfalcon	X				X			X		
Peregrine falcon		X	X		X					
American golden plover		X		X	X	X			X	
Lesser yellowlegs						X				
Solitary sandpiper		X			X	X	X		X	
Semipalmated sandpiper				X	X	X				
Western sandpiper				X	X				X	
Wandering tattler					X				X	
Whimbrel		X		X	X	X			X	
Bar-tailed godwit		X		X	X				X	
Hudsonian godwit		X		X	X	X			X	
Dunlin		X							X	
Wilson's snipe						X				
Arctic tern										X
Northern hawk owl								X		
Great gray owl	X							X		
Short-eared owl				X	X			X		
Boreal owl	X									
Olive-sided flycatcher	X		X	X	X	X	X			

Species <sup>a</sup>	Reviewing Organization									
	BPIF <sup>1</sup>	USFWS <sup>2</sup>	ADFG <sup>3</sup>	Natl. Audubon <sup>4</sup>	AK Audubon <sup>5</sup>	ABC <sup>6</sup>	BPIF <sup>7</sup>	ARWG <sup>8</sup>	ASG <sup>9</sup>	NAWCP <sup>10</sup>
Northern shrike	X									
Hoary redpoll										
Arctic warbler		X								
Gray-cheeked thrush			X							
Varied thrush	X									
Bohemian waxwing	X									
Blackpoll warbler	X		X		X		X			
Golden-crowned sparrow	X									
Rusty blackbird	X			X	X	X	X			
White-winged crossbill	X									

<sup>a</sup> These species have been documented, or are very likely to occur, at Selawik refuge. Most have been listed on watch lists by regional, national, and international organizations.

<sup>1</sup> Priority species for conservation for western and northern Alaska biographic regions as designated by Boreal Partners in Flight (1999).

<sup>2</sup> Birds of conservation concern for Bird Conservation Regions 2 and 4 as designated by the U.S. Fish and Wildlife Service (2002).

<sup>3</sup> State of Alaska species of special concern as designated by Alaska Department of Fish and Game (1998).

<sup>4</sup> Species on 2002 WatchList as designated by National Audubon Society (2002).

<sup>5</sup> Species on Alaska WatchList as designated by Audubon Alaska (Stenhouse and Senner 2005).

<sup>6</sup> Highest priority birds for conservation from Green List as designated by American Bird Conservancy (2007).

<sup>7</sup> Species of concern as profiled by Boreal Partners in Flight at the Tenth Alaska Bird Conference and Workshops (2004).

<sup>8</sup> Highest priority BPIF species as designated by Alaska Raptors Working Group of BPIF (2001).

<sup>9</sup> Priority species as designated by Alaska Shorebird Group (2008).

<sup>10</sup> Species of high concern as designated in North American Waterbird Conservation Plan (Kushlan et al. 2002).

## H.7 Terrestrial Mammals

Table H-7 provides a list of land mammals currently known to exist on Selawik refuge lands.

Table H-7. Land mammals of the Selawik National Wildlife Refuge

Common Name	Scientific Name	Iñupiaq Name
<b>Insectivores</b>		
Masked shrew	<i>Sorex cinereus</i>	Ugruṅnaq
Dusky shrew	<i>Sorex monticolus</i>	Ugruṅnaq
Arctic shrew	<i>Sorex arcticus</i>	Ugruṅnaq
Tundra shrew	<i>Sorex tundrensis</i>	Ugruṅnaq
<b>Lagomorphs</b>		
Tundra (Arctic) hare	<i>Lepus othus</i>	Ukallisugruk
Snowshoe hare	<i>Lepus americanus</i>	Ukalliq, ukalliatchiaq
<b>Rodents</b>		
Arctic ground squirrel	<i>Spermophilus parryi</i>	Siksrik
Red squirrel	<i>Tamiasciurus hudsonicus</i>	Saqalataayiq
Muskrat	<i>Ondatra zibethicus</i>	Kigvaluk
Beaver	<i>Castor canadensis</i>	Paḷuqtaq
Porcupine	<i>Erethizon dorsatum</i>	Iluqutaq
Collared lemming	<i>Dicrostonyx groenlandicus</i>	Qilaṅmiutauraq
Brown lemming	<i>Lemmus trimucronatus</i>	Aviṅaq
Redback vole	<i>Clethrionomys rutilus</i>	Aviññaq
Meadow vole	<i>Microtus pennsylvanicus</i>	Aviññaq
Tundra vole	<i>Microtus oeconomus</i>	Aviññaq
Singing vole	<i>Microtus miurus</i>	Aviññaq
<b>Ursids</b>		
Black bear	<i>Ursus americanus</i>	Iyyaḡriq
Brown bear	<i>Ursus arctos</i>	Akḷaq
<b>Mustelids</b>		
Marten	<i>Martes Americana</i>	Qapvaitchiaq
Short-tail weasel	<i>Mustela erminea</i>	Tiḡiaq
Least weasel	<i>Mustela nivalis</i>	Tiḡiaq
Mink	<i>Mustela vison</i>	Tiḡiaqpak
Wolverine	<i>Gulo gulo</i>	Qapvik
River otter	<i>Lutra canadensis</i>	Pamiuqtuuq
<b>Canids</b>		
Wolf	<i>Canis lupus</i>	Amagūq
Arctic fox	<i>Alopex lagopus</i>	Qusraaq

Common Name	Scientific Name	Iñupiaq Name
Red fox	<i>Vulpes vulpes</i>	Kayuqtuq
<b>Felids</b>		
Lynx	<i>Lynx canadensis</i>	Nuutuuyiq
<b>Cervids</b>		
Moose	<i>Alces alces</i>	Tinniikaq
Caribou	<i>Rangifer tarandus</i>	Tuttu
Muskox	<i>Ovibos moschatus</i>	Umiḡmak

## H.8 Marine Mammals

Table H-8 provides a list of marine mammal species currently known to exist on Selawik refuge and in the Selawik coastal area, including Kotzebue Sound and parts of the Chukchi Sea.

Table H-8. Marine mammals of the Selawik refuge area, including Kotzebue Sound and the Chukchi Sea

Common Name	Scientific Name	Iñupiaq Name
Beluga	<i>Delphinapterus leucas</i>	Sisuaq
Harbour porpoise	<i>Phocoena phocoena</i>	Aaglutchiaq
Bearded seal	<i>Erignathus barbatus</i>	Ugruk
Spotted seal	<i>Phoca largha</i>	Qasigiaq
Ringed seal	<i>Phoca hispida</i>	Natchiq
Walrus	<i>Odobenus rosmarus</i>	Aiviq
Polar bear	<i>Ursus maritimus</i>	Nanuq

## H.9 References

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**Appendix I**  
**Abbreviations, Acronyms and Glossary**



## **I. Abbreviations, Acronyms and Glossary**

### **I.1 Abbreviations and Acronyms**

AAC	Alaska Administrative Code
ABR	Alaska Biological Research, Incorporated
ACMP	Alaska Coastal Management Program
ADF&G	Alaska Department of Fish and Game
ADL&WD	Alaska Department of Labor and Workforce Development
AFS	Alaska Fire Service (Bureau of Land Management)
AIWFMP	Alaska Interagency Wildland Fire Management Plan
AKEPIC	Alaska Exotic Plant Information Clearinghouse
AM	Administrative Manual
AMBCC	Alaska Migratory Bird Co-management Council
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act
ANSEP	Alaska Native Science and Engineering Program
APHA	Alaska Professional Hunters Association
ARCN	Arctic Network Inventory and Monitoring Program (National Park Service)
ARLIS	Alaska Resources Library and Information Services
ATV	all-terrain vehicle
Avg.	average
AWFCG	Alaska Wildland Fire Coordinating Group
BCR	Bird Conservation Region
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CE	Categorical Exclusion
CEQ	Council on Environmental Quality

## Appendix I: Abbreviations, Acronyms and Glossary

CFR	Code of Federal Regulations
CI	confidence interval
cm	centimeters
dbh	diameter at breast height
DEC	Alaska Department of Environmental Conservation
DM	Department Manual (of the Interior)
DNR	Alaska Department of Natural Resources
DOI	Department of the Interior
DOT	Alaska Department of Transportation
EA	Environmental Assessment
Eds.	Editors
EC	electrical conductivity
e.g.	exemplia gratia—for example
EIN	Easement Identification Number
EIS	Environmental Impact Statement
et al.	et alia—and others
et seq	et sequens—and the following one
FMP	Fire Management Plan
FONSI	Finding of No Significant Impact
FR	Federal Register
FW	Fish and Wildlife Service Manual
FY	fiscal year
°F	temperature in degrees Fahrenheit
GIS	geographic information system
GLORIA	Global Observation Research Initiative in Alpine Environments

GMU	game management unit
GPS	geographic positioning system
IACUC	Institutional Animal Care and Use Committee
i.e.	id est—that is
I & M plan	Inventorying and Monitoring Plan
IPCC	Intergovernmental Panel on Climate Change
in.	inches
Inc.	Incorporated
km <sup>2</sup>	squared kilometers
KRM	Kateel River Meridian
LCC	Landscape Conservation Cooperative
LPP	Land Protection Plan
m	meters
m <sup>3</sup>	cubic meters
mm	millimeters
Max.	maximum
Min.	minimum
MRA	minimum requirement analysis
NABCI	North American Bird Conservation Initiative
NANA	NANA Regional Corporation (The Northwest Alaska Native Association no longer exists by this name, but the acronym is still used by the regional corporation; see Chapter 4, Section 4.1.1.2.)
NEPA	National Environmental Policy Act
No.	number
NPS	National Park Service

## Appendix I: Abbreviations, Acronyms and Glossary

NWAB	Northwest Arctic Borough
NWPS	National Wilderness Preservation System
NWR	National Wildlife Refuge
P.L.	public law
Plan/comprehensive plan	Revised Comprehensive Conservation Plan (for Selawik refuge)
PLO	public land order
pp.	pages, number of pages
QCD	quitclaim deed (land status records)
RAC	Regional Advisory Councils
RAWS	Remote Automated Weather Station
RIT	refuge information technician
RM	Refuge Manual
RS 2477	Revised Statute 2477
refuge	Selawik National Wildlife Refuge
Refuge System	National Wildlife Refuge System
SAR	Search and Rescue
SHC	Strategic Habitat Conservation (United States Fish and Wildlife Service)
SNAP	Scenarios Network for Alaska Planning (The Wilderness Society)
Selawik refuge	Selawik National Wildlife Refuge
Service	United States Fish and Wildlife Service
Stat.	statute
TUS	transportation or utility system(s)

U.S.	United States
U.S.C.	United States Congress
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WACH	Western Arctic Caribou Herd
WACHWG	Western Arctic Caribou Herd Working Group
WSP	Wilderness Stewardship Plan
Working Group	GMU 23 Working Group / WACH Working Group

## I.2 Glossary

accelerating climate change	Condition, state, or phenomenon in which the Earth’s climate system is changing at an accelerating rate, primarily as a result of human-generated greenhouse gas concentrations in the atmosphere caused by increasing human development and population growth. While climate change has occurred throughout the history of this planet, current changes are occurring at a substantially accelerated rate, largely as a result of human activities (USFWS 2010).
adaptive management	Adaptive management incorporates new information learned from research and monitoring into future management actions (Service Manual 602 FW 1); it is the integration of project design, management, and monitoring to systematically test assumptions in order to adapt and learn (Salafsky et al. 2001). Objectives and strategies used to reach goals can be adjusted as we learn more about refuge management as a result of implementing this Plan and monitoring progress.
adequate snow cover	Snow cover of a sufficient depth to protect underlying vegetation and soil (50 CFR 36.2); this is generally about six inches within the Selawik refuge.
Air- and water-taxi operator/transportation service provider (transporter)	A person who transports people, equipment, supplies, harvested fish and wildlife products, or other personal property by means of aircraft, boat, or other means for

	<p>compensation or with the intent or agreement to receive compensation; a transporter who provides commercial transportation services by means of aircraft, boat, or other means must have a special use permit to operate on a national wildlife refuge.</p>
allowed	<p>Activity, use, or facility is allowed under existing NEPA analysis, a specific compatibility determination, and compliance with all applicable laws and regulations of the Service, other Federal agencies, and the State of Alaska.</p>
not allowed	<p>Activity, use, or facility is not allowed.</p>
all-terrain vehicle	<p>All-terrain vehicles fall under the definition of off-road vehicle found in the Code of Federal Regulations: Off-road vehicle means any motor vehicle designed for or capable of cross country travel on or immediately over land, water, sand, snow, ice, marsh, wetland, or other natural terrain, except snowmobiles or snowmachines; off-road vehicles includes, but is not limited to, four-wheel drive or low-pressure-tire vehicles, motorcycles and related two-, three-, or four-wheeled vehicles or cycles, amphibious machines, ground-effect or air-cushion vehicles, air-thrust boats, recreation vehicle campers, and any other means of transportation deriving motive power from any source other than muscle or wind (see 50 CFR 36.2).</p>
alternatives	<p>Different ways to resolve issues, achieve refuge purposes, meet refuge goals, and contribute to the Refuge System mission. Alternatives provide different options to respond to major issues identified during the planning process.</p>
No-Action Alternative	<p>In the context of a comprehensive conservation plan, it is the current management direction. With this alternative, no change from the current comprehensive conservation plan would be implemented, except for legal or policy updates (including new goals and objectives where appropriate) and agreements with the State of Alaska that occurred after the current plan was published.</p>
Preferred Alternative	<p>A proposed action in the NEPA document for the comprehensive conservation plan identifying the alternative that the Service believes best achieves planning unit purposes, vision, and goals; helps fulfill the Refuge System mission; maintains and, where appropriate, restores the ecological integrity of each</p>

	refuge and the Refuge System; addresses the significant issues and mandates; and is consistent with principles of sound fish and wildlife management.
archaeological resource	Any material remains of past human life or activities that are of interest to the scientific study of historic or prehistoric peoples and their cultures. These include materials capable of providing an understanding of past human behavior, cultural adaptation, and related topics through the application of scholarly or scientific techniques.
authorized	Activity, use, or facility allowed upon issuance of a special use permit or other authorization.
big game hunting guide	A person who is licensed by the State of Alaska to provide services, equipment, or facilities to a big game hunter in the field. A big game guide accompanies or is present with, personally or through an assistant, the hunter in the field and must have a special use permit to operate on a national wildlife refuge.
big game outfitter	A person who provides, for compensation or with the intent to receive compensation, services, supplies, or facilities to a big game hunter in the field. An outfitter, or an assistant outfitter, does not accompany, and is not present with, the hunter in the field and must have a special use permit to operate on a national wildlife refuge.
biological diversity	The variety of life, including the variety of living organisms, the genetic differences among them, and the communities in which they occur (USFWS, 602 FW 1.6).
biological integrity	Biotic composition, structure, and functioning at the genetic, organism, and community levels consistent with natural conditions, including the natural biological processes that shape genomes, organisms, and communities (USFWS, 602 FW 1.6).
categorical exclusion	A category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a Federal agency pursuant to the National Environmental Policy Act (40 CFR 1508.4).
commercial recreational uses	Recreational uses of lands, waters, and resources for business or financial gain; includes guided recreational

	fishing, guided recreational hunting, other guided recreation, and air-taxi services.
commercial visitor service	Any service or activity made available for a fee, commission, brokerage, or other compensation to persons who visit a refuge, including such services as providing food, accommodations, transportation, tours, and guides.
compatible use	A proposed or existing wildlife-dependent recreational use or any other use of a refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge (USFWS, 603 FW 2 2.6).
Compatibility Determination	A written determination signed and dated by the refuge manager and the Service regional chief signifying that a proposed or existing use of a national wildlife refuge is a compatible use or is not a compatible use. The director of the Service makes this delegation through the regional director (USFWS, 603 FW 2 2.6).
consumptive use	Use of a refuge resource that removes the resource from the refuge (e.g., killing an animal to eat, catching and keeping fish, harvesting berries or plants, cutting firewood, or removal of mineral or other specimens).
cultural resource	Fragile nonrenewable properties, including any district, site, building, structure, or object significant in American history, architecture, archaeology, engineering, or culture. These resources are significant for information they contain or the associations they have with past people, events, or life ways (USFWS 1992).
ecological integrity	The integration of biological integrity, natural biological diversity, and environmental health; the replication of natural conditions (USFWS, 602 FW 1.6).
ecoregion	Delimits large areas within which local ecosystems recur more or less throughout the region in a predictable pattern.
ecosystem	A biological community, including human communities and social and economic activities, that functions together with its abiotic environment as a unit.
environmental assessment	A concise public document that provides a sufficient analysis for determining whether to prepare an

	environmental impact statement (EIS) or a finding of no significant impact. It also aids an agency's compliance with NEPA when no EIS is necessary (40 CFR 1508.9).
environmental health	It is the abiotic (the nonliving factors of the environment, including light, temperature, and atmosphere) composition, structure, and functioning of the environment consistent with natural conditions, including the natural abiotic processes that shape the environment (USFWS, 602 FW 1.6).
environmental impact statement	A detailed written statement, required by section 102(2)(C) of the NEPA, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.11).
geodatabase	A database designed to store, query, and manipulate geographic information and spatial data (i.e., a geospatial database).
goal	A descriptive, open-ended, and often broad statement of desired future conditions that conveys purposes but does not define measurable units (USFWS, 620 FW 1.6).
guide	Any person who has a special use permit to provide a commercial visitor service for hire on a refuge. This term does not generally apply to air-taxi operators who only provide transportation services.
habitat	The physical and biological resources required by an organism for its survival and reproduction; these requirements are species-specific. Food and cover are major components of habitat and must extend beyond the requirements of the individual to include a sufficient area capable of supporting a viable population.
ice wedge polygon	Formed by ice segregation and the drying and shrinking of sediments.
incidental uses	Recreational or public uses of refuge lands, waters and/or resources that are secondary to, or of less importance than, the primary recreational use in which a visitor participates. An incidental use may or may not support a primary use.

interpolate	In mathematics, to determine a value of a function between known values by a procedure or algorithm different than that specified by the function itself; interpolation is the noun.
issue	Any unsettled matter that requires a management decision (e.g., a Service initiative, opportunity, challenge, resource management problem, threat to the resources of the refuge, conflict in uses, public concern, or the presence of an undesirable resource condition) (USFWS, 602 FW 1.6). The process used to develop this Plan was guided by the specific planning issues identified and described herein.
Leave No Trace	Principles of outdoor recreation designed to minimize effects on the natural environment and other visitors. These principles are: (1) plan ahead and prepare, (2) travel and camp on durable surfaces, (3) dispose of waste properly, (4) leave what you find, (5) minimize campfire impacts, (6) respect wildlife, and (7) be considerate of other visitors ( <a href="http://www.lnt.org">http://www.lnt.org</a> , accessed May 24, 2010).
minimum requirement analysis	A decision making process, documented in writing, used by the Service to determine if proposed refuge management activities conducted in designated wilderness areas are necessary to administer the area as wilderness and to accomplish the purposes of the refuge, including Wilderness Act purposes. If the activities are necessary, the analysis describes how to minimize resultant impacts.
national wildlife refuge	A designated area of land or water, or an interest in land or water within the Refuge System; does not include coordination areas. Find a complete listing of all units of the Refuge System in the current <i>Annual Report of Lands under Control of the U.S. Fish and Wildlife Service</i> (USFWS 2008).
native species	A species, subspecies, or distinct population that occurs within its natural range or natural zone of potential dispersal (i.e., the geographic area the species occupies naturally or would occupy in the absence of direct or indirect human activity or an environmental catastrophe). This definition recognizes that ecosystems and natural ranges are not static; they can and do evolve over time.

	Thus a species may naturally extend its range onto (or within) a refuge and still be considered native.
navigable waters	Under Federal law, for the purpose of determining ownership of submerged lands beneath inland water bodies not reserved at the date of statehood, navigable waters are waters used or susceptible to being used in their ordinary condition as highways of commerce over which trade and travel are, or may be, conducted in the customary modes of trade and travel on water. In situations where navigability and the ownership of submerged lands are disputed, the final authority for determining navigability rests with the Federal courts.
National Environmental Policy Act	This act, promulgated in 1969, requires all Federal agencies to disclose the environmental effects of their actions, incorporate environmental information, and use public participation and involvement in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements and must prepare appropriate NEPA documents to facilitate better environmental decisions (40 CFR 1500). The law also established the Council on Environmental Quality to implement the law and to monitor compliance with the law.
non-consumptive uses	Recreational activities (e.g., hiking, photography, and wildlife observation) that do not involve the taking or catching of fish or wildlife, or removal of other natural resources.
noncommercial recreational uses	Recreational uses of lands, waters, and resources not for business or financial gain, including recreational fishing and hunting, boating and floating, camping, hiking, photography, and sightseeing.
Non-native species	A species, subspecies, or distinct population that has been introduced by humans (intentionally or unintentionally) outside its natural range or natural zone of potential dispersal.
objective	A concise statement of what we want to achieve, how much we want to achieve it, when and where we want to achieve it, and who is responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring refuge accomplishments, and evaluating the success of strategies (USFWS, 602 FW 1.6).

ordinary high-water mark	The line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding area (33 CFR 328.3[e]).
pingo	A low hill or mound forced up by hydrostatic pressure in an area underlain by permafrost.
permafrost	A feature or condition where a layer of soil, sediment, or rock below the ground surface remains frozen for a period greater than a year.
periglacial	Landforms created by processes associated with intense freeze-thaw action in high latitude areas or in alpine or continental glacier.
proposed action	The alternative that best achieves refuge purposes, vision and goals; helps fulfill the mission of the Refuge System; maintains, and where appropriate, restores the ecological integrity of the refuge and the Refuge System; addresses the significant issues and mandates, and is consistent with principles of sound fish and wildlife management. The proposed action is, for all practical purposes, the Draft Comprehensive Conservation plan for the refuge (USFWS, S 602 FW 3.4C).
prospectus	The document that the Service uses in soliciting competition to award permits for commercial visitor services on a refuge.
public	Individuals, organizations, community members, and groups; officials of Federal, state, and local government agencies; Alaska Native governments; Indian tribes; Native organizations; and foreign nations (i.e., stakeholders). The public may include anyone outside the core planning team. It could include those who may or may not have indicated an interest in the planning issues, and those who do or do not realize that Service decisions may affect them.
public involvement	A process using various methods that offers affected and interested individuals and organizations (i.e., stakeholders) opportunities to participate in, become

	<p>informed about, and express their opinions on Service decisions, actions, and policies. In the process, these public views are studied thoroughly and are thoughtfully considered in shaping decisions for refuge management.</p>
<p>purposes of the refuge</p>	<p>The purposes specified in or derived from the law (e.g., ANILCA), proclamation, Executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit (USFWS, 602 FW 1.6).</p>
<p>Record of Decision (ROD)</p>	<p>A concise public record of a decision prepared by the Federal agency, pursuant to NEPA (EIS), that contains a statement of the decision, identification of all alternatives considered, identification of the environmentally preferable alternative, a statement whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement where applicable for any mitigation (40 CFR 1505.2).</p>
<p>recreation guide</p>	<p>A commercial operator who accompanies clients on the refuge for photography, sightseeing, or other activities not related to hunting or fishing, for either day or overnight trips.</p>
<p>recreational fishing</p>	<p>Taking or attempting to take for personal use, not for sale or barter, any fish by hook and line held in the hand or attached to a pole or rod that is held in the hand or is closely attended, as defined by the regulatory agency (i.e., ADF&amp;G).</p>
<p>recreational hunting</p>	<p>Taking or attempting to take for personal use, not for sale or barter, a game animal (as defined by the regulatory agency) by any means allowed by the regulatory agency (i.e., ADF&amp;G).</p>
<p>recreational fishing or hunting guide</p>	<p>A commercial operator who accompanies recreational fishing or hunting clients on a refuge for day or overnight trips and must have a special use permit to operate on a refuge.</p>
<p>retrogressive thaw slump</p>	<p>A progressive slope failure resulting from thawing of ice-rich permafrost.</p>

scoping	An early and open process with the public and the core planning team for determining the range of issues and the significant issues related to a proposed action (40 CFR 1501.7).
seral stage	A phase in the sequential development of a climax community; used in the context of ecological or forest succession.
solifluction	A type of earth flow found in periglacial environments underlain by permafrost. During the summer, the surface layer of permafrost melts creating a water saturated layer that becomes mobile. The underlying frozen ground acts as a sliding plane along which the mass of soil can slowly move down slope.
special use permit	A U.S. Fish and Wildlife Service authorization required for all commercial uses of refuge lands and waters (and some noncommercial uses). A special use permit may contain specific stipulations or conditions for use with which the permit holder must comply.
spike camp	A temporary camp of a primitive nature set up by a guide or outfitter to provide overnight accommodations away from base camp.
step-down management plan	A plan that provides specific guidance on management subjects (e.g., habitat, land protection, public use, fire, safety) or groups of related subjects. It describes strategies and implementation schedules for meeting comprehensive conservation plan goals and objectives.
subsistence uses and activities	The customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non-edible byproducts of fish and wildlife resources taken for personal or family consumption; for barter or sharing for personal or family consumption; and for customary trade (from Section 803 of the ANILCA).
terrane	The area or surface over which a particular rock or group of rocks is prevalent.
tundra	High latitude biome dominated by a few species of dwarf shrubs, a few grasses, sedges, lichens, and

	<p>mosses. Productivity is low in this biome because of extremes of climate.</p>
thermokarst	<p>Landscape dominated by depressions, pits, and caves that is created by the thawing of ground ice in high latitude locations. Resembles karst landscape but is not created by chemical weathering. It is caused by the selective thaw of ground ice associated with thermal erosion by stream and lake water and may reflect climatic changes or human activity.</p>
visitor (unguided)	<p>A person who arranges, organizes, and conducts his or her own trip to a refuge without the assistance of a guide.</p>
visitor use day	<p>A period of one calendar day (24 hours), or portion thereof, for each person using a resource. When employed as a measure of human use, it is called a visitor use day or client use day.</p>
vision statement	<p>A concise statement of the desired future condition of the planning unit, based primarily on the Refuge System mission, specific refuge purposes, and other relevant mandates (USFWS, 602 FW 1.6).</p>
wilderness	<p>An area essentially undisturbed by human activity, together with its functioning ecosystem. The history and intent of the Wilderness Act encourages managers to manage designated wilderness as an area “retaining its primeval character and influence.” Designated wilderness provides visitors with opportunities for “solitude or a primitive and unconfined type of recreation.” Recreation in designated wilderness areas has been characterized by many types of experiences such as discovery, self-reliance, remoteness, closeness to nature, challenge, self-reflection, and freedom from societal and managerial constraints.</p>
wildlife-dependent recreation	<p>A use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation. These are the six priority public uses of the Refuge System, as established in the Refuge System Administration Act, as amended. Wildlife-dependent recreational uses, other than the six priority public uses, are those that depend on the presence of wildlife.</p>

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**Appendix J**  
**Definitions for Land Cover Classes**  
**(ABR, Inc. 2009)**



## J. Land Cover Classes of the Selawik Refuge Area

Appendix J provides detailed information on classification and descriptions of ecotypes and plant associations for land cover/vegetation classes at Selawik refuge and the surrounding area (Jorgenson et al. 2009, Alaska Biological Research, Inc.).

### J.1 Classification Definitions

#### ALPINE ACIDIC BARRENS

Geomorphology:

This ecotype occurs in the Waring Mountains, Kiliovilik Range, Western Hockley Hills, Selawik Hills, and Purcell Mountains on the edges of Selawik refuge. Geomorphology includes non-carbonate bedrock, hillside colluvium, and talus. It is typically found on upper slopes and crests at greater than 200 meters (m) elevation. Slope varies from gradual to steep, and this ecotype occurs at all aspects.

Plant Association:

Lichen–*Hierochloe alpina*

Alpine Acidic Barrens has sparse plant cover (less than 30 percent), which contributes to a low total number of species per plot. Forbs, grasses, mosses, and lichens are typically present. Trees and shrubs taller than 20 centimeters (cm) are absent. Common species include *Antennaria friesiana*, *Potentilla uniflora*, *Hierochloe alpina*, *Racomitrium lanuginosum*, and *Flavocetraria nivalis*.

Alpine Acidic Barrens is most similar to Alpine Alkaline Barrens, but it has different parent material with lower pH and lower total species diversity and higher lichen diversity. It is also similar to Alpine Acidic Dryas Dwarf Shrub and Alpine Acidic Ericaceous Dwarf Shrub but with lower species cover.

Soils:

Soils are blocky or rubbly, and surface organic horizons are very thin or completely lacking. Permafrost is presumed to be present below one meter due to the cold annual temperatures at elevation. Surface fragments are common and abundant. Loess caps are absent. Soil pH is acidic to circumneutral. The soils are typically excessively to somewhat excessively drained. Depth to water table is assumed to be substantial, given the well drained soils.

The following description is based on data collected in the Arctic Network of Alaska National Parks (ARCN) and used for the regional classification. The dominant soils in this ecotype are Typic Gelorthents (poorly developed with permafrost below one meter) and Typic Dystrogelepts (acidic, well drained, moderately thin organic horizon, permafrost below one meter).

### ALPINE ACIDIC DRYAS DWARF SHRUB

#### Geomorphology:

This ecotype occurs in similar geographic locations as Alpine Acidic Barrens, on weathered bedrock and hillside colluvium. It mainly occurs on ridge crests and slopes, generally between 300 and 700 m elevation. Slopes are typically gentle, and this ecotype occurs on all aspects.

#### Plant Association:

*Dryas octopetala*–*Hierochloe alpina*

Alpine Acidic Dryas Dwarf has high species diversity. Trees and tall shrubs are absent. Dwarf shrubs and lichens are the most common life forms. Most species except *Dryas octopetala* have less than three percent average cover. Common species include *Dryas octopetala*, *Antennaria friesiana*, *Smelowskia calycina* var. *porsildii*, *Hierochloe alpina*, *Rhytidium rugosum*, and *Flavocetraria nivalis*.

This ecotype is similar to Alpine Acidic Barrens, except for higher species cover, and Alpine Ericaceous–Dryas Dwarf Shrub, but differs in the reduced presence of Ericaceous dwarf shrubs. It has different species assemblages relative to the alpine alkaline ecotypes.

#### Soils:

Soils are blocky or rubbly and are overlain by thin organic horizons. Thaw depths often could not be determined in the rocky soils, but permafrost is presumed to be present below one meter due to the cold temperatures at high elevations. Frost boils are uncommon, and surface fragments are common and abundant. Loess caps are absent. Soil pH is acidic to circumneutral and electrical conductivity (EC) is generally low. The soils are typically somewhat excessively to excessively drained. Depth to water table often could not be measured, but it is assumed to be greater than 1.5 m depth, given the well drained soils.

The following description is based on data collected in ARCN and used for the regional classification. The soils in this ecotype include Typic Haplorthels (mineral soil over permafrost lacking cryoturbation), Typic Dystrogelepts (acidic, well drained, moderately thin organic horizon, permafrost below one meter), Lithic Cryorthents (poorly developed, less than 50 cm to bedrock, permafrost absent), and Typic Haploturbels (mineral soil over permafrost with cryoturbation).

### ALPINE ALKALINE BARRENS

#### General:

We did not collect any plot data in Selawik refuge for this ecotype, and the following data reflect plots sampled in ARCN. This ecotype was developed as part of the regional classification and was identified in Selawik refuge through the spectral classification and mapping effort.

#### Geomorphology:

Alpine Alkaline Barrens is uncommon and occurs at higher elevations in Selawik refuge in the Purcell Mountains and Kiliovilik Range. Geomorphology includes carbonate sedimentary bedrock, metamorphic carbonate (marble) bedrock, weathered bedrock, hillside colluvium, and

talus. Site chemistry is alkaline due to carbonate-rich parent material. Macrotopography consists of upper slopes, shoulders, ridge crests, and plateaus. Slopes are typically steep, and this ecotype occurs on all aspects.

Plant Association:

*Dryas octopetala*–*Saxifraga oppositifolia*

*Salix arctica*–*Minuartia arctica*

Vegetation cover is sparse in this ecotype, although species diversity is high. Plants are present in trace quantities. Trees and shrubs taller than 20 cm are absent. Total non-vascular cover is low, and not always present at sites. Common species include *Dryas octopetala*, *Saxifraga oppositifolia*, *Androsace chamaejasme*, and *Minuartia arctica*.

The most similar ecotype is Alpine Alkaline Dryas Dwarf Shrub except that vegetative cover is greatly reduced. It is also similar to Alpine Acidic Barrens except for differences in bedrock type, soil chemistry, and plant assemblages.

Soils:

Soils are blocky or rubbly and typically lack a surface organic horizon. Thaw depths often could not be determined in the rocky soils but permafrost is presumed to be present below one meter due to cold temperatures at the high elevations. Frost boils are rare, and loess caps are absent. Surface fragments are common and abundant. Soil pH is alkaline to circumneutral, and EC is low. The soils are typically excessively to well drained. Depth to water table often could not be measured but it is assumed to be at greater than 1.5 m depth, given the well drained soils.

The dominant soils in this ecotype are Typic Gelorthents (poorly developed soils, permafrost below one meter) and Typic Eutrogelepts (non-acidic, partially developed with permafrost below one meter). Less common subgroups include Typic Cryorthents (poorly developed soils, lacking permafrost) and Lithic Cryorthents (poorly developed, less than 50 cm to bedrock, permafrost lacking).

### ALPINE ALKALINE DRYAS DWARF SHRUB

General:

We did not collect any plot data in Selawik refuge for this ecotype, and the following data reflect plots sampled in ARCEN. This ecotype was developed as part of the regional classification and was identified in Selawik refuge through the spectral classification and mapping effort.

Geomorphology:

Alpine Alkaline Dryas Dwarf Shrub is uncommon and occurs on carbonate substrates on stable slopes and crests in the Purcell Mountains and Kiliovilik Range. Parent material consists of weathered bedrock, hillside colluvium, talus, young moraine, solifluction deposits and inactive alluvial fan deposits.

Plant Association:

*Dryas octopetala*– *Saxifraga oppositifolia*

*Dryas integrifolia*–*Carex scirpoidea*–*Silene acaulis*

Vegetation is dominated by dwarf shrubs, mainly *Dryas* species and has a strong subcomponent of forbs and sedges. Trees and shrubs taller than 20 cm are absent. Nonvascular species are always present in low quantities. This is a diverse ecotype. Common species in addition to the floristic class components include *Minuartia arctica*, *Polygonum viviparum*, *Dactylina arctica*, and *Vulpicida tilesii*.

The most similar ecotype is Alpine Alkaline Barrens, except it has much higher vegetative cover. It is also similar to Alpine Acidic *Dryas* Dwarf Shrub except for differences in bedrock type, higher soil pH, and much higher plant diversity.

Soils:

Soils are blocky or rubbly and are overlain by thin organic horizons. Thaw depths often could not be determined in the rocky soils, but permafrost is presumed to be present below one meter due to cold temperatures at the high elevations. Frost boils are uncommon, and surface fragments are common and abundant. Loess caps are rare; however, when they occur, they tend to be thick (greater than 20 cm). Soil pH is alkaline to circumneutral, and EC is low. Soils are typically excessively to well drained. Depth to water table often could not be measured, but it is assumed to be at substantial depths, given the well drained soils.

The dominant soils in this ecotype are Typic Eutrogelepts (non-acidic, partially developed with permafrost below one meter). Less common subgroups include Typic Haplothels (mineral soil over permafrost lacking cryoturbation), Typic Gelorthents (poorly developed soils, permafrost below one meter), Typic Haploturbels (mineral soil over permafrost with cryoturbation), and Humic Eutrogelepts (non-acidic, well drained, a moderately thick organic-rich A horizon, permafrost below one meter).

#### ALPINE CASSIOPE DWARF SHRUB

General:

We did not collect any plot data in Selawik refuge for this ecotype, and the following data reflect plots sampled in ARCN. This ecotype was developed as part of the regional classification and was identified in Selawik refuge through the spectral classification and mapping effort.

Geomorphology:

Alpine Cassiope Dwarf Shrub is distributed in small patches on north aspects and is not common. It occurs at higher elevations on upper and lower slopes on hillside colluvium. It generally occurs on north aspects and in late-lying snow beds, where soils are generally colder and moister than other alpine ecotypes. Slopes vary from gradual to steep.

Plant Association:

*Cassiope tetragona*–*Dryas octopetala*–*Polygonum bistorta*

This ecotype is dominated by dwarf shrubs, specifically *Cassiope tetragona*. Other common dwarf shrubs include *Dryas octopetala*, *Salix reticulata*, and *Vaccinium uliginosum*.

Similar ecotypes include Alpine Ericaceous–Dryas Dwarf Shrub and Alpine Alkaline Dryas Dwarf Shrub. In these types the dominant species that defines the vegetation type is Dryas as opposed to Cassiope. Also, site chemistry is more acidic in Alpine Ericaceous–Dryas Dwarf Shrub and more alkaline in Alpine Alkaline Dryas Dwarf Shrub.

#### Soils:

Soils are blocky or rubbly and are overlain by thin organic horizons. Thaw depths often could not be determined in the rocky soils, but permafrost is presumed to be present below one meter due to the cold temperatures at the high elevations. Frost boils are rare; however, when present, they tend to occur at high abundance. Surface fragments are common and moderately abundant, and loess caps are absent. Soil pH is circumneutral, and EC is low. The soils are typically somewhat excessively to well drained. Depth to water table often could not be measured but it is assumed to be substantial, given the well drained soils.

The dominant soils in this ecotype are Typic Eutrogelepts (non-acidic, partially developed with permafrost below one meter) and Typic Gelorthents (poorly developed soils, permafrost below one meter).

### ALPINE ERICACEOUS–DRYAS DWARF SHRUB

#### Geomorphology:

Alpine Ericaceous–Dryas Dwarf Shrub occurs on hillside colluvium and weathered bedrock above 200 m elevation in the Selawik Hills, Western Hockley Hills, and Waring Mountains. Macrotopography includes upper slopes and crests. Slopes vary from gentle to steep and include all aspects.

#### Plant Association:

*Betula nana*–*Vaccinium vitis-idaea*–*Dryas octopetala*

Dwarf shrubs characterize this ecotype, while trees and tall shrubs are absent. Mosses and lichens are always present. Sedges, grasses, and forbs are well represented but typically have low total cover. Common species include *Betula nana*, *Empetrum nigrum*, *Vaccinium vitis-idaea*, *Vaccinium uliginosum*, *Anemone narcissiflora*, *Hierochloa alpina*, *Carex bigelowii*, *Pohlia nutans*, and *Cladina rangiferina*.

This ecotype is most similar to Alpine Acidic Dryas Dwarf Shrub and Alpine Cassiope Dwarf Shrub, except for differences in site chemistry and plant associations.

#### Soils:

Soils are blocky or rubbly and are overlain by thin organic horizons. Permafrost is presumed to be present below one meter due to the cold annual temperatures. Frost boils are uncommon; however, when present, they tend to occur at high abundance. Loess caps are generally absent, and surface fragments are common and abundant. Soil pH is acidic. The soils are typically somewhat excessively to well drained. Depth to water table is assumed to be substantial, given the well drained soils.

The following description is based on data collected in ARCN and used for the regional classification. The dominant soils in this ecotype are Typic Dystrogelepts (acidic, well drained, moderately thin organic horizon, permafrost below one meter), Typic Haploturbels (mineral

soil over permafrost with cryoturbation), and Typic Gelorthents (poorly developed soils, permafrost below one meter).

### ALPINE WET SEDGE MEADOW

General:

We did not collect any plot data in Selawik refuge for this ecotype, and the following data reflect plots sampled in ARCN. This ecotype was developed as part of the regional classification and was identified in Selawik refuge through the spectral classification and mapping effort.

Geomorphology:

Alpine Wet Sedge Meadow is uncommon and occurs on gradual slopes of hillside colluvium. It is found on concave surfaces and toe slopes where water tends to collect and is often associated with non-incised water tracks or seeps.

Plant Association:

*Eriophorum angustifolium*–*Pedicularis sudetica*

Sedges dominate this type, specifically *Eriophorum angustifolium*, *Carex bigelowii*, and *C. aquatilis*. Forb and deciduous shrub cover is also high. Mosses are common, but due to wet surfaces, lichens are not. Common species include a variety of dwarf willows, and the forbs *Pedicularis sudetica* and *Polygonum bistorta*. Alpine Wet Sedge Meadow is relatively species-rich, but total diversity is not as high as other alpine ecotypes.

Lacustrine Wet Sedge Meadow and Riverine Wet Sedge Meadow are similar in soil moisture, site chemistry and vegetation structure except deciduous shrub cover is lower. Due to physiographic and geomorphic differences, Alpine Wet Sedge Meadow has rockier soils and a thinner organic horizon.

Soils:

Soils are gravelly, rubbly, blocky, or bouldery and are overlain by thin organic horizons. Permafrost typically occurred within two meters of the soil surface. Frost boils are rare, and surface fragments are common and abundant. Loess caps are absent. Soil pH is alkaline to circumneutral and EC is generally low. The soils are typically poorly drained and featured a shallow water table.

The dominant soils in this ecotype are Typic Aquorthels (wet, mineral soil over permafrost lacking cryoturbation) and Typic Aquiturbels (wet, mineral soil over permafrost with cryoturbation). A less common subgroup is Typic Gelaquepts (wet, partially developed, permafrost below one meter).

### COASTAL BRACKISH SEDGE MARSH

Geomorphology:

This ecotype occurs on flat areas on delta abandoned overbank deposits on the Kobuk River. Elevations are at sea level or slightly raised. Soil electrical conductivity values are above 800 $\mu$ S.cm<sup>-1</sup>. This ecotype occurred in patches too small to be mapped.

## Plant Association:

*Carex lyngbyei*

Sedges characterize this ecotype, while forbs, grasses, and low deciduous shrubs contribute a minor amount to the overall assemblage. Trees, tall shrubs, mosses, and lichens are absent. Vegetation is dominated by *Carex lyngbyei*, *Eriophorum russeolum*, and *Potentilla palustris*.

## Soils:

Soils are loamy and typically feature a moderately thick surface organic horizon. Permafrost occurs in the upper meter of the soil profile. Organic horizons, buried by ocean sands and silts during tidal floods, are sometimes found in these soils. Soil pH is circumneutral, site chemistry is brackish, and EC is high. The soils are very poorly drained, and the water table is very shallow to above ground. Surface water is always present.

We documented the soil subgroup Typic Aquorthels (wet, mineral soil over permafrost lacking cryoturbation) in this ecotype.

LACUSTRINE BARRENS

## Geomorphology:

Lacustrine Barrens is a transitional ecotype that occurs either when a lake basin becomes tapped and drained or when lakes lose water or completely dry up due to other effects. It occurs along lake beaches, in draining organic fens, in both ice-rich and ice-poor thaw basin centers, and on older moraine kettle lakes where thawing of subsurface permafrost affects the water table. Lacustrine Barrens occurs at low elevations in lowland areas throughout Selawik refuge. Lacustrine Barrens occurred in small, spectrally indistinct patches and was not suitable for mapping.

## Plant Association:

*Eriophorum angustifolium*–*Epilobium palustre*

Early colonizing forbs and sedges are the characteristic life forms in Lacustrine Barrens. Total live cover is variable but is typically less than 30 percent. Most species occur in trace amounts. A mix of aquatic and terrestrial species is common. Trees, shrubs, and lichens occur infrequently, whereas mosses occur in trace amounts. Common species include *Epilobium palustre*, *Eleocharis acicularis*, and *Arctagrostis latifolia*.

This ecotype is most similar to Lacustrine Bluejoint Meadow, which it sometimes transitions to in the successional sequence. The main differences are that Lacustrine Barrens has lower total cover, more ruderal species, and fewer species that are slower to establish.

## Soils:

Soils are typically loamy and frequently have a thick surface organic horizon. Permafrost can occur within the upper meter of the soil profile. Soil pH is circumneutral to alkaline, and EC is moderate. The soils are somewhat poorly to well drained, and the water table is moderately deep to deep.

We documented Terric Fibristels (wet, thick, and poorly decomposed organic horizon, with greater than or equal to 30 cm mineral horizon within one meter) in Selawik refuge. Additional common soil types (from ARCN data) include Oxyaquic Gelorthents (wet, saturated early in growing season, poorly developed with permafrost below one meter) and Typic Gelorthents (poorly developed with permafrost below one meter).

### LACUSTRINE BLUEJOINT MEADOW

#### Geomorphology:

These meadows occur on glaciolacustrine deposits and on drained basins, including both ice-poor thaw basin centers and margins. Surfaces are flat and non-patterned. These meadows occur at low elevations in lowland areas. Lacustrine Bluejoint Meadow was not mappable because it occurred in small patches.

#### Plant Association:

*Calamagrostis canadensis*–*Potentilla palustris*

Bluejoint grass (*C. canadensis*) grows profusely in this ecotype. Forbs and sedges create a quasi-understory in the tall grass. Mosses are typically present. Trees are absent, while shrubs and lichens occur infrequently, always with low total cover. Common species include *Polemonium acutiflorum*, *Eriophorum angustifolium* and *Aulacomnium palustre*.

This ecotype is similar to Lacustrine Barrens as described in the previous section. Riverine Bluejoint Meadow is very similar and shares a floristic association, but it occurs on a different terrain type. Upland Bluejoint Meadow is only similar in the characteristic species, *C. canadensis*.

#### Soils:

Soils are typically loamy with a moderately thick surface organic horizon. Permafrost often occurs within the upper meter of the soil profile. Frost boils, surface fragments, and loess caps are absent. Soil pH is circumneutral to acidic, and EC is low. The soils are typically poorly to moderately well drained, and the water table occurs at shallow depths.

The dominant soil subgroups in this ecotype are Oxyaquic Cryorthents (moist, saturated early in growing season, lacking permafrost) and Typic Aquorthels (wet, mineral soil over permafrost lacking cryoturbation). Less common subgroups (documented in the regional classification) include Aquic Umbrorthels (wet, organic-rich mineral soil over permafrost lacking cryoturbation) and Typic Umbrorthels (moist, organic-rich mineral soil over permafrost lacking cryoturbation).

### LACUSTRINE BUCKBEAN FEN

#### Geomorphology:

This productive ecotype occurs in fens (thick peat with groundwater input), margins of drained basins, shore fens, and shallow thaw lakes. It is evenly distributed throughout lowland areas at low elevations in Selawik refuge. Water actively moves through these hydrologically connected fen ecosystems. This ecotype could not be mapped separately due to the high reflectance of water.

## Plant Association:

*Menyanthes trifoliata*–*Potentilla palustris*

Buckbean (*M. trifoliata*) is the dominant species in this ecotype. It grows in dense mats, often floating over open water, which creates substrate on which other species establish. Water-tolerant or aquatic species occur on these mats or in shallow water at the margins, while more terrestrial species occur along the shoreline. Minerals and nutrients are supplied from flowing water and promote productivity and species diversity. Trees and lichens are absent. Common species include *Potentilla palustris*, *Carex aquatilis*, *Eriophorum angustifolium*, and *Sphagnum squarrosum*.

Similar ecotypes to Lacustrine Buckbean Fen include Lacustrine Horsetail Marsh and Lacustrine Maretail Marsh. The main differences are in characteristic species, and Lacustrine Buckbean Fen occurs at shallower water depths.

## Soils:

Soils are poorly drained with thick accumulations of peat. Permafrost typically occurs within one meter of the surface. Coarse fragments are absent in the active layer. Frost boils, loess caps, and surface fragments are absent. Soil pH is circumneutral to acidic, and EC is low. The soils are typically very poorly drained to flooded, and the water table occurs at shallow depths or above ground.

The most soil subgroups in this ecotype are Typic Historthels (wet, organic-rich soil over permafrost lacking cryoturbation), Typic Fibristels (wet, poorly decomposed thick peat, permafrost in upper meter) and Hydric Cryofibrists (wet, poorly decomposed peat with a water layer below 60 cm, lacking permafrost). Less common subgroups include Fluvaquentic Cryofibrists (wet, poorly decomposed peat, with thin buried mineral horizons), and Typic Cryofibrists (wet, poorly decomposed peat, lacking permafrost).

## Geomorphology:

This ecotype occurs in water along the margins of shallow isolated thaw lakes and in organic fens and creates a highly visible swath of deep green color from a distance. It occurs in small dense patches throughout Selawik refuge. This ecotype could not be mapped separately due to the high reflectance of water. Lacustrine Horsetail Marsh occurs at low elevations where water depths are less than one meter.

## Plant Association:

*Equisetum fluviatile*–*Potentilla palustris*

The horsetail *E. fluviatile* is the predominant species in this ecotype, often appearing to grow in a near monoculture. Forbs, sedges, and mosses are prevalent, while grasses and low shrubs occur less commonly or in small quantities in Lacustrine Horsetail Marsh. Common species include *Equisetum fluviatile*, *Potentilla palustris*, *Utricularia vulgaris* ssp. *macrorrhiza*, and *Calliergon* sp.

This ecotype is similar to Lacustrine Maretail Marsh and Lacustrine Pendent Grass Marsh except for differences in plant associations.

Soils:

Flooded soils were not described.

### LACUSTRINE MARESTAIL MARSH

Geomorphology:

Lacustrine Marestalk Marsh commonly occurs in shallow isolated or connected thaw lakes and in ice-poor thaw basin centers. It occurs at low elevations throughout Selawik refuge in water of less than one meter depth. This ecotype could not be mapped separately due to the high reflectance of water.

Plant Association:

*Hippuris vulgaris*–*Utricularia vulgaris* ssp. *macrorhiza*

The common marestalk, *H. vulgaris*, is the most characteristic species of this ecotype, and grows partially submerged in the water. Emergent species are common in this ecotype, including several species of pondweeds (*Potamogeton* spp.) and bur-reeds (*Sparganium* spp.). Additional common species include *Equisetum fluviatile* and *Sphagnum* spp.

Many of the species that occur in this ecotype also occur in Lacustrine Pendent Grass Marsh, Lacustrine Horestail Marsh, and Lacustrine Buckbean Fen. Its primary distinguishing factor is in the dominant species.

### LACUSTRINE PENDENT GRASS MARSH

Geomorphology:

This ecotype is common in the shallow margins of small to large lakes. This includes in deep isolated or connected thaw, moraine or kettle lakes, ice-rich thaw basins, and on glaciolacustrine deposits. It occurs at low elevations. Water depths are typically around 0.5 m but can be deeper. Water is always present in this ecotype, making it spectrally indistinct and impossible to map.

Plant Association:

*Arctophila fulva*–*Hippuris vulgaris*

Emergent species such as pendent grass (*A. fulva*) and common marestalk (*H. vulgaris*) predominate. Forbs, grasses, and sedges are the dominant life forms. Trees and lichens are absent. Shrubs and mosses are sometimes present with low cover. Common species include *Potentilla palustris*, *Cicuta virosa*, *Galium trifidum* ssp. *trifidum*, and *Eriophorum angustifolium*.

This ecotype is easy to distinguish from other lacustrine ecotypes by the presence of *A. fulva*.

Soils:

Soils were predominantly loam or peat-dominated with a thick surface organic layer. Soils were typically flooded. Soil pH was circumneutral, and EC was moderate.

The dominant soil subgroups in this ecotype are Typic Aquorthels (wet, mineral soil over permafrost lacking cryoturbation), Typic Cryohemists (wet, moderately decomposed organic matter, lacking permafrost), and Typic Cryaquepts (wet, minimally developed, lacking permafrost).

### LACUSTRINE WET SEDGE MEADOW

#### Geomorphology:

This ecotype occurs in ice-poor centers and margins of drained-lake basins and in organic fens. It also occurs on lacustrine deposits on lake shore margins. Surfaces are flat, and water is commonly visible. It occurs at low elevations. This ecotype occurred in small patches and was mapped as Lowland Sedge Fen.

#### Plant Association:

*Carex aquatilis*–*Potentilla palustris*

Lacustrine Wet Sedge Meadow is characterized by sedges and forbs, while shrubs, grasses and mosses are present in lower quantities. Trees are absent, and lichens are only infrequently present. Common species include *Salix planifolia* ssp. *pulchra*, *Eriophorum angustifolium*, *Calamagrostis canadensis*, and *Sphagnum squarrosum*. This ecotype is most similar to Lowland Sedge Fen, except it is more strongly associated with lake processes, and the characteristic species are more rapid colonizers.

#### Soils:

Soils are organic-rich loams and silt-loams with a moderately thick surface organic horizon. Permafrost occurs within the upper meter of the soil profile. Frost boils, surface fragments, and loess caps are absent. Soil pH is circumneutral to acidic, and EC is low. The soils are typically very poorly to somewhat poorly drained, and the water table is typically slightly above or below the ground surface.

The dominant soil subgroups in this ecotype are Histic Cryaquepts (wet, moderate soil development with thick surficial organic horizon, lacking permafrost) and Typic Fibristels (wet, poorly decomposed thick peat, permafrost in upper one meter). Soils identified in the regional classification also include Typic Aquorthels (wet, mineral soil over permafrost lacking cryoturbation) and Typic Historthels (wet, organic-rich soil over permafrost lacking cryoturbation).

### LOWLAND ALDER TALL SHRUB

#### General:

We only sampled one plot in this ecotype in Selawik refuge. The following description mostly uses data from plots sampled in ARCN to provide a more robust description of this ecotype.

#### Geomorphology:

Lowland Alder Tall Shrub occurs on delta abandoned overbank deposits in Selawik refuge. Surfaces are flat. Site elevation is low. This ecotype represents a community in transition from dwarf shrub or graminoid-dominated vegetation and may be expanding in response to a warming climate.

Plant Association:

*Alnus crispa*–*Salix planifolia* ssp. *pulchra*–*Hylocomium splendens*

All life forms are represented in this stable ecotype, although it is not particularly species rich. Alder, *A. crispa* grows in mostly open patches. Additional common species include *Vaccinium uliginosum*, *Equisetum arvense*, *Calamagrostis canadensis*, and *Tomentypnum nitens*.

This ecotype is most similar to Lowland Willow Tall Shrub in environmental factors but has different characteristic species. It differs from Upland Alder-Willow Tall Shrub in floristics, physiography, and dominant soil type.

Soils:

Soils are typically loamy with a thin to moderately thick surface organic horizon. Permafrost and evidence of cryoturbation often occurs within the upper 1.5 m of the soil profile. Frost boils and surface fragments are absent, and loess caps are absent to thick. Soil pH is circumneutral, and EC is low. The soils are poorly to moderately well drained, and the water table is typically shallow.

The dominant soil subgroups in this ecotype are Typic Cryofluvents (poorly developed with buried organic horizons, lacking permafrost) and Typic Cryorthents (poorly developed soils, lacking permafrost). Additional soils identified in this ecotype for the regional classification include Typic Aquorthels (wet, mineral soil over permafrost lacking cryoturbation) and Typic Histoturbels (wet, organic-rich soil over permafrost with cryoturbation).

LOWLAND BIRCH–ERICACEOUS LOW SHRUB

Geomorphology:

This ecotype is abundant in Selawik refuge and usually occurs at less than 80 m elevation. It occurs on delta abandoned overbank deposits, bogs, lowland loess, old moraines, and ice-rich thaw basin margins. Surfaces are flat or on planar slopes. High-centered polygons, ice-cored, mineral-cored mounds, or peat mounds create micro-topographic variability.

Plant Association:

*Betula nana*–*Ledum decumbens*

Low shrubs and mosses are the dominant life forms. Sedges, grasses, and lichens are usually present, while trees occur only infrequently. Common species include *Empetrum nigrum*, *Ledum decumbens*, *Betula nana*, *Eriophorum vaginatum*, *Aulacomnium turgidum*, and *Flavocetraria cucullata*.

This ecotype is most similar to Lowland Birch–Willow Low Shrub except for the prevalence of ericaceous shrubs instead of willow species. It is floristically similar to Upland Birch–Ericaceous Low Shrub, although cover of dwarf birch is higher in the uplands, and site and soil factors are dissimilar.

Soils:

Soils are typically loamy with moderately thick to thick surface organic horizons. Depth to permafrost is typically less than one meter. Frost boils and surface fragments are absent.

Loess is rare, with the exception of one site where a thick (greater than 120 cm) accumulation of loess occurred. Soil pH is circumneutral to acidic, and EC is low. The soils are typically very poorly to somewhat poorly drained. Water table is typically shallow to moderately deep.

Dominant soil subgroups in this ecotype are Typic Hemistels (wet, moderately decomposed organic horizon greater than 40 cm, permafrost present), Typic Historthels (wet, organic-rich soil over permafrost lacking cryoturbation), and Fluventic Historthels (wet, organic-rich soil with buried organic horizons over permafrost, lacking cryoturbation). Less common subgroups include Terric Fibristels (wet, thick, and poorly decomposed organic horizon, with greater than or equal to 30 cm mineral horizon within one meter) and Typic Histoturbels (wet, organic-rich soil over permafrost with cryoturbation).

### LOWLAND BIRCH–WILLOW LOW SHRUB

#### General:

We did not collect any ground plot data in Selawik refuge for this ecotype, and the following data reflect plots sampled in ARCN. We did sample six plots in this ecotype during the aerial assessment.

#### Geomorphology:

This common ecotype is found on hillside colluvium, lowland loess, lowland retransported deposits, solifluction deposits, abandoned braided overbank deposits, older moraine, ice-poor and ice-rich centers and ice-rich margins of thaw basins, and in bogs. Surfaces are flat or either concave or planar gradual slopes. Ice-cored, peat-cored, or undifferentiated mounds are common micro-topographic features. This ecotype is stable and not prone to disturbance except for changes associated with thawing permafrost.

#### Plant Association:

*Betula nana*–*Salix planifolia* ssp. *pulchra*–*Eriophorum angustifolium*

Low deciduous shrubs characterize this ecotype. Mosses and lichens are always present in small quantities. Forbs make up a minor component. Common species include *Vaccinium uliginosum*, *Petasites frigidus*, *Carex bigelowii*, *Aulacomnium palustre*, and *Flavocetraria cucullata*.

This ecotype is most similar to Lowland Birch–Ericaceous Low Shrub, as previously discussed, and to Lowland Willow Low Shrub, except for the prevalence of dwarf birch.

#### Soils:

Soils are typically loamy with moderately thick to thick surface organic horizons. Depth to permafrost is typically less than one meter. Frost boils and surface fragments are rare. Loess is rare; however, when loess did occur, it was generally thick (greater than 20 cm). Soil pH is circumneutral to acidic, and EC is low. The soils are typically very poorly to somewhat poorly drained. Water table was typically shallow to moderately deep.

The dominant soil subgroups in this ecotype are Typic Aquorthels (wet, mineral soil over permafrost lacking cryoturbation), Typic Hemistels (wet, moderately decomposed organic

horizon thicker than 40 cm, permafrost present), and Typic Aquiturbels (wet, mineral soil over permafrost with cryoturbation).

### LOWLAND BLACK SPRUCE FOREST

Geomorphology:

This ecotype is common at elevations less than 120 m on hillside colluvium, upland and lowland loess, and retransported deposits. Surface topography includes basins, flats, upper and lower slopes, and toe slopes. Common micro-topographic features include mineral-cored and undifferentiated hummocks.

Plant Association:

*Picea mariana*–*Ledum decumbens*

This fire-prone, late-successional ecotype is dominated by black spruce. The forest canopy is open, and the understory shrub canopy includes tall, low, and dwarf shrubs growing out of a thick carpet of mosses and lichens. Forbs are always present, while sedge and grass cover is variable. Common species include *Empetrum nigrum*, *Vaccinium vitis-idaea*, *Vaccinium uliginosum*, *Rubus chamaemorus*, *Carex bigelowii*, *Hylocomium splendens*, *Cladina stygia*, and *Peltigera aphthosa*.

This is the only ecotype characterized by black spruce trees. Upland White Spruce–Ericaceous Forest has some similar species, but soils are rockier with less organic accumulation and higher pH.

Soils:

Soils are typically loamy with moderately thick to thick surface organic horizons. Depth to permafrost is typically less than one meter. Frost boils and surface fragments are absent. Loess is uncommon. Soil pH is acidic, and EC is low. The soils are typically very poorly to somewhat poorly drained or well to moderately well drained. Water table was typically moderately deep to deep.

The dominant soil subgroups in this ecotype are Typic Aquorthels (wet, mineral soil over permafrost lacking cryoturbation) and Typic Haplorthels (mineral soil over permafrost lacking cryoturbation). Additional soil subgroups documented in the regional classification include Typic Historthels (wet, organic-rich soil over permafrost lacking cryoturbation) and Typic Haploturbels (mineral soil over permafrost with cryoturbation).

### LOWLAND ERICACEOUS SHRUB BOG

Geomorphology:

This common ecotype occurs in bogs. Flats, drained basins, and thermokarst basins are the common types of macrotopography in this ecotype. Ground patterns, where present, include low and high-centered polygons, disjunct polygon rims, and peat-, ice-, and mineral-cored mounds.

Plant Association:

*Andromeda polifolia*–*Sphagnum* sp.

These wet ombrotrophic bog communities are characterized by shrubs, sedges, and mosses. Lichens are infrequently present on raised micro-sites. Common species include *Oxycoccus microcarpus*, *Betula nana*, *Carex aquatilis*, *C. rotundata*, *Eriophorum russeolum*, *Aulacomnium turgidum*, and a mix of *Sphagnum* species, including *S. balticum* and *S. steerei*.

This ecotype is similar to Lowland Sedge-Willow Fen, which lacks *Sphagnum* mosses, has more abundant willow, and occurs in long, hydrologically connected landforms.

#### Soils:

Soils are poorly drained with moderately thick to thick accumulations of peat. Permafrost is present within one meter depth. Coarse fragments are rarely encountered in the active layer. Frost boils and surface fragments are absent. Loess caps are uncommon; however, when they occur, they tend to be thick (greater than 20 cm). Soil pH is acidic, and EC is low. The soils are typically very poorly to somewhat poorly drained, and the water table occurs at shallow depths or above ground.

The dominant soil subgroups in this ecotype include Sphagnic Fibristels (wet, *Sphagnum*-rich, poorly decomposed thick peat, permafrost in upper meter), Typic Fibristels (wet, poorly decomposed thick peat, permafrost in upper meter), Sphagnic Cryofibrists (wet, *Sphagnum*-rich, poorly decomposed peat, lacking permafrost), and Typic Historthels (wet, organic-rich soil over permafrost lacking cryoturbation). Less common soil subgroups include Terrie Fibristels (wet, thick, and poorly decomposed organic horizon, with greater than or equal to 30 cm mineral horizon within one meter) and Typic Hemistels (wet, moderately decomposed organic horizon thicker than 40 cm, permafrost present).

### LOWLAND LAKE

#### Geomorphology:

Lowland Lake comprises the vast majority of lakes in Selawik refuge. This ecotype includes shallow and deep isolated moraine or kettle lakes, deep connected moraine or kettle lakes, shallow and deep isolated thaw lakes, and shallow isolated dune lakes.

#### Plant Association:

Water–*Potamogeton* spp.

Submerged aquatic species characterize Lowland Lake. Water usually covers at least 96 percent of the total lake surface. Sedges, grasses, forbs, and mosses can occur at the shoreline. Multiple pondweed species, including *Potamogeton alpinus*, *Potamogeton perfoliatus* ssp. *richardsonii*, and *Potamogeton zosterifolius*, are common.

Lowland Lake is similar to Lacustrine Marestail Marsh, except it encompasses the entire lake instead of the margin and has deeper water and few emergent aquatic species. It is also similar to Alpine Lake, except it is much more common, occurs at lower elevations, and has higher biological productivity.

#### Soils:

Flooded soils were not described.

### LOWLAND SEDGE FEN

Geomorphology:

Lowland Sedge Fen occurs throughout Selawik refuge on flat terrain. Geomorphology includes ice-poor thaw basin margins and organic fens. Surfaces are non-patterned on ice-poor soils and include peat mounds in basins.

Plant Association:

*Carex chordorrhiza*–*Carex aquatilis*

Lowland Sedge Fen is characterized by sedges, mosses, and forbs; all other life forms have more variable presence and cover. Trees and lichens are absent. Common species include *Andromeda polifolia*, *Carex aquatilis*, *C. rotundata*, *Eriophorum angustifolium*, *Eriophorum russeolum*, and *Scorpidium scorpioides*.

This ecotype is very similar to Lowland Sedge-Willow Fen, except water levels are higher and it has fewer shrubs. These two ecotypes are spectrally similar and were mapped together. It is also comparable to Lacustrine Wet Sedge Meadow except for physiographic and species differences.

Soils:

Soils are poorly drained with moderately thick to thick accumulations of peat. Permafrost is often present within one meter depth. Coarse fragments are rarely encountered in the active layer. Frost boils, loess caps, and surface fragments are absent. Soil pH is circumneutral to acidic, and EC is low. The soils are typically very poorly to poorly drained, and the water table occurs at shallow depths or above ground.

The dominant soil subgroups in this ecotype are Typic Fibristels (wet, poorly decomposed thick peat, permafrost in upper meter) and Fluvaquentic Fibristels (wet, poorly decomposed organic horizon thicker than 40 cm interbedded with buried mineral horizons, permafrost within one meter). Less common subgroups include Typic Historthels (wet, organic-rich soil over permafrost lacking cryoturbation), Terric Fibristels (wet, thick, and poorly decomposed organic horizon, with greater than or equal to 30 cm mineral horizon within one meter), and Terric Hemistels (wet, thick, and moderately decomposed organic horizon, with greater than or equal to 30 cm mineral horizon within one meter).

LOWLAND SEDGE–WILLOW FEN

General:

We only sampled one plot in this ecotype in Selawik refuge. The following description is based on data collected in ARCN and used for the regional classification.

Geomorphology:

Lowland Sedge–Willow Fen occurs on abandoned meander overbank deposits, abandoned braided fine channel deposits, abandoned alluvial fan deposits, older moraine, channel fens, organic fens, and shore fens. Surfaces are flat and are frequently non-patterned, although micro-topographic features include mineral-cored hummocks, peat mounds, and low-centered polygons.

## Plant Association:

*Eriophorum angustifolium*–*Carex aquatilis*–*Salix planifolia* ssp. *pulchra*

This ecotype is sedge-dominated with a subcomponent of deciduous shrubs. All life forms may be present, although trees are uncommon. Common species include *Betula nana*, *Potentilla palustris*, *Eriophorum angustifolium*, *Aulacomnium palustre*, and *Paludella squarrosa*.

This ecotype is most similar to Lowland Sedge Fen except it is drier and has higher shrub cover. It is also comparable to Lacustrine Wet Sedge Meadow except for physiographic and species differences. Lowland Sedge–Willow Fen was not spectrally distinct and was mapped as Lowland Sedge Fen.

## Soils:

Soils are poorly drained with moderately thick to thick accumulations of peat. Permafrost is often present within one meter depth. Coarse fragments are rarely encountered in the active layer. Frost boils, loess caps, and surface fragments are absent. Soil pH is circumneutral to acidic, and EC is low. The soils are typically very poorly to poorly drained, and water table occurs at shallow depths or above ground.

The dominant soil subgroup in this ecotype is Terric Fibristels (wet, thick, and poorly decomposed organic horizon, with greater than or equal to 30 cm mineral horizon within one meter). Additional soil subgroups documented in the regional classification include Typic Fibristels (wet, poorly decomposed thick peat, permafrost in upper meter), Typic Aquorthels (wet, mineral soil over permafrost lacking cryoturbation), and Typic Cryofibrists (wet, poorly decomposed peat, lacking permafrost). A less common soil subgroup is Typic Hemistels (wet, moderately decomposed organic horizon thicker than 40 cm, permafrost present).

LOWLAND WILLOW LOW SHRUB

## Geomorphology:

This willow-dominated lowland ecotype occurs on older moraine, upland loess, ice-rich thaw basins, glaciolacustrine deposits, and abandoned meander overbank deposits. The surface is usually flat or a gentle concave slope. It occurs throughout Selawik refuge at less than 100 m elevation.

## Plant Association:

*Salix planifolia* ssp. *pulchra*–*Valeriana capitata*

Deciduous shrubs, forbs, and grasses characterize this ecotype. Mosses often create a carpet in the understory. All life forms may be present to some degree. Common species include *Salix planifolia* ssp. *pulchra*, *Equisetum arvense*, *Rubus arcticus*, *Calamagrostis canadensis*, *Eriophorum angustifolium*, and *Brachythecium* sp.

This ecotype is similar to Lowland Birch–Willow Low Shrub except for the absence of dwarf birch. It is different from Riverine Willow Low Shrub in physiographic characters and species composition.

Soils:

Soils are typically loamy with moderately thick surface organic horizons. Depth to permafrost is typically less than one meter. Loess caps, frost boils, and surface fragments are absent. Soil pH is circumneutral to acidic, and EC is low. The soils are typically very poorly to somewhat poorly drained. The water table is typically shallow.

The dominant soil subgroups in this ecotype are Typic Historthels (wet, organic-rich soil over permafrost lacking cryoturbation) and Typic Haploorthels (mineral soil over permafrost lacking cryoturbation). Less common subgroups include Histic Cryaquepts (wet, moderate soil development with thick surficial organic horizon, lacking permafrost) and Typic Cryaquents (wet, minimally developed, lacking permafrost).

RIVERINE ALDER TALL SHRUB

Geomorphology:

This ecotype comprises closed alder stands on younger riverine surfaces and is common in Selawik refuge. It occurs on delta, braided, and meander active and inactive overbank deposits. Surface forms include interfluves, terraces, flat banks, and point bars.

Plant Association:

*Alnus crispa*–*Rubus arcticus*

Riverine Alder Tall Shrub consists of open to closed stands of *A. crispa* with an understory of forbs, grasses, and mosses. Tall willows occasionally are co-dominant with alder. Trees sometimes occur as seedling in the understory, and cover of lichens and grasses is variable. Common species include *Rubus arcticus*, *Aconitum delphinifolium*, *Equisetum arvense*, *Calamagrostis canadensis*, and *Sanionia uncinata*.

This ecotype is similar to Lowland Alder Tall Shrub and Upland Alder-Willow Tall Shrub, although it is strongly affected by riverine processes, and has different species assemblages.

Soils:

Soils are loamy with a thin overlying organic horizon. Permafrost is often found within the upper one meter of soil. Frost boils, loess caps, and surface fragments are absent. Organic horizons, buried during flooding by riverine silts and sands, often occur in these soils. Soil pH is acidic to circumneutral, and EC is low. The soils are typically moderately well to somewhat poorly drained. Depth to water table often could not be measured, but it is assumed to fluctuate throughout the year within the upper two meters of soil.

Dominant soil subgroups include Typic Haplocryepts (non-acidic, partially developed, lacking permafrost) and Oxyaquic Cryofluvents (wet, saturated early in growing season, poorly developed with thin buried horizons, lacking permafrost). Additional soil subgroups documented in the regional classification include Fluvaquentic Haploorthels (wet, mineral soil with buried organic horizons, permafrost within one meter) and Fluventic Haploorthels (moist, mineral soil with buried organic horizons, permafrost within one meter).

RIVERINE BARRENS

## Geomorphology:

Riverine Barrens occurs on river bars that are frequently flooded and scoured. Geomorphology is depositional, including both delta and meander active channel deposits. Surface forms include point bars and interfluves on nearly flat surfaces at low elevations in Selawik refuge.

## Plant Association:

*Salix alaxensis*–*Epilobium latifolium*

Vegetation is sparse, with primarily ruderal species and early colonizers present. Mature trees, mosses, and lichens are mostly absent due to frequent disturbance. Common species include *Salix alaxensis*, *Equisetum arvense*, *Rorippa islandica*, *Eriophorum russeolum*, and *Juncus alpinus*.

This ecotype is similar to Riverine Dryas Dwarf Shrub and Riverine Moist Willow Tall Shrub, except it occurs primarily on active deposits where there is greater disturbance.

## Soils:

Soils are typically gravelly or sandy and lack a surface organic horizon. Depth to permafrost it is assumed to be greater than one meter depth or absent due to well drained soils and the proximity to flowing water. Frost boils and loess caps are absent. Surface fragments are common and abundant. Soil pH is circumneutral to alkaline, and EC is low. The soils are excessively to moderately well drained. Depth to water table was difficult to determine in some cases; however, in such cases, it was assumed that the water table occurs within the upper meter of soil for at least the first few weeks of the growing season.

The dominant soil subgroups in this ecotype are Typic Cryaquents (wet, minimally developed, lacking permafrost) and Typic Gelaquents (wet, poorly developed with permafrost below one meter). Additional soil subgroups documented in the regional classification include Oxyaquic Cryorthents (moist, saturated early in growing season, lacking permafrost) and Oxyaquic Gelorthents (wet, saturated early in growing season, poorly developed with permafrost below one meter).

RIVERINE BIRCH–WILLOW LOW SHRUB

## General:

We did not collect any ground plot data in Selawik refuge for this ecotype, and the following data reflect plots sampled in ARCN. This ecotype was developed as part of the regional classification and was identified in Selawik refuge through the spectral classification and mapping effort.

## Geomorphology:

These low shrub communities grow in linear bands that segregate stands of spruce forest along meandering rivers in Selawik refuge. It occurs on meander inactive overbank deposits and meander fine inactive channel deposits. Surface forms include interfluves, bars, and flat banks. It usually occurs at less than 60 m elevation.

Plant Association:

*Betula nana*–*Salix planifolia* ssp. *pulchra*–*Pyrola grandiflora*

The low, deciduous shrub canopy is typically closed (greater than 75 percent) in this ecotype. Forbs and grasses characterize the understory, while the presence of trees, evergreen shrubs, sedges, and nonvascular species is variable. Common species include *Vaccinium uliginosum*, *Petasites frigidus*, *Valeriana capitata*, and *Hylocomium splendens*.

This ecotype is similar to Lowland Birch-Willow Low Shrub except soils are predominantly loamy and haven't had time to develop thick organic horizons.

Soils:

Soils are loamy with a thin organic horizon above the mineral soil surface. Permafrost is often found in the upper meter of the soil profile. Frost boils, loess caps, and surface fragments are absent. Organic horizons, buried during flooding by riverine silts and sands, were commonly found in these soils. Soil pH is circumneutral to acidic, and EC is low. The soils are typically moderately well to somewhat poorly drained, and the water table is shallow to moderately deep.

The dominant soil subgroups in this ecotype are Fluvaquentic Haplorthels (wet, saturated within 75 cm, mineral soil with buried organic horizons, and permafrost within one meter) and Fluvaquentic Aquorthels (wet, saturated within 50 cm, mineral soil with thin buried horizons, and permafrost within one meter). Less common soil types include Typic Dystrogelepts (acidic, well drained, moderately thin organic horizon, permafrost below one meter) and Typic Gelorthents (poorly developed with permafrost below one meter).

### RIVERINE BLUEJOINT MEADOW

Geomorphology:

This ecotype occurs at low elevations on delta inactive overbank deposits, meander abandoned overbank deposits, and meander inactive overbank deposits. Surface forms include channels, levees and flats. The ground is usually non-patterned.

Plant Association:

*Calamagrostis canadensis*–*Potentilla palustris*

Riverine Bluejoint Meadow is dominated by grasses, deciduous shrubs, and forbs. Cover of trees, sedges, and lichens is variable. Common species include *Salix planifolia* ssp. *pulchra*, *Equisetum arvense*, *Iris setosa*, *Rubus arcticus*, and *Valeriana capitata*.

Riverine Bluejoint Meadow is most similar to Lacustrine Bluejoint Meadow. It shares a dominant species with Upland Bluejoint Meadow but soils are much wetter. Due to its low abundance, Riverine Bluejoint Meadow was not mapped.

Soils:

Soils are loamy with a thin surface organic horizon. Permafrost is at variable depths, and sometimes is absent. Frost boils and surface fragments are absent. The presence of loess caps is variable. Coarse fragments are absent in the upper meter of the active layer. Subsurface organic horizons, buried during flooding by riverine silts and sands, are commonly found in

these soils. Soil pH is acidic to circumneutral, and EC is variable. The soils are moderately well drained, and the water table is deep to very deep.

The dominant soil subgroups in this ecotype are Typic Aquorthels (wet, mineral soil over permafrost lacking cryoturbation), Typic Cryofluvents (poorly developed with buried organic horizons, lacking permafrost), and Typic Cryaquents (wet, minimally developed, lacking permafrost).

### RIVERINE DRYAS DWARF SHRUB

#### General:

We did not collect any plot data in Selawik refuge for this ecotype, and the following data reflect plots sampled in ARCN. This ecotype was developed as part of the regional classification and was identified in Selawik refuge through the spectral classification and mapping effort.

#### Geomorphology:

Riverine Dryas Dwarf Shrub occurs on stabilized braided and meander abandoned and inactive deposits of both coarse and fine materials, and to a lesser extent on active braided overbank and channel deposits. Surfaces are primarily flat banks, terraces, and interfluves at lower elevations along the Kobuk River.

#### Plant Associations:

*Dryas integrifolia*–*Salix brachycarpa* ssp. *nipoclada*

*Dryas drummondii*–*Oxytropis campestris*

Evergreen shrubs characterize this ecotype, while deciduous low shrubs and forbs contribute to the secondary component. Trees species are present as seedlings in this early-successional ecotype, as are a few nonvascular species. Common species include *Salix alaxensis*, *Lupinus arcticus*, *Calamagrostis purpurascens*, and *Rhytidium rugosum*.

This ecotype is similar to Riverine Barrens, although it is more stable and with much greater vegetative cover. It differs from Alpine Dryas Dwarf Shrub by its occurrence on floodplains.

#### Soils:

Soils are typically gravelly or bouldery and often lack a surface organic horizon. Depth to permafrost is difficult to determine in the rocky soils; however, if permafrost does occur, it is assumed to be greater than one meter, given the well drained soils. Frost boils and loess caps are absent. Surface fragments are present at low to moderate abundance. Soil pH is alkaline, and EC is low. The soils are typically excessively to well drained, and depth to water table is typically greater than one meter.

Dominant soil subgroups in this ecotype include Oxyaquic Cryorthents (moist, occasionally lacking permafrost) and Typic Gelorthents (poorly developed with permafrost below one meter).

### RIVERINE FORB MARSH

#### Geomorphology:

Riverine Forb Marsh occurs in channels, swales, or flood basins on inactive channel deposits or on the margins of shallow riverine lakes. It is found infrequently at low elevations along large rivers.

#### Plant Association:

*Eleocharis acicularis*–*Equisetum fluviatile*

Forbs dominate this ecotype, in particular horsetail. Sedges and water-tolerant mosses are always present, while trees, shrubs, and lichens are absent. Common species include *Equisetum fluviatile*, *Caltha palustris*, *Cicuta mackenzieana*, *Potentilla palustris*, *Eriophorum angustifolium*, and *Calliergon giganteum*.

This ecotype is similar to Riverine Wet Sedge Meadow, which occurs on similar terrain but is drier and is dominated by sedges. Lacustrine Horsetail Marsh has some similar plant species, but ecological processes, physical structure, and community associations are unrelated. Riverine Forb Marsh was not mapped because it occurs in small, isolated patches.

#### Soils:

Soils are typically loamy or sandy and lack a surface organic horizon. Thaw depths could not be determined as the depth to permafrost, if present, was always greater than the maximum depth sampled (1.3 meters). Frost boils, surface fragments, and loess caps are absent. Soil pH is circumneutral to alkaline, and EC is low to moderate. The soils are typically very poorly drained or flooded. The water table occurs at shallow depths or above ground.

The dominant soil subgroups in this ecotype are Typic Gelaquents (wet, poorly developed with permafrost below one meter) and Typic Cryaquents (wet, minimally developed, lacking permafrost).

### RIVERINE MOIST WILLOW TALL SHRUB

#### Geomorphology:

These tall willow communities occur on active floodplains, including delta active and inactive overbank deposits and meander active and inactive overbank deposits. This ecotype is subject to frequent flooding.

#### Plant Association:

*Salix alaxensis*–*Aster sibiricus*

This early-successional community is characterized by tall felt-leaf willow (*S. alaxensis*). Forbs are the prevalent understory life form, although all other life forms except lichens can be present in small quantities. The amount of understory cover is variable. Common species include *Alnus crispa*, *Artemisia tilesii*, *Equisetum arvense*, and *Calamagrostis canadensis*.

This ecotype varies in species assemblages from two willow dominated riverine ecotypes: Riverine Wet Tall Willow Shrub and Riverine Willow Low Shrub. It has drier soils and a

higher disturbance rate than Riverine Wet Willow Tall Shrub and taller shrub heights than Riverine Willow Low Shrub.

#### Soils:

Soils are typically gravelly, sandy, or loamy and often lack a surface organic horizon. Depth to permafrost is typically within one meter of the surface. Frost boils were absent and loess caps are rare. Surface fragments are uncommon; however, when they occur, they tend to be abundant. Soil pH is circumneutral to alkaline, and EC is low. The soils are typically somewhat excessively to well drained, and depth to water table was typically within one meter.

The dominant soil subgroups in this ecotype are Oxyaquic Cryorthents (moist, saturated early in growing season, lacking permafrost), Typic Cryaquents (wet, minimally developed, lacking permafrost), and Typic Gelorthents (poorly developed with permafrost below one meter). Uncommon soil types include Typic Cryopsamments (sandy, low coarse fragment content, well drained, lacking permafrost) and Typic Cryofluvents (poorly developed with buried organic horizons, lacking permafrost).

### RIVERINE PENDENT GRASS MARSH

#### Geomorphology:

Riverine Pendent Grass Marsh occurs at low elevations on both active and inactive meander fine channel deposits. Surfaces consist of point bars and are non-patterned. This ecotype occurs in small patches and was not able to be mapped.

#### Plant Association:

*Arctophila fulva*–*Eleocharis acicularis*–*Caltha palustris*

Pendent grass, *A. fulva*, is the dominant species in this ecotype. Trees, evergreen shrubs, and nonvascular species are absent. Common species include *Salix alaxensis*, *Equisetum arvense*, *Stellaria crassifolia*, *Arctophila fulva*, *Deschampsia caespitosa* and *Carex aquatilis*. Bare ground and litter are always present.

This ecotype is most similar to Lacustrine Pendent Grass Marsh except it occurs along rivers and not in lake basins.

#### Soils:

Soils are organic-rich loams and sands that often lack a surface organic horizon. Buried organic horizons are common. Permafrost and rock fragments are absent in the upper meter of the soil profile. Frost boils, surface fragments, and loess caps are absent. Soil pH is circumneutral, and EC is low to moderate. Soils are typically poorly to somewhat poorly drained, and the water table is typically slightly above or below the ground surface.

The dominant soil subgroup in this ecotype is Typic Cryaquents (wet, minimally developed, lacking permafrost).

## RIVERINE POPLAR FOREST

### Geomorphology:

These early to mid-successional poplar stands occur on braided and meander active and inactive overbank deposits. Surfaces consist of levees, interfluves, flat banks, and point bars.

### Plant Association:

*Populus balsamifera*–*Picea glauca*–*Salix alaxensis*

The rapid rate of succession that this ecotype experiences is reflected in its plant association, which contains a dominant species from the first three stages of the floodplain successional sequence (willow dominated, then poplar dominated, then spruce dominated stands). *Populus balsamifera* is the dominant species, while forbs and deciduous shrubs characterize the understory. *Picea glauca* occurs as seedlings in the understory. Additional common species include *Rosa acicularis*, *Equisetum arvense*, *Galium boreale*, *Hedysarum alpinum*, and *Calamagrostis canadensis*.

Riverine Poplar Forest is most similar to Riverine White Spruce–Poplar Forest because it transitions to this ecotype as spruce mature.

### Soils:

Soils are typically sandy or loamy with a thin, often scattered surface organic horizon. Depth to permafrost is about one meter, given the well drained soils and proximity of flowing water. Frost boils and loess caps are absent. Surface fragments are rare. Organic horizons, buried during flooding by riverine silts and sands, sometimes occur in these soils. Soil pH is circumneutral to alkaline, and EC is low. Soils are typically somewhat excessively to moderately well drained. Depth to water table often could not be measured but is assumed to fluctuate throughout the year within the upper two meters of the soil profile, given the proximity to river water.

We did not collect soil stratigraphy data for this ecotype in Selawik refuge. The dominant soil subgroups in this ecotype that we documented in the regional classification are Typic Gelorthents (poorly developed with permafrost below one meter) and Typic Cryorthents (poorly developed soils, lacking permafrost).

## RIVERINE WATER

### General:

This ecotype includes both rivers and riverine lakes. We only sampled rivers in Selawik refuge, and we did not develop a plant association for these plots. The following vegetation description is based on data collected at plots in riverine lakes in ARC/N, while the water characteristic data is based on plots sampled in Selawik refuge.

### Geomorphology:

Riverine Water occurs throughout Selawik refuge and includes upper and lower perennial non-glacial rivers, mountain headwater streams, lowland headwater streams, and shallow oxbow lakes that have been isolated from actively flowing rivers through depositional

processes. River channels are both braided and meandering. Elevations vary from sea level to greater than 500 m in headwater streams.

Plant Association:

Potamogeton spp.–*Utricularia vulgaris* ssp. *macrorhiza*

In riverine lakes, aquatic vegetation grows on shallow bottoms and near the margins. Multiple species of pondweeds, *Potamogeton* spp., are common. Sedges and grasses sometimes occur on shallow water near the margins of riverine lakes.

Soils:

Flooded soils were not described.

### RIVERINE WET SEDGE MEADOW

Geomorphology:

Riverine Wet Sedge Meadow occurs in inactive or abandoned channels that were initially shallow or have infilled. These include meander fine abandoned channel deposits and meander inactive overbank deposits along rivers. Macrotopography includes channels, swales, and flats margins.

Plant Association:

*Carex aquatilis*–*Eriophorum angustifolium*

Sedges are the dominant life form in Riverine Wet Sedge Meadow, with forbs and mosses always comprising a lesser component. Cover of deciduous shrubs and grasses is variable. Trees and lichens are absent. Common species include *Equisetum fluviatile*, *Potentilla palustris*, *Carex aquatilis*, *C. rostrata*, *Eriophorum angustifolium*, and *Warnstorfia exannulata*.

This ecotype is similar to Riverine Forb Marsh, which has deeper water and is forb instead of sedge-dominated. Riverine Wet Sedge Meadow occurred in patches too small to be mapped.

Soils:

Soils are typically loamy with a thin to moderately thick surface organic horizon. Thaw depths were at least 70 cm but were frequently deeper than the maximum depth sampled (1.3 meters). Organic horizons, buried during flooding by riverine silts and sands, commonly occur in these soils. Frost boils, surface fragments, and loess caps are absent. Soil pH is circumneutral to acidic, and EC is generally low except along coastal rivers, where it may be moderately high. The soils are typically very poorly to moderately well drained, and the water table occurs at shallow depths or above ground.

The dominant soil subgroups in this ecotype are Typic Cryaquents (wet, minimally developed, lacking permafrost) and Typic Aquiturbels (wet, mineral soil over permafrost with cryoturbation). Additional soil subgroups documented in the regional classification include Typic Gelaquents (wet, poorly developed with permafrost below one meter) and Oxyaquic Cryofluvents (wet, saturated early in growing season, poorly developed with thin buried horizons, lacking permafrost).

### RIVERINE WET WILLOW TALL SHRUB

#### Geomorphology:

This ecotype occurs along drainages and channels on meander fine inactive deposits, meander inactive overbank deposits, and lowland headwater overbank deposits. Surfaces are usually flat, and this ecotype occurs at low elevations.

#### Plant Association:

*Salix planifolia* ssp. *pulchra*–*Potentilla palustris*

Tall (greater than 1.5 m) deciduous shrubs, mainly *S. planifolia* ssp. *pulchra*, dominate this ecotype with a strong component of low shrubs, forbs, grasses, and mosses. Sedge contributes a minor component. This ecotype contains a mix of species that grow in waterlogged soils with those that grow on raised micro-sites. Common species include *Alnus crispa*, *Equisetum fluviatile*, *Calamagrostis canadensis*, *Carex aquatilis*, and *Rhizomnium* sp.

This ecotype is similar to Riverine Moist Tall Willow Shrub and Riverine Willow Low Shrub except for species assemblages. It also has higher soil moisture and a lower disturbance rate than Riverine Moist Willow Tall Shrub, as well as a different distribution than Riverine Willow Low Shrub. Due to spectral similarities, this ecotype was mapped with Riverine Moist Willow Tall Shrub.

#### Soils:

Soils are loamy with a thin organic horizon above the mineral soil surface. Permafrost is occasionally found in the upper meter of the soil profile, and is generally assumed to be at greater than one meter depth, given the well drained soils and proximity to flowing water. Frost boils, loess caps, and surface fragments are absent. Organic horizons, buried during flooding by riverine silts and sands, are frequently found in these soils. Soil pH is acidic to circumneutral, and EC is low. The soils are typically moderately well to very poorly drained, and the water table is shallow to moderately deep.

The dominant soil subgroup in this ecotype is Fluvaquentic Aquorthels (wet, saturated within 50 cm, mineral soil with thin buried horizons, permafrost within one meter), Fluvaquentic Cryofibrists (wet, poorly decomposed peat, with thin buried mineral horizons), and Oxyaquic Cryofluvents (wet, saturated early in growing season, poorly developed with thin buried horizons, lacking permafrost).

### RIVERINE WHITE SPRUCE–ALDER FOREST

#### Geomorphology:

This ecotype consists of mature white spruce stands with alder characterizing the understory, a legacy from an earlier successional stage. It occurs on inactive and abandoned meander overbank deposits. It is widespread in riverine corridors in Selawik refuge.

#### Plant Association:

*Picea glauca*–*Alnus crispa*–*Calamagrostis Canadensis*

All life forms are represented in Riverine White Spruce–Alder Forest. Evergreen trees and tall deciduous shrubs are co-dominant. Moss cover is typically high. Common species include *Linnaea borealis*, *Vaccinium vitis-idaea*, *Alnus crispa*, *Rosa acicularis*, *Equisetum arvense*, *Calamagrostis canadensis*, *Hylocomium splendens*, *Sanionia uncinata*, and *Cladina stygia*.

This ecotype is most similar to Riverine White Spruce–Willow Forest, except spruce trees are co-dominant with *Salix lanata* ssp. *richardsonii* instead of *Alnus crispa*. Due to spectral similarities, it was mapped as Riverine White Spruce–Willow Forest.

#### Soils:

Soils are typically loamy, or sandy with a thin surface organic horizon. Permafrost is often found in the upper meter of the soil profile. Frost boils, surface fragments, and loess caps are absent. Organic horizons, buried during flooding by riverine silts and sands, often occur in these soils. Soil pH is acidic to circumneutral, and EC is low. The soils are well drained to moderately well drained. Depth to water table often could not be measured, but it is assumed to fluctuate throughout the year within the upper two meters of the soil profile, given the proximity of river water.

The dominant soil subgroup in this ecotype identified in Selawik refuge is Typic Haplorthels (mineral soil over permafrost lacking cryoturbation). Additional soil subgroups documented in the regional classification include Typic Gelifluvents (poorly developed with buried organic horizons, permafrost below one meter) and Fluventic Historthels (wet, organic-rich soil with buried organic horizons over permafrost, lacking cryoturbation).

### RIVERINE WHITE SPRUCE–POPLAR FOREST

#### General:

We did not collect any plot data in Selawik refuge for this ecotype, and the following data reflect plots sampled in ARCN. This ecotype was developed as part of the regional classification and was identified in Selawik refuge through the spectral classification and mapping effort.

#### Geomorphology:

This is a mid-successional ecotype that occurs along rivers. It occurs on braided and meander inactive overbank deposits and braided coarse inactive channel deposits at low elevations.

#### Plant Association:

*Populus balsamifera*–*Picea glauca*–*Salix alaxensis*

A mix of evergreen and deciduous trees characterizes this ecotype. Deciduous shrubs, forbs, and mosses are prevalent in the understory. Common species include *Shepherdia canadensis*, *Moneses uniflora*, *Pyrola secunda*, *Hylocomium splendens*, and *Sanionia uncinata*.

Riverine White Spruce–Poplar Forest is most similar to Riverine Poplar Forest, except it is an older successional stage, and spruce trees are co-dominant.

Soils:

Soils are typically loamy or sandy with a thin surface organic horizon. Depth to permafrost is difficult to determine; however, if permafrost does occur, it is assumed to be greater than one meter, given the well drained soils and proximity to flowing water. Frost boils and surface fragments are rare, and loess caps are absent. Organic horizons, buried during flooding by riverine silts and sands, sometimes occur in these soils. Soil pH is circumneutral to alkaline, and EC is low. The soils are typically somewhat excessively to moderately well drained. Depth to water table often could not be measured but it is assumed to fluctuate throughout the year within the upper two meters of the soil profile.

The dominant soil subgroups in this ecotype are Typic Gelorthents (poorly developed with permafrost below one meter) and Typic Cryorthents (poorly developed soils, lacking permafrost).

RIVERINE WHITE SPRUCE–WILLOW FOREST

Geomorphology:

Riverine White Spruce–Willow Forest occurs on braided and meander inactive overbank deposits, and meander fine inactive channel deposits. Surface forms include interfluves, flat banks or channels.

Plant Association:

*Picea glauca*–*Salix lanata* ssp. *richardsonii*–*Moneses uniflora*

Spruce trees in these mature forests have open canopies, and the understory consists of mixed low and tall shrubs and forbs growing out of a thick carpet of feather mosses. All life forms can be present. Common species include *Linnaea borealis*, *Alnus crispa*, *Anemone parviflora*, *Mertensia paniculata*, *Moneses uniflora*, *Senecio lugens*, and *Rhytidiadelphus triquetrus*.

This ecotype is most similar to Riverine White Spruce–Alder Shrub as previously discussed.

Soils:

Soils are typically loamy or sandy with a thin surface organic horizon. Depth to permafrost is usually within one meter of the surface. Frost boils, surface fragments, and loess caps are absent. Organic horizons, buried during flooding by riverine silts and sands, often occur in these soils. Soil pH is circumneutral to alkaline, and EC is low. The soils are typically well to moderately well drained. Depth to water table often could not be measured, but it is assumed to fluctuate throughout the year within the upper two meters of the soil profile, given the proximity of river water.

The dominant soil subgroups in this ecotype are Typic Gelorthents (poorly developed with permafrost below one meter) and Typic Gelifluvents (poorly developed with buried organic horizons, permafrost below one meter).

RIVERINE WILLOW LOW SHRUB

General:

We did not collect any plot data in Selawik refuge for this ecotype, and the following data reflect plots sampled in ARCN. This ecotype was developed as part of the regional

classification and was identified in Selawik refuge through the spectral classification and mapping effort.

**Geomorphology:**

This ecotype occurs along rivers on braided active channel deposits, braided and meander active and inactive overbank deposits, meander inactive channel deposits, old alluvial fans, and moderately steep headwater floodplains and channel deposits. Surface forms include interfluves, flat banks, terraces, and drainage-ways.

**Plant Association:**

*Salix lanata* ssp. *richardsonii*–*Salix reticulata*

This ecotype is characterized by open canopied, low (less than 1.5 m) willow with a subcomponent of dwarf shrubs, forbs and mosses. Presence of graminoids and evergreen trees is variable. Common species include *S. lanata* ssp. *richardsonii*, *S. reticulata*, *S. glauca*, *Anemone parviflora*, *Festuca altaica*, *Carex capillaris*, *Aulacomnium palustre*, *Hylocomium splendens* and *Flavocetraria cucullata*.

This ecotype differs from other riverine willow ecotypes in characteristic species and shrub heights are lower.

**Soils:**

Soils are typically gravelly, loamy, or sandy with a thin surface organic horizon. Depth to permafrost is difficult to determine in the rocky soils; however, if permafrost does occur, it is assumed to be greater than one meter, given the well drained soils. Frost boils and loess caps are absent, and surface fragments are rare. Soil pH is circumneutral to alkaline, and EC is low to moderate. The soils are typically excessively to well drained. Depth to water table often could not be measured, but it is assumed to fluctuate throughout the year within the upper two meters of the soil profile, given its proximity to river water.

The dominant soil subgroups in this ecotype are Typic Gelorthents (poorly developed with permafrost below one meter) and Typic Eutrogelepts (non-acidic, partially developed with permafrost below one meter).

**UPLAND ALDER–WILLOW TALL SHRUB**

**Geomorphology:**

This ecotype occurs on hillside colluvium, older moraine, and upland loess. It is found on steep to moderately steep upper and lower concave and convex slopes up to approximately 300 m elevation throughout Selawik refuge. At some sites, gelifluction lobes and undifferentiated mounds create micro-topographic variation.

**Plant Associations:**

*Alnus crispa*–*Calamagrostis canadensis*

*Alnus crispa*–*Salix lanata* ssp. *richardsonii*

These tall shrub communities have open (greater than 25 percent) to closed (greater than 75 percent) canopies with an understory of low and dwarf shrubs, forbs, grasses, and mosses. Lichen, sedge, and tree cover is more variable. There are two distinct community types for Upland Alder–Willow Tall Shrub. The first has bluejoint grass, *C. canadensis*, as an understory dominant, while the second has a stronger willow subcomponent, particularly *S. lanata* ssp. *richardsonii*. Common species include *S. planifolia* ssp. *pulchra*, *Empetrum nigrum*, *Vaccinium uliginosum*, *Equisetum arvense*, and *Epilobium angustifolium*.

Upland Alder–Willow Tall Shrub is similar to Upland Birch Forest in site factors, although species assemblages are distinctly different. It is similar to Riverine Alder Tall Shrub in the dominance of *A. crispa*, but physiographic characters are unrelated.

Soils:

Soils are typically loamy or rubbly, with a thin to moderately thick surface organic horizon. Thaw depths are often less than one meter. Frost boils and surface fragments are absent, and loess caps are uncommon. However, when loess caps occur, they tend to be thick. Soil pH is acidic to circumneutral, and EC is low. The soils are typically well drained to moderately well drained. Depth to water table often could not be measured, and it was assumed in such instances to be at substantial depths, given the well drained soils.

Dominant soil subgroups in this ecotype include Typic Haploturbels (mineral soil over permafrost with cryoturbation), and Typic Cryorthents (poorly developed soils, lacking permafrost). Additional soil subgroups identified in the regional classification include Typic Eutroglepts (non-acidic, partially developed with permafrost below one meter), Typic Dystrocryepts (acidic, partially developed, lacking permafrost), and Typic Humicryepts (moist, acidic, organic-rich, partially developed, lacking permafrost).

## UPLAND BIRCH FOREST

Geomorphology:

The distribution of Upland Birch Forest is limited to localized, fragmented patches in Selawik refuge. It occurs on slopes comprised of older moraine and kame deposits.

Plant Association:

*Betula papyrifera*–*Picea glauca*–*Ledum decumbens*

*Betula papyrifera*–*Picea glauca*–*Vaccinium vitis-idaea*

Open to closed stands of birch (*Betula papyrifera*) dominate this ecotype, and all life forms except sedges are typically present. Common species include *Ledum decumbens*, *Vaccinium uliginosum*, *V. vitis-idaea*, *Epilobium angustifolium*, and *Cladina rangiferina*.

Upland Birch Forest is comparable to Upland Spruce–Birch Forest, with which it shares a plant association. The primary difference is this ecotype is strictly birch-dominated, while the other is co-dominated by birch and white spruce.

Soils:

Soils are typically gravelly or loamy and feature a thin surface organic horizon. Thaw depths often could not be determined in the rocky soils, but permafrost is presumed to be absent or to

occur below a depth of two meters. Frost boils and surface fragments are absent. Loess caps are uncommon. Soil pH is acidic, and EC is low. The soils are well drained. Depth to water table often could not be measured, but it is assumed to be at substantial depths, given the well drained soils.

A common soil type is Typic Cryorthents (poorly developed soils, lacking permafrost). A less common soil type is Typic Dystrocryepts (acidic, partially developed, lacking permafrost).

#### UPLAND BIRCH–ERICACEOUS LOW SHRUB

##### Geomorphology:

This low shrub-dominated ecotype is common throughout Selawik refuge in upland areas up to approximately 400 meters. It occurs on hillside colluvium, older moraine, solifluction deposits, upland loess, and eolian inactive sand deposits.

##### Plant Association:

*Betula nana*–*Ledum decumbens*

Both dwarf and low shrubs characterize this ecotype. Mosses and lichens are well represented, and sedges, grasses, forbs, and trees are present with low cover. Ericaceous shrubs and dwarf birch, (*B. nana*) are abundant. Common species include *Vaccinium vitis-idaea*, *V. uliginosum*, *Empetrum nigrum*, *Carex bigelowii*, *Flavocetraria cucullata*, and *Aulacomnium turgidum*.

This ecotype is most similar to Upland Birch–Willow Low Shrub, where willows are co-dominant. Lowland Birch–Ericaceous Low Shrub has similar species but has wetter, loamy, organic-rich soils.

##### Soils:

Soils are loamy, and feature a thin to moderately thick surface organic horizon. Permafrost typically occurred in the upper meter of the soil profile. Cryoturbation is common. Surface fragments are absent. Frost boils are rare, and loess caps are uncommon. However, when loess occurs, it tends to be thick. Soil pH is acidic to circumneutral, and EC is low. The soils are typically well drained to somewhat poorly drained.

Common soil types include Typic Haplorthels (mineral soil over permafrost lacking cryoturbation) and Typic Haploturbels (mineral soil over permafrost with cryoturbation). A less common subgroup is Typic Cryorthents (poorly developed soils, lacking permafrost).

#### UPLAND BIRCH–WILLOW LOW SHRUB

##### General:

We did not collect any ground plot data in Selawik refuge for this ecotype, and the following data reflect plots sampled in ARC/N. This ecotype was developed as part of the regional classification and was identified in Selawik refuge through the spectral classification and mapping effort.

Geomorphology:

Upland Birch–Willow Low Shrub is a widespread ecotype that is abundant on older moraine, hillside colluvium, solifluction deposits, upland loess, upland retransported deposits, and abandoned alluvial fan deposits. Surfaces are typically sloped.

Plant Association:

*Betula nana*–*Vaccinium vitis-idaea*–*Dryas octopetala*

*Salix planifolia* ssp. *pulchra*–*Betula nana*– *Polygonum bistorta*

This ecotype has two plant associations, and both contain a mix of low birch and willow shrub communities. The first is dominated by *B. nana* with a reduced willow component, and the second is dominated by *S. planifolia* ssp. *pulchra* with a reduced dwarf birch component. Upland Birch–Willow Low Shrub has variable cover of most life forms. Common species include *Salix glauca*, *Vaccinium uliginosum*, *Polygonum bistorta*, *Petasites frigidus*, *Carex bigelowii*, *Hylocomium splendens*, and *Flavocetraria cucullata*.

This ecotype is most similar to Upland Birch–Ericaceous Low Shrub as previously discussed. It is also comparable to Lowland Birch–Willow Low Shrub, although the vegetation community is different because soils are drier and rockier with less organic matter.

Soils:

Soils are loamy, blocky, or gravelly, with a thin surface organic horizon. Thaw depths often could not be determined in the rocky soils, but permafrost is presumed to be present within the upper two meters of the soil profile. Cryoturbation is rare. Frost boils are uncommon, and surface fragments and loess caps are rare. Soil pH is acidic to circumneutral, and EC is low. The soils are typically well drained to moderately well drained, or somewhat poorly drained. Depth to water table ranged from shallow to moderately deep; however, the rocky soils made it difficult to measure.

At well drained sites, the dominant soil subgroups are Typic Dystroglepts (acidic, well drained, moderately thin organic horizon, permafrost below one meter) and Typic Haploorthels (mineral soil over permafrost lacking cryoturbation). At poorly drained sites, dominant soil subgroups include Typic Haploturbels (mineral soil over permafrost with cryoturbation) and Typic Aquorthels (wet, mineral soil over permafrost lacking cryoturbation).

### UPLAND BLUEJOINT MEADOW

General:

We only sampled one plot in this ecotype in Selawik refuge. The following description mostly uses data from plots sampled in ARCN to provide a more robust description of this ecotype.

Geomorphology:

Upland Bluejoint Meadow primarily occurs after fire and is uncommon in Selawik refuge. It occurs on upper slopes comprised of hillside colluvium or loess. Due to its low abundance, this ecotype was not mapped.

## Plant Association:

*Calamagrostis canadensis*–*Polemonium acutiflorum*

Upland Bluejoint Meadow is primarily grass-dominated, although forbs can be co-dominant at some sites. Trees and tall shrubs are rare, but all other life forms are well represented. Total nonvascular cover is often low. Common species include *Aconitum delphinifolium*, *Equisetum sylvaticum*, *Petasites frigidus*, and *Carex podocarpa*.

Upland Bluejoint Meadow is similar to Riverine Bluejoint Meadow and Lacustrine Bluejoint Meadow in species composition, although physiographic factors are unrelated.

## Soils:

Soils are loamy, blocky, or rubbly, with a thin surface organic horizon and a thick, dense root mat. Thaw depths often could not be determined in the rocky soils, but permafrost is presumed to be absent or to occur below a depth of one meter. Frost boils and loess caps are absent, and surface fragments are rare. Soil pH is acidic to circumneutral, and EC is low. The soils are well drained to moderately well drained. Depth to water table often could not be measured.

The dominant soil subgroup is Typic Haploturbels (mineral soil over permafrost with cryoturbation). Additional soil subgroups identified in the regional classification include Typic Eutrogelepts (non-acidic, partially developed with permafrost below one meter) and Typic Dystrogelepts (acidic, partially developed, permafrost below one meter).

UPLAND DWARF BIRCH–TUSSOCK SHRUB

## Geomorphology:

Upland Dwarf Birch–Tussock Shrub is the most abundant ecotype in Selawik refuge. It is found on moderate to gentle slopes at low elevations. It occurs on loess, older moraine, abandoned delta deposits, ice-rich centers, and margins of thaw basins, drained basins, and bogs.

## Plant Association:

*Betula nana*–*Eriophorum vaginatum*

*Eriophorum vaginatum*–*Drosera rotundifolia*

Vegetation in this type is dominated by the tussock forming sedge *Eriophorum vaginatum* and the dwarf shrub *Betula nana*. It is the primary ecotype used by caribou for winter lichen grazing, and lichen cover is higher in this ecotype than in other similar ones. Other common species include *Ledum decumbens*, *Vaccinium vitis-idaea*, *V. uliginosum*, *Rubus chamaemorus*, *Carex bigelowii*, and *Flavocetraria cucullata*. Sphagnum mosses are also abundant and diverse.

This ecotype is very similar to Upland Moist Birch–Ericaceous Shrub, Lowland Moist Birch–Ericaceous Shrub, and Lowland Wet Dwarf Birch–Ericaceous Shrub but differs by the prevalence (greater than or equal to 25 percent cover) of tussocks formed by *Eriophorum vaginatum* and lower cover of ericaceous shrubs.

Soils:

Soils are typically organic-rich loams and silt-loams and feature a moderately thick to thick surface organic horizon. Depth to permafrost is typically less than one meter. Cryoturbation was common in the upper meter of the soil profile, and buried discontinuous organic layers sometimes occur as the result of cryoturbation of surface organics. Frost boils and loess caps are rare, and surface fragments are absent. Soil pH is acidic, and EC is low. The soils are typically very poorly to somewhat poorly drained, and water table is shallow.

Common soil types include Typic Historthels (wet, organic-rich soil over permafrost lacking cryoturbation), Typic Histoturbels (wet, organic-rich soil over permafrost with cryoturbation), and Typic Fibristels (wet, poorly decomposed thick peat, permafrost in upper meter). Less common soil types are Typic Haplorthels (mineral soil over permafrost lacking cryoturbation) and Typic Haploturbels (mineral soil over permafrost with cryoturbation).

UPLAND SANDY BARRENS

General:

We only collected aerial plots for this ecotype in Selawik refuge, and the following data reflect ground plots sampled in ARCN. This ecotype was developed as part of the regional classification and was identified in Selawik refuge through the aerial surveys and spectral classification and mapping effort.

Geomorphology:

Upland Sandy Barrens encompasses the active portions of the Little Kobuk Sand Dunes and isolated smaller exposed dunes in the Waring Mountains region in Selawik refuge. These eolian active sand dunes occur under approximately 100 m elevation.

Plant Association:

*Calamagrostis purpurascens*–*Oxytropis kobukensis*

The unique flora of the Kobuk Sand Dunes has been well documented. All life forms can be present in trace quantities. Forbs and grasses are the most represented. We documented two rare species in this ecotype, *Oxytropis kobukensis* and *Lupinus kuschei*. Common species include *Eritrichium splendens*, *Minuartia elegans*, *Senecio ogotorukensis*, *Bromus pumpellianus* var. *arcticus*, and *Calamagrostis purpurascens*.

This ecotype is unique. Its closest analog is Upland White Spruce–Lichen Woodland, which occurs adjacent to it on stabilized dunes.

Soils:

Soils are sandy and lack a surface organic horizon. Thaw depths could not be determined as the depth to permafrost, if present, was always greater than the maximum depth sampled (1.3 m). Frost boils, surface fragments, and loess caps are absent. Thin organic horizons, buried by wind blown sands, occurred occasionally. Soil pH is alkaline to circumneutral, and EC is low. The soils are excessively drained. Depth to water table often could not be measured, but it is assumed to be at substantial depths, given the excessively drained soils.

This ecotype included one soil subgroup, Typic Cryopsamments (sandy, low coarse fragment content, well drained, lacking permafrost).

#### UPLAND SEDGE–DRYAS MEADOW

General:

We did not collect any plot data in Selawik refuge for this ecotype, and the following data reflect plots sampled in ARCN. This ecotype was developed as part of the regional classification and was identified in Selawik refuge through the spectral classification and mapping effort.

Geomorphology:

These upland meadows are associated with carbonate-rich bedrock. Surface geomorphology consists of hillside colluvium, older moraine, and upland retransported deposits. Surfaces are sloped and feature mineral-cored hummocks, stripes, and gelifluction lobes.

Plant Association:

*Dryas integrifolia*–*Carex bigelowii*–*Equisetum arvense*

*Dryas integrifolia*–*Carex scirpoidea*–*Rhododendron lapponicum*

Dwarf shrubs, sedges, forbs, and mosses are prevalent in Upland Sedge–Dryas Meadow. We identified two distinct plant associations in this ecotype. Common species include *Salix reticulata*, *Chrysanthemum integrifolium*, *Polygonum viviparum*, *Thalictrum alpinum*, *Carex atrofusca*, *Rhytidium rugosum*, and *Flavocetraria cucullata*.

This ecotype is similar to Alpine Alkaline Dryas Dwarf Shrub, except soils are moist to wet instead of dry, and sites occur at slightly lower elevations and have higher cover of sedges.

Soils:

Soils are loamy to rubbly, with a thin to moderately thick surface organic horizon. Permafrost often occurs in the upper meter of the soil profile. Frost boils and sorted ground are common. Surface fragments and loess caps are rare. Buried discontinuous organic layers sometimes occur as the result of cryoturbation. Soil pH is alkaline to circumneutral, and EC is low. The soils are somewhat poorly drained, and occasionally well drained. The water table is shallow to moderately deep.

Dominant soil subgroups include Typic Aquiturbels (wet, mineral soil over permafrost with cryoturbation), Ruptic-histic Aquiturbels (wet, highly cryoturbated surface organics and mineral soil above permafrost), and Typic Gelaquepts (wet, partially developed, permafrost below one meter).

#### UPLAND SPRUCE–BIRCH FOREST

Geomorphology:

These mixed forests are uncommon and occur on hillside colluvium and loess within the boreal forest zone in Selawik refuge. Slope gradient is high to moderately high, and slope aspect is typically southerly or westerly.

Plant Association:

*Betula papyrifera*–*Picea glauca*–*Vaccinium vitis-idaea*

White spruce and birch trees are co-dominant in open to closed stands in this ecotype, and all life forms except sedges are typically present. Common species include *Alnus crispa*, *Vaccinium vitis-idaea*, *Linnaea borealis*, *Equisetum pratense*, *Hylocomium splendens*, *Cladina rangiferina*, and *Peltigera aphthosa*.

Upland Spruce–Birch Forest is comparable to Upland Birch Forest, as previously discussed. It is somewhat similar to Upland White Spruce–Ericaceous Forest and Upland White Spruce–Willow Forest in that white spruce is a dominant species but varies in actual species composition and site factors.

Soils:

Soils are typically loamy, blocky, or rubbly and feature a thin to moderately thick surface organic horizon. Thaw depths often could not be determined in the rocky soils, but, in most cases, permafrost is presumed to be absent or to occur below a depth of two meters. Frost boils and surface fragments are absent. Loess caps are rare. However, when loess does occur, it tends to be thick. Soil pH is acidic, and EC is low. The soils are well drained to moderately well drained. Depth to water table often could not be measured, but it is assumed to be at substantial depths, given the well drained soils.

A common soil subgroup is Typic Dystrocryepts (acidic, partially developed, lacking permafrost). A less common soil subgroup is Typic Haplorthels (mineral soil over permafrost lacking cryoturbation).

#### UPLAND WHITE SPRUCE–ERICACEOUS FOREST

Geomorphology:

Upland White Spruce–Ericaceous Forest is common throughout Selawik refuge in places forming the circumpolar treeline. Slope gradient is typically low to moderately steep. It is found on hillside colluvium, upland loess, and older moraine upwards to nearly 300 m elevation.

Plant Association:

*Picea glauca*–*Ledum decumbens*

*Picea glauca*–*Vaccinium vitis-idaea*

White spruce (*P. glauca*) predominates and occurs in open stands. The understory is dominated by evergreen shrubs but also contains a mixture of deciduous low and tall shrubs, forbs, and nonvascular species, with more variable cover of graminoids. Common species include *Empetrum nigrum*, *Ledum decumbens*, *Vaccinium uliginosum*, *Lycopodium annotinum*, *Hylocomium splendens*, *Pleurozium schreberi*, and *Cladina rangiferina*.

This ecotype is similar to Upland White Spruce–Willow Forest except that low and dwarf ericaceous shrubs are more prevalent than are willow species, it is more acidic, and it has lower species diversity.

## Soils:

Soils are loamy, blocky, or rubble, with a surface organic horizon thin to moderately thick. Depth to permafrost was often less than one meter. Frost boils are absent, and surface fragments are absent. Loess caps are uncommon, and moderately thick to thick. Soil pH is acidic to circumneutral, and EC is low. The soils are well to moderately well drained. Depth to water table often could not be measured, and it is assumed to be at substantial depth.

A common soil subgroup is Typic Haplorthels (mineral soil over permafrost lacking cryoturbation). Less common soil subgroups include Typic Histoturbels (wet, organic-rich soil over permafrost with cryoturbation) and Typic Haploturbels (mineral soil over permafrost with cryoturbation).

UPLAND WHITE SPRUCE–LICHEN WOODLAND

## General:

We only collected aerial plots for this ecotype in Selawik refuge, and the following data reflect ground plots sampled in ARCN. This ecotype was developed as part of the regional classification and was identified in Selawik refuge through the aerial surveys and spectral classification and mapping effort.

## Geomorphology:

This ecotype occurs on eolian inactive sand dunes in the Waring Mountains. These dunes are stable enough for a thick cover of lichens to develop. Surface forms include slopes, shoulders, and crests.

## Plant Association:

*Picea glauca*–*Cladina stellaris*

Lichens and white spruce are co-dominant in this ecotype. Spruce trees have 10–24 percent cover. Deciduous and evergreen shrubs, grasses, and forbs are always present in low quantities. Sedges are absent. Common species include *Empetrum nigrum*, *Vaccinium uliginosum*, *Solidago multiradiata*, *Cladina rangiferina*, *C. stellaris*, *Flavocetraria nivalis*, and *Stereocaulon* sp.

This ecotype is most similar to Upland White Spruce–*Dryas* Woodland except the substrate is more stabilized and lichens are more prevalent.

## Soils:

Soils are sandy and typically feature a thin discontinuous surface organic horizon. Thaw depths could not be determined, as the depth to permafrost, if present, was always greater than the maximum depth sampled (1.3 meters). Frost boils, surface fragments, and loess caps are absent. Soil pH is acidic, and EC is low. The soils are typically excessively to somewhat excessively well drained. Depth to water table often could not be measured, but it is assumed to be at substantial depths, given the well drained soils.

The dominant soil subgroup in this ecotype is Typic Cryopsamments (sandy, low coarse fragment content, well drained, lacking permafrost). A less common subgroup is Typic Dystrocryepts (acidic, partially developed, lacking permafrost).

## UPLAND WHITE SPRUCE–WILLOW FOREST

### General:

We only sampled one plot in this ecotype in Selawik refuge. The following description mostly uses data from plots sampled in ARCN to provide a more robust description of this ecotype.

### Geomorphology:

This ecotype is common in the Waring Mountains, Kiliovilik Range, Purcell Mountains, and Selawik Hills. Surfaces are sloped, and this ecotype occurs at elevations up to 550 m. It is found on hillside colluvium, older moraine, retransported deposits, and abandoned alluvial fan deposits.

### Plant Association:

*Picea glauca*–*Salix reticulata*–*Carex scirpoidea*

Vegetation is dominated by white spruce and deciduous shrubs. White spruce stands vary from woodlands to open canopies (10–74 percent cover). Cover of evergreen shrubs, forbs, and mosses can be high. Sedges are usually present in low amounts. Common species include *Arctostaphylos rubra*, *Potentilla fruticosa*, *Salix reticulata*, *S. lanata* ssp. *richardsonii*, *Vaccinium uliginosum*, *Anemone parviflora*, *Carex scirpoidea*, *Hylocomium splendens*, and *Peltigera aphthosa*.

This ecotype is similar to Upland White Spruce–Ericaceous Forest, except willow is the dominant understory species instead of ericaceous shrubs.

### Soils:

Soils are typically rubbly, blocky, or loamy and feature a thin to moderately thick surface organic horizon. Thaw depths often could not be determined in the rocky soils, but permafrost is presumed to be present below one meter. Frost boils, loess caps, and surface fragments are rare. Soil pH is alkaline to circumneutral, and EC is low. The soils are typically moderately well to well drained. Depth to water table often could not be measured, but it is assumed to be at substantial depths, given the well drained soils.

We identified the soil subgroup Typic Histoturbels (wet, organic-rich soil over permafrost with cryoturbation) in Selawik refuge. Additional soil subgroups in this ecotype identified in the regional classification include Typic Eutrogelepts (non-acidic, partially developed with permafrost below one meter), Humic Eutrogelepts (non-acidic, well drained, a moderately thick organic-rich A horizon, permafrost below one meter), and Typic Haplorthels (mineral soil over permafrost lacking cryoturbation).

## UPLAND WILLOW LOW SHRUB

### General:

We did not collect any plot data in Selawik refuge for this ecotype, and the following data reflect plots sampled in ARCN. This ecotype was developed as part of the regional classification and was identified in Selawik refuge through the spectral classification and mapping effort.

**Geomorphology:**

Upland Willow Low Shrub occurs on gentle to moderate slopes on colluvium and alluvial fan deposits. This type is found throughout Selawik refuge at elevations above 150 m and often is associated with alkaline soil parent material.

**Plant Association:**

*Salix lanata* ssp. *richardsonii*–*Equisetum arvense*

Vegetation is dominated by low willows (0.2–1.5 m tall) with an open to closed canopy. The canopy is dominated by *Salix lanata* ssp. *richardsonii* but often includes *S. glauca* and *S. planifolia* ssp. *pulchra*. Forbs are prevalent, specifically *Equisetum arvense* and *Valeriana capitata*. Other common species include *Dryas* spp., *Vaccinium uliginosum*, *S. reticulata*, and *Festuca altaica*. The mosses *Tomentypnum nitens* and *Hylocomium splendens* are also common. This ecotype has high species diversity.

Upland Birch–Willow Low Shrub is similar to this ecotype, except dwarf birch is co-dominant and *S. planifolia* ssp. *pulchra* is usually the dominant willow.

**Soils:**

Soils are loamy, with a moderately thick surface organic horizon. Permafrost often occurs in the upper meter of the soil profile. Frost boils, surface fragments, and loess caps are rare. Buried discontinuous organic layers sometimes occur as the result of cryoturbation. Soil pH is alkaline to circumneutral, and EC is low. The soils are somewhat poorly to well drained. The water table is shallow to moderately deep.

Dominant soil subgroups include Typic Aquorthels (wet, mineral soil over permafrost lacking cryoturbation) and Typic Eutrogelepts (non-acidic, partially developed with permafrost below one meter). Uncommon subgroups include Aquic Eutrogelepts (wet, non-acidic, mineral soil, permafrost below one meter), Typic Historthels (wet, organic-rich soil over permafrost lacking cryoturbation), and Typic Haploturbels (mineral soil over permafrost with cryoturbation).

**ALPINE LAKE****General:**

We did not collect any plot data in Selawik refuge for Alpine Lake, which comprises one hectare of the map outside the refuge boundary in the 10-mile buffer zone. The following data are from the regional classification.

**Geomorphology:**

Alpine Lake occurs in mountain cirques and in depressions in bedrock or glacial moraine. This ecotype is found in mountainous regions throughout our study area and includes shallow (less than 1.5 m) to deep (greater than or equal to 1.5 m) lakes, usually above 400 m elevation.

Floristic classes were not developed for lake ecotypes since vegetation is lacking or sparse. Vegetation only occurs in shallow lakes or margins in this ecotype. The only vascular species we encountered was *Ranunculus hyperboreus*, but additional species such as pondweeds (*Potamogeton* spp.) probably occur in Alpine Lake.

This ecotype is most similar to Lowland Lake but is less productive, has fewer plant species, and is much less prevalent across the landscape.

### COASTAL BARRENS

General:

We did not collect any plot data in Selawik refuge for this ecotype. This ecotype was developed as part of the regional classification and was identified in Selawik refuge through the spectral classification and mapping effort.

Geomorphology:

Coastal Barrens is uncommon in Selawik refuge and comprises salt affected active marine beaches, active eolian coastal sand deposits, and active tidal flats along ocean waters. The surface is frequently scoured by wave action and storm surges.

Plant Association:

*Elymus arenarius* ssp. *mollis*–*Lathyrus maritimus*

*Carex ramenskii*–*Puccinellia phryganodes*

High disturbance maintains the barren nature of this ecotype, and vegetation is sparse to non-existent. Plant species occur in trace quantities. Trees, evergreen shrubs, and lichens are absent. The species present in this ecotype are early colonizers tolerant of inundation by seawater and frequent scouring by wind and sand. Common species include *Honckenya peploides*, *Lathyrus maritimus*, and *Elymus arenarius* ssp. *mollis*.

This ecotype is not similar to any other ecotypes.

Soils:

On beaches, soils are sandy, excessively drained and lack a surface organic horizon. On active tidal flats, loamy soils and proximity to sea level impede drainage, resulting in wet soils with poor drainage. Organic horizons, buried by ocean sands and silts during tidal floods, are commonly found in these soils. At all sites, permafrost occurs at or near a depth of one meter below the soil surface. Frost boils, loess caps, and surface fragments are absent. Coarse fragments are absent in the active layer. Soil pH is circumneutral to alkaline, site chemistry is brackish or saline, and EC is high.

The dominant soil subgroups in this ecotype are Oxyaquic Cryopsamments (wet, saturated early in growing season, sandy, low coarse fragment content, lacking permafrost), Typic Cryopsamments (sandy, low coarse fragment content, well drained, lacking permafrost), and Fluvaquentic Aquorthels (wet, saturated within 50 cm, mineral soil with thin buried horizons, permafrost within one meter).

COASTAL BRACKISH SEDGE–GRASS MEADOW

## General:

We did not collect any plot data in Selawik refuge for this ecotype. This ecotype was developed as part of the regional classification and was identified in Selawik refuge through the spectral classification and mapping effort.

## Geomorphology:

This ecotype occurs on flat areas on active and inactive tidal flats, particularly around deltas, in limited distribution along the coast. Elevations are at sea level or slightly above. Soil electrical conductivity values are above 800 $\mu$ S.cm-1.

## Plant Association:

*Carex ramenskii*– *Dupontia fischeri*

*Carex ramenskii*–*Puccinellia phryganodes*

Grasses and sedges characterize this ecotype, while forbs and low deciduous shrubs contribute a minor amount to the overall assemblage. Trees, tall shrubs, mosses, and lichens are absent. The first plant association is related to brackish sites. Common species on these sites include *Carex ramenskii*, *Dupontia fischeri*, and *Calamagrostis deschampsoides* on lower, wetter micro-sites, and *Salix ovalifolia* and *Deschampsia caespitosa* on drier micro-sites. The second plant association is related to saline sites. Common species on these sites include *Carex ramenskii*, *Puccinellia phryganodes*, *Chrysanthemum arcticum*, and *Carex subspathacea*.

## Soils:

Soils are loamy and typically feature a moderately thick surface organic horizon. Permafrost occurs in the upper meter of the soil profile. Frost boils, loess caps, and surface fragments are absent. Coarse fragments are absent in the active layer. Organic horizons, buried by ocean sands and silts during tidal floods, are sometimes found in these soils. Soil pH is circumneutral, site chemistry is brackish, and EC is high. The soils are very poorly drained, and the water table is very shallow to above ground.

The dominant soil subgroups in this ecotype are Typic Historthels (wet, organic-rich soil over permafrost and lacking cryoturbation) and Fluvaquentic Aquorthels (wet, saturated within 50 cm, mineral soil with thin buried horizons, and permafrost within one meter).

COASTAL WATER

## General:

We did not collect any plot data in Selawik refuge for this ecotype. This ecotype was developed as part of the regional classification and was identified in Selawik refuge through the spectral classification and mapping effort.

## Geomorphology:

Coastal Water includes the nearshore waters of the Chukchi Sea, Kotzebue Sound, and Hotham Inlet. It also includes the brackish watering comprising estuarine waters and lakes on

the coast that are influenced by both fresh and nearshore water, such as Selawik Lake. Brackish waters are flooded periodically with saltwater during high tides or storm surges, subsequently resulting in fluctuations in salinity levels. Some lakes have distinct outlets or have been tapped and partially drained through erosional processes. Shallow lakes (less than 1.5 m) freeze to the bottom during winter.

### SNOW/GLACIERS

We mapped two hectares of this ecotype in the Kiliovilik Range near the refuge boundary. This ecotype represents late-thawing seasonal snowpack that is present on the Landsat Imagery. Selawik refuge does not contain any glaciers or permanent snowfields.

### RARE ECOTYPES

We identified three ecotypes that are rare in Selawik refuge: Lacustrine Willow Shrub, Upland Spruce–Aspen Forest, and Upland Willow Tall Shrub.

Lacustrine Willow Shrub occurs on the margins of lakes on lacustrine deposits, on older moraine near kettle basins, and on ice-poor margins of drained-lake basins. Common species include *S. planifolia* ssp. *pulchra*, *Betula nana*, *Carex aquatilis*, and *Aulacomnium palustre*. Soils are typically loamy with a thin to moderately thick surface organic horizon. Permafrost occurs within the upper meter of the soil profile. Soil pH is circumneutral to acidic, and EC is low. Soil subgroups documented in this ecotype include Typic Aquorthels (wet, mineral soil over permafrost lacking cryoturbation) and Typic Umbrorthels (moist, organic-rich mineral soil over permafrost lacking cryoturbation).

Upland Spruce–Aspen Forest occurs in small patches on older moraine in Selawik refuge. Common species include *Picea glauca*, *Populus tremuloides*, *Vaccinium uliginosum*, *Betula glandulosa*, *Festuca altaica*, and *Stereocaulon* sp. Soils are loamy to gravelly and are well drained. Soil pH is circumneutral, and EC is low. Soil subgroups documented in this ecotype include Typic Haploturbels (mineral soil over permafrost with cryoturbation) and Typic Eutrogelepts (non-acidic, partially developed with permafrost below one meter).

Upland Willow Tall Shrub is found on upland and lowland loess deposits. Dominant plant species include *Salix lanata* ssp. *richardsonii*, *Equisetum arvense*, *Petasites frigidus*, and *Valeriana capitata*. Soils are loamy, and pH is circumneutral, and EC is low. A soil subgroup documented in this ecotype is Typic Haploorthels (mineral soil over permafrost lacking cryoturbation).

Source:

Jorgenson, M. T., J. E. Roth, P. F. Miller, M. J. Macander, M. S. Duffy, E. R. Pullman, E. A. Miller, L. B. Attanas, A. F. Wells, and S. Talbot. 2009. An ecological land survey and landcover map of the Selawik National Wildlife Refuge. Final Report. ABR, Inc., Fairbanks, AK and U.S Fish and Wildlife Service, Anchorage, AK. 238 pp.

**Appendix K**  
**Response to Public Comments**



## **K. Response to Public Comments on the Draft Plan and Environmental Assessment**

### **K.1 Introduction**

This appendix summarizes the public comments that the Service received in response to the Draft Revised Comprehensive Conservation Plan and Environmental Assessment for the Selawik refuge (draft plan). Section K.2 of this appendix provides a general overview and summary of the public comments. The Service responded to substantive comments in Section K.3 of this appendix. We received public comments and other feedback through letters, e-mails, comment worksheets, and at public meetings. The full text of comments and detailed notes from public meetings are part of the administrative record and are available upon request from the U.S. Fish and Wildlife Service Regional Office in Anchorage, Alaska.

### **K.2 Summary of Public Comments**

Written comments were received from 30 individuals and organizations: 21 from Alaska, five from outside Alaska, and four unknown. Agencies and organizations included the State of Alaska, Citizens' Advisory Commission on Federal Areas, NANA Regional Corporation, Northwest Arctic Borough, Native Village of Kotzebue, Native Village of Selawik, Safari Club International, Alaska Professional Hunters Association, Science Now Project, and Friends of Alaska National Wildlife Refuges. Twenty individuals commented, including one registered guide and transporter and at least three residents of communities near the Selawik refuge. Refuge staff attended tribal or city council meetings in Selawik and Noorvik, where oral comments and questions were received from approximately nine individuals. Refuge staff also held informal conversations with the public about the draft plan as opportunity allowed.

There were numerous positive comments. The State of Alaska said, "We appreciate the considerable efforts of both refuge and regional staff in developing a clear planning document that addresses a variety of management issues identified through the planning process." The Northwest Arctic Borough (NWAB, borough) said, "The Borough ... appreciates your communication and willingness to work cooperatively with the borough and our residents on the draft plan." NANA Regional Corporation stated, "Overall, we are very pleased with the level of local community and regional involvement that went into the creation of this management plan."

While many of those who commented disagreed with aspects of the draft plan, few were highly critical of the planning process or overall document. One believed the plan required an Environmental Impact Statement, "not a sloppy, cheap Environmental Assessment." Two people objected to the inclusion of a representative from NANA Regional Corporation on the planning team. For example, the Science Now Project stated that it "... opposes an ANCSA-defined, for profit regional corporation being included as a member of the core planning team when developing the draft plan language ... This action represents a substantial breach of public trust due to the unavoidable conflicts of interest between NANA Regional Corporation and the public."

#### **K.2.1 Alternatives**

Alternative B, the Service's preferred alternative, received the most support from reviewers, although many favored modifications to it or one of the other alternatives for certain issues.

For example, on the issue of shelter cabins, Alternative C received more support than Alternative B. Some reviewers did not specify which alternative they preferred.

The issue of commercial use of refuge lands received the most attention and the greatest mix of responses. Although Alternative B received the most support on this issue, a similar number of reviewers supported either Alternatives A or C on this issue. This was the only issue in the preferred alternative with which the State of Alaska had significant concerns. Substantive comments on this issue and responses are presented in the following section.

### **K.2.2 Vision and Goals**

Several reviewers were complimentary about the draft vision and goals statements. Individual responses include “Excellent,” “Decent goals,” and “Good effort!” The Northwest Arctic Borough called the goals “very good.” The Native Village of Kotzebue said, “It appears from the proposed plan that the refuge understands the needs of the local communities ... The emphasis on communication and building relationships is a positive approach.” One individual commented, “I welcome and support the refuge’s Vision Statement. It is refreshing to see its integration of community well-being into the overall vision for this refuge ....”

### **K.2.3 Commercial Use of Refuge Lands**

Commercial use of refuge lands received the greatest number of comments of any topic. Local residents and regional organizations in northwest Alaska widely supported the management outlined in the preferred alternative pertaining to commercial uses. NANA Regional Corporation said that excluding these lands to commercial transporters and guides “... will help insure that local residents who strongly rely on the subsistence resources in the area will have the greatest opportunity to do so. ... This alternative will greatly improve our ability to patrol NANA lands and ensure that unauthorized hunting is not occurring.” The Northwest Arctic Borough emphasized the importance of the refuge being managed in accordance with ANILCA’s subsistence priority, allowing recreational hunting only when surplus game is available and subsistence needs are being met. The borough also suggested updates to the refuge permitting process for commercial uses. Individuals’ comments included “restriction of numbers” of guides and transporters, “give preference to Natives,” or “reduce trophy hunting to zero.” One said, “Local use and subsistence should trump any commercial use.”

Most non-local organizations and individuals expressed concern about restrictions to commercial guides and transporters in the western portion of the refuge. This included the State of Alaska, Safari Club International, Citizens’ Advisory Commission on Federal Areas, Alaska Professional Hunters Association, and Science Now Project, along with several individuals. The Citizens’ Advisory Commission on Federal Areas said, “... Implementing restrictions that will affect the ability of the majority of non-local hunters to use refuge resources should not be adopted except in extraordinary circumstances. We do not believe that those circumstances exist.” The Alaska Professional Hunters Association stated, “As a matter of policy, APHA is strongly opposed to diminished opportunities for hunting and fishing on publically owned and administered lands like the Selawik refuge.”

One of the most common concerns expressed by these groups was that the Service lacked sufficient evidence to justify not authorizing transporters and guides to use these lands. For example, Safari Club International said, “The Refuge is proposing to take aggressive action to limit recreational hunting on a National Wildlife Refuge without documentation that non-local hunting has any impact, let alone detrimental impact, on the resources or on the hunting

opportunities and success of resident subsistence hunters.” Another frequently mentioned concern was that not authorizing guide and transporter use of these lands violated provisions of ANILCA and other Federal laws and regulations.

#### **K.2.4 Off-refuge Administrative Facility**

Most expressed support for partnering with local organizations to jointly maintain a shared building in Selawik and/or Noorvik for office, storage, and meeting space. The Citizens’ Advisory Commission on Federal Areas said, “Connections and networking are a vital part of many successful relationships. ... Sharing space, meeting, office, sleeping, and maintenance facilities in the small communities with local users is a prudent and sensible alternative.” Another reviewer supported establishing “... more presence in Noorvik, Selawik, and Kiana via facilities and local refuge technicians.” NANA Regional Corporation said, “We appreciate the discussions that have already occurred to help move this critical project forward.”

One anonymous individual, who opposed a shared facility, commented, “No partnerships are needed. National taxpayers pay for this site therefore you should not seek closer relationships that make the American citizen a second class citizen with ‘partners’ being first class.” Another individual expressed skepticism that the villages could maintain facilities.

#### **K.2.5 Motorized Access and Roads on Refuge Lands**

In general, wide support existed for the management outlined in the preferred alternative pertaining to all-terrain vehicle use on the refuge. A handful of specific comments were received, ranging from “ATVs should be restricted” to “Allow ATV use in the refuge.” NANA Regional Corporation asked to be added to the list of entities that the refuge will work in partnership with in conducting a traditional access study.

A few reviewers discussed road construction between villages. The Northwest Arctic Borough described the current concept of a road linking Kotzebue to Selawik, Noorvik, and Kiana for economic, social, and cultural benefits. One individual endorsed building roads between villages in preparation for environmental changes brought about by a warming climate. Another individual was concerned about the negative impacts that a proposed road from Nome to Ambler would have on the refuge.

#### **K.2.6 Winter Trail Marking and Shelter Cabins**

Reviewers overwhelmingly supported a formal partnership with other organizations to mark and maintain winter trails and shelter cabins. The Citizens’ Advisory Commission on Federal Areas said, “Any movement toward improving the safety of our public lands will improve the experience found on those public lands. Marking trails, designating areas for motorized use, and maintaining shelter cabins will improve the safety of local users and preserve uses of the land that pre-date establishment of the Refuge.”

A few respondents supported an expanded winter trail system, while many more supported reviewing the need for additional shelter cabins. One individual commented that climate change will result in the need for additional marked trails and shelter cabins.

#### **K.2.7 Singauruk Bridge**

All reviewers supported the Service’s preferred alternative pertaining to the Singauruk Bridge. Individual comments included, “Review purposes for bridge” and “Bridge was poorly designed and built.” A few respondents suggested that a seasonal bridge be considered as an option.

### **K.2.8 Hot Springs**

Reviewers overwhelmingly supported a formal partnership with appropriate villages and organizations to maintain facilities at the Selawik Hot Springs. NANA Regional Corporation stated that this ensures "... that Shungnak and Huslia elders have access to the hot springs and are not solely burdened with the costs of maintaining the facilities."

### **K.2.9 Competitive Events of Community and Historic Importance**

Wide support was expressed for use of public lands for events that support local communities and establish a positive relationship between user groups and the refuge. The Citizens' Advisory Commission on Federal Areas said, "The Service should continue to support local events like this [Willie Goodwin-Archie Ferguson Snowmachine Race] and other future events that strengthen community by authorizing the use of Refuge lands." The Native Village of Selawik said they "... would like to see that event happen each year as it is one of our highlights in our community" and they "... would like to see the refuge be open to having other events that involve Noorvik, Kiana, and Selawik." One individual commented that snowmachine racing should be restricted.

### **K.2.10 Wilderness**

Two people commented that the draft plan should consider additional wilderness protection for the refuge.

### **K.2.11 Climate Change**

Several individuals mentioned climate change in their comments. One individual supported the draft plan's goals that emphasized the need to recognize climate change. Another individual listed a long series of potential impacts to the local environment and people as a result of global warming. Another individual said, "Climate change is a big concern."

### **K.2.12 Miscellaneous Subsistence and Culture**

Several comments were received on other topics, including reindeer herding, subsistence, cultural preservation, locally-based outdoor tourism businesses, and renewable energy resources.

## **K.3 Response to Substantive Comments**

This section responds to those comments considered substantive. By substantive, we mean comments that point out errors in the document, disagree with our conclusions, or otherwise merit a response. If there was any question on whether a comment merited a response, we provided a response. Comments provided by governments and organizations are so noted. The State of Alaska comment letter is included in its entirety at the end of this section. Responses to State comments are incorporated directly into their letter.

### **K.3.1 Alternatives and Planning Process**

Comment 1: One individual noted, "There is one huge management issue this draft plan does not address—how the refuge would manage the consequences of increased non-local hunters to the refuge when road access to the Ambler mining district with links to the State's road system is built .... The draft plan's three Alternatives ... do not take into account the potential for new road access bringing large numbers of hunters into the refuge, which do not depend on air access."

Response: In response to this comment, we have revised our regional transportation planning objective in Chapter 2 (Objective 4 under Goal 7) to read:

“Objective 4: Actively participate and engage in regional transportation planning.

*Rationale:* Transportation development, particularly roads, has the potential to substantially change the region. Sharply higher prices for fuel and goods beginning in 2008 have led to more serious discussions about transportation alternatives for northwest Alaska. Keeping informed and involved with these planning efforts as an active participant is crucial for long-term management of access to both resources on refuge lands and public uses of the Selawik refuge. Staying involved with regional transportation planning is necessary to meet the missions of the Service and the Refuge System.

Road construction projects under consideration in 2011 included a road to the Ambler Mining District from the Dalton Highway that could eventually extend to Nome or the Red Dog road; a road from the Dalton Highway to Nome along the Yukon River; and a variety of other inter-village secondary roads, such as one linking Kotzebue, Selawik, and Noorvik. If any of the proposed routes crossed the refuge, an environmental impact statement would be required with opportunities for public comment. The process for considering a road within the refuge is outlined in ANILCA Title XI and the related regulations. The refuge can allow roads in some areas, but only if they are compatible with refuge purposes and if there is no economically feasible and prudent alternative route for the road. The State of Alaska has identified rights-of-way for roads and trails on public and private lands within the Selawik refuge (Appendix F).”

Comment 2: The Science Now Project objected to NANA Regional Corporation being a member of the core planning team, especially when Alternatives B and C “... propose to restrict methods or means of public access to refuge lands bordering significant corporation owned inholdings within the refuge.” The Science Now Project believed that the FWS regional office “... acted outside the guidance of the National Department of Interior (DOI) policy” when it interpreted various executive orders and congressional acts to allow NANA Regional Corporation’s participation. The Science Now Project considered this “... a significant breach of public trust in the draft plan and the planning process.” One individual similarly expressed concern about a representative from NANA Regional Corporation participating on the planning team, a process which “... could be considered to have violated FACA ....” This person asked, “Could you please provide historical evidence where other USFWS public land plans were developed similarly?”

Response: The Service’s planning policies direct us to use planning teams when developing conservation plans for refuges. Planning teams are interdisciplinary in membership and function. Teams generally consist of a team leader, a refuge manager, key refuge staff members, and appropriate support staff or specialists from the regional office. We provide representatives from appropriate State and tribal conservation agencies, and any public agency that may have a direct land management relationship with the refuge, the opportunity to serve on planning teams. We also ask other Federal and tribal natural resource agencies to provide team members as appropriate. If we meet the requirements of Section 204(b) of the Unfunded Mandates Reform Act of 1995 (P. L. 104-4), participation by these State and tribal agencies is not subject to the Federal Advisory Committee Act.

Comment 3: Two individuals believed that the draft plan required an Environmental Impact Statement, not simply an Environmental Assessment.

Response: Our analysis showed that the proposed plan and alternatives would not significantly affect the quality of the human environment. Therefore, an environmental impact statement was not necessary.

Comment 4: One person opposed Federal government control and believed the State of Alaska should make the rules and regulations. “Creating education and respect works better than setting laws,” this individual concluded.

Response: The State of Alaska makes most of the rules and regulations on the refuge regarding fishing and hunting. The Service agrees that education and the creation of respectful partnerships are critical for successful conservation, and we believe that these are clearly reflected in the final comprehensive plan for the Selawik refuge.

### **K.3.2 Goals and Objectives**

Comment 5: One individual inquired, “Are all eight goals of equal importance? Will you prioritize goals and strategies for achieving goals?”

Response: All eight goals are of equal importance. The objectives under each goal are prioritized by the time frame for completion set by the refuge. For example, some objectives are currently being implemented and thus have high priority. Others are of short-term priority to be completed within 5-8 years, and still others are of longer-term priority to be completed within the 15-year life of the final comprehensive plan.

Comment 6: The Northwest Arctic Borough requested that Goal 3 recognize the subsistence priority in Federal law and Goal 6 recognize “... the lands as Iñupiaq lands—historically through today.”

Response: Regarding Goal 3, the first sentence of the rationale for Objective 3 states: “The refuge is mandated by the ANILCA to provide opportunities for continued subsistence activities by local residents.” ANILCA made subsistence a purpose of the Selawik refuge, and the Service fully intends to fulfill this purpose. Sections 2.4.13, 2.4.13.1, and 2.4.13.2 of the draft plan also outlined the Service’s legal policies and direction for providing continued opportunities for subsistence on refuge lands and how it will be legally managed. These sections will be carried forward into the final comprehensive plan.

In regard to Goal 6, we revised the rationale for Objective 1 to read: “The lands, features, and places within the external boundary of the Selawik refuge are the ancestral homelands of the Iñupiat and remain part of their larger homeland today. The Iñupiat have named these lands, features, and places through time in their own language and in accordance with their cultural beliefs and intimate relationships with the land and the places there. Place names contain an enormous amount of information ...”

Comment 7: NANA Regional Corporation requested that Goal 8 (Climate Change) be made a priority for protecting wetlands and the natural state of the refuge.

Response: Addressing changes to refuge lands and natural resources on those lands related to accelerating climate change is a priority of the Service and the refuge. Meeting Goal 8 is a high priority. Regarding water resources, the Service believes that Goal 2, Objectives 1-5 adequately provide a strong foundation on which the Service and the refuge can build programs and partnerships to address changes and effects related to accelerating climate change and, in the process, protect wetlands on refuge lands.

Comment 8: One person recommended that measures be taken to ascertain that the goals have been attained.

Response: The Service agrees that it is critically important to track its progress toward meeting these goals and objectives. The refuge's plan for monitoring, in conjunction with the implementation strategies outlined in Chapter 5 of the final comprehensive plan, will ensure that we track our success and address our challenges as we work with our partners to meet these goals.

### **K.3.3 Commercial Use of Refuge Lands**

Comment 9: Several reviewers, including Safari Club International, Citizens' Advisory Commission on Federal Areas, Alaska Professional Hunters Association, and a few individuals stated that the Service lacked evidence and concrete facts to justify not authorizing guides and transporters to use portions of the refuge. Some pointed to page 2-11 of the draft plan which described the local perception that visiting hunters may be affecting subsistence hunter success. Safari Club International, for example, said, "ANILCA does not authorize complete closures of areas and resources based on 'perceptions' or 'concerns' and never when the resources are adequate to provide for both subsistence and non-subsistence uses." The Citizens' Advisory Commission on Federal Areas stated, "The plan presents no data to indicate that the presence of sport hunting and fishing or commercially guided hunting prevents local subsistence users from meeting their needs. ... Decreases in the number of transported hunters and harvested moose and caribou clearly indicate that there is no resource based need to limit access via air taxi or air transporter to any portion of the refuge." One individual commented that some transporters no longer operate in the region and existing problems between subsistence and recreational hunters may be exaggerated. Another individual said there is "... no substantive support in the planning documents that justify the discrimination represented by the agency's preferred Alternative B."

Response: The Service greatly appreciates these comments and concerns. We agree that there is no mathematical formula complete with quantitative data and concrete and clear-cut results or numbers on which to formulate one true solution to this ongoing and complex problem. The time and research that would be required to gather more information, which still would not guarantee a clear and concrete solution, would result in taking no management action. The Service cannot passively observe what has been identified as an important management issue. This proposal and decision are strongly rooted in an open, public, and collaborative planning process, which was required by numerous laws. Alternative B does not propose a closure to the public, and no regulations are being proposed to do so. The final comprehensive plan describes an area of the refuge that is not authorized, via special use permit stipulation, for use by commercial guides and transporters. Members of the public who do not use such commercial services are allowed to access these lands for hunting, fishing, and other activities. Alternative B provides the best balance between public and commercial uses of refuge lands. It provides a proactive, responsible, and transparent means for addressing long-term issues of conflict between commercial and public uses in the Selawik refuge. Alternative B responds to the concerns of members of the public who are intimately familiar with refuge lands and private lands and protects the experiences of those visitors who are not. Of the three alternatives, Alternative B best ensures high quality hunting experiences for both local residents and refuge visitors that use commercial services.

Comment 10: Safari Club International and several individuals questioned the need to not authorize areas to transporters and guides when the draft plan states on page 1-25 that user conflicts tend to be less intense on Selawik refuge than in other parts of the region.

Response: Alternative B and this decision represent a proactive means to minimize further conflicts. Alternative B maintains the management of commercial operation that was previously in place as a result of refuge land being selected for conveyance by native corporations and limited by permit stipulation. We believe that this past management contributed to user conflicts being less severe on the refuge than in other areas in the region. During the life of the 15-year comprehensive plan, it is foreseeable that conflicts could increase on refuge lands if no action was taken. Please see our response to Comment 9 in this appendix.

Comment 11: One individual commented that even if conflict between non-local and subsistence hunters is less intense in the refuge than in other areas of the region, "... it still exists and needs to be actively managed to minimize impacts on local residents. If additional administrative, regulatory, or statutory changes are required to enable the refuge to better address conflicts among users, please identify these needs in the comprehensive plan and detail how they may be met." This reviewer believed that user conflicts can arise from the mere presence of non-local hunters, even when few in number, because their actions can conflict with local cultural norms.

Response: The Service agrees with both points made in this comment and, at this time, does not see a need for additional changes of the nature described in order to address this issue. The management direction in the final comprehensive plan is adequate.

Comment 12: One individual commented, "Restricting lands to hunting efforts for all species may ... be inappropriate. Big-game hunting numbers for moose and grizzly bear are already somewhat limited by nonresident drawing permit requirements."

Response: The intent of Alternative B and this decision is to reduce conflicts between commercial and subsistence uses in a specific area of the refuge, not to reduce hunting effort for moose and grizzly bears. The majority of commercially supported hunting for moose and grizzly in the past has occurred outside the area identified in Alternative B.

Comment 13: One individual was concerned that reducing lands available to commercially transported and guided hunters without limiting the number of hunters could increase conflicts and crowding in other parts of the refuge. He encouraged the refuge "... to consider strongly 'quality of experience' and the 'carrying capacity' of hunters if any refuge lands are to be restricted. If available land is reduced, measures may be needed to further control the number of seasonal users and the density of camp placements."

Response: The Service agrees with this assessment and will continue to monitor hunting across the entire refuge to track tangible aspects of the quality of the hunting experiences such as crowding and conflict. The Service will continue to rely on the policies of the Big Game Commercial Services Board and reports from commercial operators and their clients as sources of information.

If conditions at the refuge change or specific needs arise, the refuge manager can, on a case-by-case basis, reauthorize commercial use by special use permit for a specific area or areas within this larger affected area. The refuge manager will use two criteria to evaluate requests

for commercial operations in the affected area shown in Map 2-2: (1) a compatibility determination will be completed and (2) an 810 analysis will be conducted.

Comment 14: One individual suggested that the management intent for Issue 1 (Maintain Hunting Opportunities) be modified "... to provide the refuge manager the authority to specifically close any area within the refuge to commercial uses if there are compelling reasons to do so."

Response: We described the primary planning issues learned during public and internal scoping as the basis for developing management objectives and alternatives for the draft plan. There is no management intent implied in this issue statement. It is meant to describe the situation.

Comment 15: The Citizens' Advisory Commission on Federal Areas and two individuals encouraged the refuge to continue supporting and participating in the Game Management Unit 23 Working Group.

Response: The Selawik refuge fully supports the next phase of the Working Group as an active participant (Chapter 2, Goal 4, Objective 3). The next phase of the Working Group will serve as a way to continue coordination with other State, Federal, and tribal government agencies and to monitor the outcomes of this comprehensive plan for addressing commercial use, big game hunting, and reduction of social conflict. The Working Group will most likely offer suggestions on other Federal and State plans as well. The refuge and its partners will also use the second phase of the Working Group to address new issues related to big game hunting and commercial uses in the region as they arise. The Selawik refuge will participate in this group as long as it functions.

Comment 16: The Citizens' Advisory Commission on Federal Areas commented that closing any part of the refuge through special use permit stipulations or permanently is in conflict with Section 101(b) of ANILCA (preserving related recreational opportunities) and the Refuge System Improvement Act of 1997 allowing wildlife-dependent recreation. Similar views were expressed by Safari Club International and Alaska Professional Hunters Association. The former stated that the draft plan "appears to illegally close large areas of the refuge to recreational hunting," while the latter said that the Service has an express duty to facilitate, and not just allow, priority public uses.

Response: The Service believes that Alternative B and this decision facilitate quality hunting experiences for all parties on refuge lands. Please see our response to Comment 9 in this appendix.

Comment 17: The Citizens' Advisory Commission on Federal Areas was concerned that limiting hunters' access via commercial transporters "sets an unfortunate precedent."

Response: The Service maintains that Alternative B and this decision allow the refuge a means to proactively and responsibly manage commercial hunting on refuge lands. It sets a positive precedent aimed at reducing user conflicts in the affected area without placing any limits on the public or number of commercial operators.

Comment 18: One individual commented, "Commercial operators must book clients months in advance, so closing areas based on a short-term variable like in-season timing of caribou movements will be problematic for commercial operators."

Response: The Service agrees that this is a problematic criterion for not authorizing commercial use in the affected area. This, with other challenges, is precisely why Alternative C was not chosen for implementation in the final comprehensive plan.

Comment 19: One person inquired, “Is there a way to encourage guides to use Selawik locals on hunts in the refuge?”

Response: Hunting guides and other commercial operators are free to hire assistants of their choice, limited only by the list of applicants or other known candidates. If there was strong interest on the parts of both guides and local residents, encouraging local residents to go through the steps to become assistant guides would provide additional economic opportunity in the villages and an important opportunity to share local culture and norms with non-local hunters. The refuge recommends that these opportunities be discussed at the next meeting of the GMU 23 Working Group. The Big Game Commercial Services Board is another entity that has been engaged in this issue.

Comment 20: The Northwest Arctic Borough requested that the comprehensive plan “... have guidelines for monitoring [commercial guides and transporters] with enforcement support during the high use period of fall.”

Response: We appreciate this comment and the importance of monitoring commercial hunting during the peak fall season. Chapter 2 of the final comprehensive plan includes Goal 4, Objective 1, which reads: “Continue to implement and strengthen the refuge’s special use permit program and increase enforcement of and compliance with permit stipulations. Maintain current permit conditions for commercial transporting and guiding.”

The refuge will continue to monitor commercial use through communications with law enforcement agents and hunters in the field and by mandatory reports provided by commercial operators. The refuge is adjacent to lands administered by the BLM and NPS. Guided clients and other hunters using BLM lands adjacent to the Selawik refuge often harvest wildlife that regularly move in and out of the refuge. The refuge will work closely with the BLM on management of guides and locations of base camps in drainages in and adjacent to the refuge.

The refuge will work to maintain a strong partnership with local village tribal councils and the private trespass officer program to best inform our permit decisions; accurately analyze the effects of the refuge’s permitting program on subsistence users; and assist in the enforcement of permit stipulations. Communication between the various law enforcement entities and those living within the refuge boundaries during fall hunting season has many benefits. Improved communication in this area has resulted from the collaborative discussions of the GMU 23 Working Group, and the Service will continue to encourage and facilitate these efforts.

Comment 21: The Northwest Arctic Borough was concerned that the refuge be managed in accordance with ANILCA’s subsistence priority and only allow recreational hunting when subsistence needs are being adequately met and there is a surplus of game. The borough described local concerns associated with non-local recreational hunting, including disruption of caribou migration, displacement of river-based subsistence hunters, increased waste of meat, and demands on the search-and-rescue program.

Response: Alternative B and this decision represent a balance between commercial recreational hunting and subsistence and resulted from a public planning process designed to address these very concerns and others. Please see our response to Comment 6 in this appendix.

Comment 22: The Northwest Arctic Borough suggested that the comprehensive plan include a process for community involvement in the refuge permitting process, such as a permit review committee with local representatives.

Response: The special use permitting process for refuges in Alaska has been standardized across the State and is primarily informed by regulations (50 CFR 36.41). The refuge manager is directed by these regulations when implementing the permitting process. The Service must undertake public involvement activities and other means of informing the public in the local area when areas on a refuge are closed or opened to commercial uses. At this time, the refuge does not have or use any formal or legal means to work directly with community groups or review panels of community representatives as a way to guide or inform the permitting process. However, the refuge welcomes the opportunity to discuss your question further and to talk about other issues related to permitting commercial uses on refuge lands. The refuge will continue to share details of its permitting process with the public and current permit holders at the preseason coordination meeting of the GMU 23 Working Group, which is hosted by the Northwest Arctic Borough.

Comment 23: The Northwest Arctic Borough suggested that caps on the number of commercial operators (transporters, guides, tour operators, lodges, etc.) be established, along with caps on the number of clients and group sizes, especially during the August through October period.

Response: The Service maintains, at the present time, that existing stipulations on commercial permits and the decision not to authorize commercial operations in a portion of the refuge will adequately address most conflicts between commercial hunters and subsistence hunters on refuge lands without having to cap numbers.

Comment 24: The Northwest Arctic Borough asked the refuge to coordinate its permitting with the borough's permitting requirements for commercial transporters and guides, whose compliance is poor with these municipal ordinances. The borough stated, "The comprehensive plan should recognize this issue and include measures to ensure that commercial operators are responsible and obtain all necessary permits and authorizations to operate businesses in the Selawik refuge, and provide a process to revoke USFWS permits due to noncompliance with municipal ordinances."

Response: The Service has no authority to enforce permitting requirements of the borough or municipal ordinances. However, the Service does have a process for revoking permits if they have been found to be in violation of the permit stipulations or other State and Federal regulations regarding commercial big game hunting.

Comment 25: NANA Regional Corporation requested enforcement of the hunting regulations and the permit process for transporters, guides, and commercial operators with a suspension period for permit renewals if violations occur. One individual similarly expressed the view that regulations should be enforced for transporters and non-local hunters.

Response: The Service has the authority to revoke permits and deny applicants in cases of violations of permit stipulations or State or Federal hunting regulations. State and Federal officers and other authorities agree that it is critical to enforce regulations, and they will continue to work hard to do so.

Comment 26: The Alaska Professional Hunters Association objected to the draft plan not distinguishing between transporters and guides when discussing local concerns about recreational hunting, explaining that the one authorized big game guide takes very few clients compared to the transporters and has virtually no conflicts with local residents. “Most local concerns are caused by air transporter hunting services—not guided services—and this must not be overlooked or disregarded,” the association stated. They also believed that the conclusions in the draft plan about conflicts and controversy related to guided hunting “are overstated ... and must be corrected.” The association agreed that caribou management issues in Selawik are not resource issues but perception issues and that “most of the perceived problems are associated with air transporter related hunting, not guided hunters.” One individual expressed a similar view, pointing out that reported conflicts in the region can be attributed almost entirely to commercial transporters. “Further restrictions to already limited and highly regulated guides may be inappropriate and unnecessary,” he concluded.

Response: The Service agrees that commercial guides and transporters are not the same thing, especially in the case of Selawik refuge, which only has one guide in operation. The Service strongly disagrees that this problem is overstated in the draft plan, and we do believe that public concerns and perceptions are an important part of refuge management regardless of the condition of the herd. Please see our response to Comment 9 in this appendix.

Comment 27: The Alaska Professional Hunters Association was concerned that Service personnel, especially those new to Alaska, fully understand and appreciate the access guarantees of Section 1110(c) of ANILCA.

Response: We fully agree that all Service personnel working in Alaska be properly versed and thoroughly trained with respect to the ANILCA and its provisions. New employees to the region are made to take a multiagency training course on the ANILCA. They also work closely with highly experienced State and Federal employees, who know this law inside and out, during planning processes and other projects.

Comment 28: The Alaska Professional Hunters Association noted on page 2-52 that “consumptive” recreation activities on the refuge are “appropriate pursuant to the Service’s Appropriate Uses policy.” The Association also strongly concurs (on page 2-31) that “... commercial big game hunting guide services are fully compatible with the mission and purposes of the Selawik refuge. The same is true regarding recreational hunting, fishing, and other commercial hunting guide services.”

Response: The Service appreciates this comment and fully agrees.

Comment 29: One individual, who supported Alternative C on this issue, asked whether the benefits generated by this alternative were worth the increased effort and cost. “How do you quantify or calculate this?” he asked.

Response: The Service considered Alternative C to be within the reasonable range of alternatives to address this issue. The planning team was concerned that implementing this

option would require a substantial amount of research, new information, and lengthy public processes not feasible to accomplish before each fall hunting season.

Comment 30: The Science Now Project commented, “NANA Regional Corporation is obliged to share equally in the mitigation measures identified as alternatives in reducing this ‘perceived’ conflict.” Science Now Project suggested options such as NANA allowing public access to corporation inholdings or contracting with the permitted hunting guide to shift hunting effort in socially acceptable ways. “NANA Regional Corporation bears a responsibility of considering the option of providing additional opportunity on corporation owned inholdings as a potential mitigation alternative,” Science Now Project said.

Response: Although the Service has no direct authority over the management of NANA lands or public uses on those private lands, we agree that the NANA Regional Corporation is a key stakeholder and land manager in the Selawik area. The refuge will continue to work closely with NANA and other stakeholders on the issues surrounding public uses and subsistence in the area. The refuge will continue to actively participate as a member of the GMU 23 Working Group as one strategy.

Comment 31: The Science Now Project was concerned that restricting commercial services relied upon by individuals or a user group is an ineffective long-term solution because this “... prejudices the select sub group that only relies on the restricted commercial services, not the component that participates in the activity directly ... that is causing the negative impact in the first place.” The Science Now Project continued, “Should a perceived conflict result in a finding that a refuge should restrict public access as the alternative of choice (NEPA), ... the USFWS has no other option than to restrict access opportunity by implementing a fair and equal drawing among ALL citizens of the United States,” and then let them decide how they want to access the refuge. “What may be needed ... is a simple restriction on the number of non local hunters. But the USFWS must establish the level of non local hunting access that is acceptable and that includes identifying what level the subsistence hunting access is required as well.”

Response: Alternative B and this decision are based on a public planning effort and a NEPA compliance document contained in the draft plan. We fully agree that more studies, assessments, and monitoring of all public uses and subsistence on refuge lands may become necessary in the future. At this time, the refuge has not planned in-depth studies of use levels for these different groups. If such studies are proposed in the future, the refuge will work closely with the State, local communities, and commercial operators in the Selawik area, and others on planning and implementing the work.

Comment 32: The Science Now Project commented, “The issue at the Selawik is a ‘favorite time and location’ conflict. If the USFWS considers this a negative impact to ANILCA mandates or refuge management mandates it is essential that the USFWS evaluates those conflicts in a formal NEPA process ....”

Response: When the Service developed the draft plan, it simultaneously conducted an environmental assessment to comply with the requirements of the NEPA.

Comment 33: The Science Now Project inquired, “Does the USFWS have an 810 analysis for transporters, say from 2000, stating that a negative impact to subsistence harvest opportunity did occur prior to the implementation of transporter permit stipulations?”

Response: The refuge conducted an 810 analysis in conjunction with the special use permitting process and stipulations for the 2006-2007 hunting season and found that transporter operations would not have an impact on subsistence as a result of the number of all commercially transported clients, where operators proposed to take clients, and the permit stipulations in effect at that time.

Comment 34: The Science Now Project asked, “Do you have any formal analysis by the USFWS that ANILCA protects favorite time and location preferences for subsistence harvest opportunity?”

Response: We agree that subsistence hunting of big game animals on the Selawik refuge involves knowledge of and preference for times and locations related to the presence of animals. ANILCA protects subsistence harvest on refuge lands along with these aspects of the activity.

Comment 35: One individual requested the Service’s definition of a “transporter.”

Response: Appendix I of the draft plan defined “air-taxi operator/transporter” to be: “A person who transports people, equipment, supplies, harvested fish and wildlife products, or other personal property by means of aircraft for compensation or with the intent or agreement to receive compensation; a transporter who provides commercial transportation services by means of aircraft must have a special use permit to operate on a national wildlife refuge.”

### **K.3.4 Hunting, Trapping, and Subsistence**

Comment 36: Several individuals expressed opposition in general to hunting, trophy hunting, and/or trapping on the refuge. Examples of specific comments included “reduce trophy hunting to zero,” “ban hunting and trapping,” “ban all hunting guides,” and “big game hunting is not a necessity of life.”

Response: The Service has found these uses to be appropriate and compatible with the mission of the Refuge System and the purposes of the Selawik refuge. The Service is required by law to allow these uses and will continue to work closely with the State of Alaska, which has primary jurisdictional authority over the take of fish and wildlife, to responsibly manage these uses and the resources on which these activities depend.

Comment 37: The Northwest Arctic Borough commented, “The USFWS must recognize the importance of the refuge area to support subsistence of the Borough’s residents and include this recognition in the comprehensive plan.”

Response: The final comprehensive plan does recognize the role and importance of the Selawik refuge for local subsistence. Please see Goal 3, Objectives 1-7 in Chapter 2 and Section 4.4.1.9 in Chapter 4 of the final comprehensive plan.

Comment 38: One individual mentioned that new regulations needed to be established and enforced regarding removal of killed game. This person wrote, “Hunters need to be required to haul out their game and, if not wanted, deposit it at the community center,” where local residents can cut, clean, bag, and distribute the meat to those needing food.

Response: All hunters are required by State regulations to properly salvage game that is taken on refuge lands. The refuge welcomes opportunities to work with State and local programs to

ensure that all game meat is properly salvaged, preserved, and if not wanted by the hunter, properly provided to those who are in need or want of meat harvested on refuge lands.

### **K.3.5 Off-refuge Administrative Facility**

Comment 39: One individual commented, “No partnerships are needed because national taxpayers pay for this site. The USFWS should not seek closer relationships that make the American citizen a second class citizen with ‘partners’ being first class.”

Response: The missions of both the Service and the National Wildlife Refuge System direct us to work with citizens to fulfill our conservation mandate. This includes partnerships with national-, regional-, and local-level members of the public and other groups. To the extent practicable, the refuge and the Service give equal consideration to all scales of public involvement and collaboration and will continue to strive to work with the public in a fair and equal manner on conservation planning and management issues affecting the Selawik refuge. Maintaining administrative sites in remote arctic villages is costly; shared facilities are one way of working with partners to reduce maintenance costs. The Service does not agree that working with current partners and developing new partnerships in this region or in Alaska is a detriment to any American citizen, and we are open to discussions that will enable our work to be ever more inclusive.

### **K.3.6 Motorized Access and Roads on Refuge Lands**

Comment 40: One individual commented, “Just because people haven’t historically used ATVs in the refuge, doesn’t mean they won’t want that opportunity in the future. Most of Alaska is already locked up, so please don’t restrict future uses.”

Response: The refuge currently does not allow ATVs to be used on refuge lands.

Comment 41: NANA Regional Corporation requested that they be added “... to the list of entities that the refuge will work in partnership with in conducting the traditional access study.”

Response: In response to this comment we revised Objective 7 under Goal 3 to read: “Conduct a historical access study in cooperation with the State of Alaska and Alaska Native tribal elders and leaders living in communities within and adjacent to the refuge and NANA Regional Corporation and Northwest Arctic Borough as necessary.”

Comment 42: The Northwest Arctic Borough commented, “As the concept [of a new road connecting Kotzebue to Selawik, Noorvik, and Kiana] is moved forward, the comprehensive plan will need to recognize this transportation project and how the USFWS can be supportive of village planning, design, and construction.” One individual supported the construction of roads, believing that communities needed to be linked by roads to the rest of Alaska.

Response: In response to this comment, we have revised our regional transportation planning objective in Chapter 2. Please see our response to Comment 1 in this appendix.

Comment 43: One individual cited two places in the comprehensive plan where proposed roads are mentioned (pp. 1-24 and 3-54) and commented, “This management issue deserves more than two brief mentions in the comprehensive plan ... It is possible road access to Northwest Alaska will become a reality during the 15 year life of this revised plan. ... If the refuge considers itself constrained by existing statute and regulations from being able to effectively address conflicts arising from non-local hunters or other visitors to the refuge, or

the consequences of suddenly being on the state's road system, I encourage the refuge to identify, seek, and acquire the necessary legal tools to be able to address this 'tragedy of the commons' situation that might occur."

Response: In response to this comment, we have revised our regional transportation planning objective in Chapter 2. Please see our response to Comment 1 in this appendix.

### **K.3.7 Winter Trail Marking and Shelter Cabins**

Comment 44: NANA Regional Corporation requested that Alternative C be modified to include a provision that "... the partnership reviews the need for an expansion of the marked winter trails with the local communities to ensure that their needs are considered." NANA also requested more involvement in trail mapping so that these can be included in the GIS database that NANA maintains.

Response: The Service appreciates this comment. This is valuable information that should be brought to the partnership as soon as it is formed. In the management direction described in Chapter 2, we have listed NANA Regional Corporation as a member of this working partnership. The Service welcomes the input of NANA, local communities, and other groups in the region on how to best plan and implement maintenance and marking of the winter trail system. We expect that data generated from these efforts will be shared among the partners.

Comment 45: NANA Regional Corporation requested that they be included "... in the discussion for site locations for any additional shelter cabins which may be built." NANA also requested that its lands department be notified of the GIS data for both existing and proposed cabin site locations.

Response: In the management direction described in Chapter 2, we have listed NANA Regional Corporation as a member of this working partnership. The Service welcomes the input of NANA, local communities, and other groups in the region on how to best evaluate the need for additional shelter cabins and appropriate locations or relocations for these structures on refuge lands. We expect that data generated from these efforts will be shared among the partners.

Comment 46: One individual commented that the wording in the plan implied that "... 'expansion' of the winter trail system is imminent. It seems more appropriate to state that a proposed expansion should be part of a public process if State or Federal funds or personnel are involved."

Response: This comment refers to the proposal in Alternative C, which was not selected for implementation in the final comprehensive plan. Such a proposal, if it were to be advanced in the future by the partnership, would most likely involve extensive public participation, particularly at the local level.

Comment 47: One individual requested that minimum design and furnishings/equipment standards be established for shelter cabins.

Response: These standards have been established and can be found in the U. S. Code of Federal Regulations (50 CFR 36.33) and in the Region 7 policy for managing permitted cabins on refuges in Alaska (Region 7 Policy Manual RW-1).

Comment 48: One individual suggested that clearly marked trails be constructed connecting villages to each other and the rest of Alaska if road building among villages is not feasible. Another individual requested that the refuge allow trails to be marked and maintained.

Response: Communities in northwest Alaska have long been connected by an extensive winter trail system. Currently, the Northwest Arctic Borough takes the lead in marking and maintaining the trail system with the refuge providing support as available. Unimproved and unmaintained trails are allowed on Selawik refuge lands for the purpose of general public use and can be marked with signs and shown on maps; there is no current plan to construct any other type of trails for public use in the refuge. The refuge welcomes opportunities to talk with the State Department of Transportation, regional authorities, and communities in and near the refuge about alternatives to roads linking villages in the region (see Objective 4, Goal 7 in Chapter 2).

### **K.3.8 Singauruk (Siñjaġruk) Bridge**

Comment 49: NANA Regional Corporation commented that a "... seasonal bridge should be considered as an alternative in the evaluation of rebuilding the bridge if the local communities of Noorvik and Selawik favor that construction method." One individual similarly suggested that a temporary bridge removed seasonally to prevent ice damage might be less costly in the long term, especially with a changing climate.

Response: The Service appreciates this comment. This is valuable information that should be brought to the partnership as soon as it is formed. We welcome the input of NANA and other groups in the region on how to best evaluate and address the issues related to this bridge.

Comment 50: NANA Regional Corporation pointed out, "Section 2.12.4 Funding and Personnel Requirements notes that under Alternative C the bridge would be removed and no funds would be required for repair or maintenance. It does not address the funds necessary for the construction of a temporary bridge should Alternative C be adopted."

Response: This observation is correct. Thank you for pointing out this oversight. Since Alternative C was not selected for the final comprehensive plan, a temporary bridge will not be constructed.

Comment 51: One individual asked, "Does USFWS have bridge construction standards for use at Singauruk River?"

Response: Yes, the Service is provided general standards for bridge construction in the U. S. Code of Federal Regulations (23 CFR 650). Site-specific requirements for work on the Siñjaġruk Bridge at this particular site on the Siñjaġruk River will have to be determined and described in future work plans, scope of work documents, and/or NEPA compliance documents.

Comment 52: One individual commented, "It seems a bridge would primarily benefit the named communities rather than the public in general, so maintenance might be more appropriately done by the benefitted communities rather than the federal government unless a direct tie to traditional use of a bridge or refuge purposes is defined."

Response: A formal partnership and memorandum of understanding (or other voluntary agreement among partners) will be created among the Service, Selawik refuge, and NWAB to formalize the roles and responsibilities of each partner in jointly re-evaluating the bridge for

rebuilding or repairs. The objective is to assess and address issues related to slope, approach, width, and location for the bridge. Regular management and maintenance of the Singauruk Bridge will become the responsibility of this partnership.

### K.3.9 Hot Springs

Comment 53: One individual inquired, “What is policy on aircraft landing at or near hot springs?”

Response: Airplanes are allowed for access to the hot springs site. Permit stipulations prohibit the construction of permanent landing strips or pads. Incidental hand removal of rocks and other minor obstructions may be permitted. Marking of a temporary ski-plane airstrip is permitted, provided the markers used are temporary in nature. The use of helicopters for cabin maintenance or to fulfill other obligations under the special use permit is authorized with prior permission from the refuge manager for *each* flight. Fuel caches are prohibited.

Comment 54: Two individuals pointed out that page D-14 implies that use of Selawik Hot Springs is by Native elders only when in fact many members of the public use this area.

Response: These reviewers are correct, and the Service agrees with their observation. The draft language on page D-14 has been revised in the final compatibility determination to read: “The use of the Selawik Hot Springs has a long-standing history in northwest Alaska.”

### K.3.10 Competitive Events of Community and Historic Importance

Comment 55: In regards to dog sled racing, one individual asked, “What is ‘appropriate’ and what are considered ‘compatible uses’?”

Response: An appropriate use is a proposed or existing use or activity on a refuge that meets at least one of three conditions. The use: (a) is related to wildlife recreation as defined in the Refuge Improvement Act; (b) fulfills the purposes of the refuge, or goals and objectives described in the refuge’s comprehensive management plan, or fulfills the mission of the Refuge System; or (c) involves the take of fish or wildlife under State regulations. There are 10 criteria listed in the Service Manual (603 FW 1) that a refuge manager uses to determine if a use or activity is appropriate (also see Chapter 3, Section 3.4.5). A compatible use is a proposed or existing use or activity related to wildlife recreation, or any other use or activity on a national wildlife refuge that, based on sound professional judgment, will not interfere with or detract from fulfilling the mission of the Refuge System or the purposes of the refuge (also see Chapter 3, Section 3.4.6). Dog sled racing, specifically the historic Kobuk 440, has been determined to be appropriate and compatible in the case of Selawik refuge (Appendix D.)

### K.3.11 Wilderness and Wild River Review

Comment 56: Two individuals requested additional wilderness review and protection for the Selawik Wild River and designated wilderness area.

Response: The Service appreciates this comment. The wilderness and river values of the refuge are described in the draft and final plans. Additional recommendations for designations of this nature were not include because the goals, objectives, and management direction described in Chapters 2 and 3 adequately protect both wilderness and wild river values on refuge lands.

### K.3.12 Climate Change

Comment 57: One individual offered these comments: “Global warming changes will affect everyone. Helicopter pads need to be built and maintained for search and rescue and access in strategic areas. Boat dock facilities where feasible and necessary need to be built and maintained. Sewage disposal due to local flooding from global warming will affect water quality and quantity issues. Sewage facilities need to be inspected, repaired, updated, and maintained.”

Response: The Service agrees that accelerating climate change is a top priority for refuge management and resource conservation. Our responses and proactive strategies must consider both community and natural resources issues and concerns in this time of imminent change. Please see Chapter 2, Goal 8 and the Service’s strategic plan for responding to climate changes published in 2010.

### K.3.13 Other Comments

Comment 58: One individual pointed out, “In Chapter 3 the paragraph with the heading “Other Private Lands” (page 3-3) overlooks the existence of a second private land patent.”

Response: Thank you for bringing this oversight to our attention. We have revised this section of the final plan to acknowledge this small private home site.

Comment 59: One individual requested that we update community population data in Chapter 3 with 2010 Census data. “In Chapter 3, please update the section on “Population Trends and Composition” (pages 3-64 through 3-70) with the latest available Census 2010 data.”

Response: We agree with this suggestion, and we have updated these data accordingly.

Comment 60: The Northwest Arctic Borough stated that the comprehensive plan “... needs to recognize the cultural relationship of the Iñupiat people to the land, and the land to the Inupiat people. This can be accomplished by supporting cultural preservation of the area including Iñupiaq place names, archeological sites including traditional hunting and camping areas, knowledge of caribou migration routes, and Inupiaq language support through the region/borough.”

Response: Both the Service and the Selawik refuge strongly feel that the cultural relationships between the Alaska Native peoples living in the region and refuge lands are highly important to our mission and purposes. Please see Chapter 2, Goal 6.

Comment 61: The Northwest Arctic Borough said, “The comprehensive plan needs to support local/regional communities in starting businesses in outdoor tourism recreation” as a way to create jobs, develop the economy, and promote partnerships with existing operators. One individual similarly expressed support for more tourism efforts.

Response: We welcome opportunities to talk with the NWAB and the villages in the region about tourism enterprises and other opportunities for small business/economic development. We request that the NWAB provide the refuge with information that would help identify the level of interest in such enterprises from local citizens, communities, or organizations.

Comment 62: The Northwest Arctic Borough requested that the comprehensive plan “... recognize the renewable energy resources within the Selawik refuge ... and work with

regional organizations and villages to assess ... [those] resources ... and how those might best be accessed for village clean energy production.”

Response: The Service is a proponent of developing clean and renewable sources of energy. We welcome the opportunity to talk with the villages of Selawik and Noorvik, the NWAB, and NANA Regional Corporation about any current or proposed projects of this nature on or near refuge lands. The Service will also conduct any future environmental assessments or other NEPA analysis for energy development proposals on refuge lands using an open and public process.

Comment 63: One individual questioned whether the refuge had the staff and funds to carry out the management outlined under Alternative B for the Singauruk Bridge, Hot Springs, and dog sled and snowmachine racing.

Response: Addressing public concerns over the Singauruk (Sinjagrak) Bridge requires additional funding to explore design modifications, meet environmental compliance regulations, and cover construction costs. A dollar amount is difficult to estimate, but it will likely require \$40,000 in contracting, staff time, and logistic support for the first phase of planning.

Adequate refuge personnel and base operational funds are available to manage activities at the Hot Springs for existing and projected levels. Administrative staff time, an estimated two staff days every five years, primarily involves phone conversations, written correspondence, and permit renewal.

Adequate refuge personnel and base operational funds are available to manage dog sledding and the Kobuk 440 activities at current and projected levels. Administrative staff time primarily involves phone conversations, written correspondence, and interaction with visitors at the office, providing information through commercial services on the refuge, or law enforcement contacts in the field.

In the case of the Kobuk 440 dog sled race, administration consists of the issuance of a special use permit and special conditions. Processing the permit takes less than one day; monitoring the impacts of the race is done incidental to other activities that involve the staff traveling by snowmobile between race checkpoints (villages). It's not anticipated that there will be requests for additional races; however, if there are, availability of resources and impacts to the refuge will be determined on a case-by-case basis and a special use permit will be required.

Adequate refuge personnel and base operational funds are available to manage the use of snowmachines. Currently, monitoring is conducted by talking with local residents; meeting with local tribal, borough, and city councils; and during over-flights of the refuge conducted for other purposes.

Comment 64: One individual recommended that the comprehensive plan include a history of reindeer herding in the refuge and acknowledgment of Selawik's strong historic ties to the reindeer herding industry.

Response: This recommendation was helpful for improving Chapter 4 of the final comprehensive plan. We added language in Chapter 4 to describe the history of reindeer herding in the Selawik area.

Comment 65: One individual asked, “Are there any regulatory policies being developed associated with the Selawik comprehensive plan?”

Response: No regulations will be promulgated to implement the final comprehensive plan.

Comment 66: One individual asked for the Service's definition of "the general public" as it pertains to hunting.

Response: We do not define the phrase "the general public." In the context of refuge planning, any individual hunter who does not specifically identify himself or herself as representing an organization, agency, or business could be considered a member of the general hunting public. The draft plan provided a definition for "public" in Appendix I on page I-12: "Individuals, organizations, community members, and groups; officials of Federal, State, and local government agencies; Alaska Native governments; Indian tribes; Native organizations; and foreign nations (i.e., stakeholders). The public may include anyone outside the core planning team. It could include those who may or may not have indicated an interest in the planning issues, and those who do or do not realize that Service decisions may affect them."

### **K.3.14 Letter from the State of Alaska**

March 15, 2011

Lee Anne Ayres, Refuge Manager  
160 2nd Avenue  
P.O. Box 270 MS 565  
Kotzebue, AK 99752

Dear Ms. Ayres:

The State of Alaska reviewed the Draft Revised Comprehensive Conservation Plan (Plan) and Environmental Assessment (EA) for the Selawik National Wildlife Refuge. The following comments represent the consolidated views of the State's resource agencies.

Comment: We appreciate the considerable efforts of both refuge and regional staff in developing a clear planning document that addresses a variety of management issues identified through the planning process. With limited exception, the State supports the implementation of this draft Plan. Specifically, we support the following actions:

- marking winter trails
- creating partnerships to address maintenance and repairing shelter cabins and the Singauruk Bridge
- addressing existing issues surrounding the hot springs
- retain local knowledge by capturing traditional place names and documenting elder's knowledge of pre-ANILCA activities and modes of access
- continue locally important competitive events and consider new competitive events on a case-by-case basis

Response: The Service appreciates the valuable support and assistance that the State of Alaska has provided throughout the planning process.

Comment: However, we have concerns regarding the proposed closure of refuge lands to commercial guides and transporters.

Response: The Service maintains that this is not a closure to the public and no regulations are proposed. The final comprehensive plan describes an area of the refuge that is not

authorized, via special use permit stipulation, for use by commercial guides and transporters. Members of the public who do not use such commercial services are allowed to access these lands for hunting, fishing, and other activities. The majority of the public using the refuge is in this category.

Comment: The State is keenly aware that fall hunting in Game Management Unit 23 (GMU 23) has been the subject of user conflicts since the early 1980s, primarily between local residents and non-local hunters (both Alaska residents and non-residents) transported by commercial operators. The State of Alaska has invested considerable time and effort attempting to resolve this issue, including allocating over \$80,000 to planning processes such as the GMU 23 User Conflict Working Group, which is dedicated to working toward solutions to these issues. The Alaska Department of Fish and Game (ADF&G) has submitted or supported multiple proposals to the Alaska Board of Game (state Board) and participated in education and communication programs, which have shown progress in combating wanton waste and educating non-local residents of local concerns. We strongly support resolution of this conflict.

Response: The Service greatly appreciates the efforts put forth by the State to address these conflict issues in the Northwest Arctic region, and we have appreciated the opportunities to partner with the State and others in the GMU 23 Working Group discussions. The Selawik refuge fully intends to support the continuation of this working group as an active member.

Comment: While we recognize both the State and the Service are under considerable pressure to act, we all must work within our existing regulatory frameworks to address the specific issues raised by the public. The state Boards allocate fish and wildlife across the state for a variety of uses, including subsistence, and can address both direct and indirect effects on fish and wildlife. For example, controlled use areas can restrict means of access or methods of take to achieve a certain outcome, usually associated with a conservation issue. ADF&G manages fish and wildlife across Alaska and, if necessary, utilizes emergency orders to assure the sustainability of all fish and wildlife.

The Service manages refuges for multiple purposes under a variety of statutes, regulations, and policies. Chief among those statutes in Alaska is the Alaska National Interest Lands Conservation Act (ANILCA), which established the refuge. Amendments to the Refuge Administration Act also identify a number of principles that guide refuge management. These include conserving populations of fish and wildlife; monitoring the status and trends of fish and wildlife; maintaining opportunities for compatible forms of hunting, fishing, and trapping; and coordinating, interacting, and cooperating with adjacent landowners and state fish and wildlife agencies. We encourage the Service to continue to work closely with state agencies, including the Departments of Fish and Game and Natural Resources, and other partners to develop cooperative management responses to the issues within the Selawik refuge and adjoining area.

Response: The Selawik refuge also is managed for “the opportunity for continued subsistence use by local residents” along with the other purposes listed in ANILCA. The Service will use one of its existing frameworks, the special use permit, to address this issue in part. In addition to using this existing tool, the Service will continue to work closely with the State and the many other stakeholders involved with the issues surrounding big game hunting in the region.

Comment: The Service also regulates commercial services on the refuge and ANILCA Section 1110(a) contributes applicable guidance by allowing certain motorized access,

including airplanes, for traditional activities, subject to reasonable regulation. By any reasonable standard, hunting by local and non-local hunters is clearly a traditional activity. We realize that regulation of transporters, as a commercial activity, is somewhat different from regulating public access; however, ANILCA Section 1110(a) protects the use of specific modes of transportation – it is not specific as to the user. Consequently, even though the managed use is commercial, any restrictions on transporters should be based on documented impacts to resources values, consistent with the criteria in the implementing regulations at 43 CFR Part 36. Since wildlife populations remain stable, conservation concerns currently do not exist, and subsistence needs are currently being met, restrictions that meet the Section 1110(a) criteria will be difficult to justify.

In addition, we question the actual on-the-ground benefit of the proposed closure. As stated on page 1- 25 of the EA, *“the conflict tends to be less intense on Selawik refuge lands than in other more heavily hunted parts of the region.”* Very few commercial transporters drop clients in this area due to lack of suitable landing areas and no permitted guides have ever included the areas proposed for closure in their operating plans. We therefore question the need for a formal closure when its only effect would be to essentially institutionalize the existing on-the-ground situation – especially considering commercial services would still be allowed for other activities, including small game hunting and wildlife viewing, as well as private plane use for big game hunting and other activities.

Moreover, within the existing framework of available tools, we expect non-closure related stipulations in the draft compatibility determination to address the majority of potential on-the-ground impacts. For example, stipulations already state *“the operation of aircraft at altitudes and in flight paths resulting in the herding, harassment, hazing, or driving of wildlife is prohibited. It is recommended that all aircraft, except for takeoff and landing, maintain a minimum altitude of 2,000 feet above ground level”* and *“any action by a permittee or the permittee’s employees which unduly interferes with or harasses other refuge visitors or impedes access to any site is strictly prohibited.”* In addition, the established hunter education program as well as recent actions by the state Board to require mandatory pilot education for all hunters flying into GMU 23 should also help prevent future conflicts. We understand these actions do not provide a tangible limit to commercial use as desired by local residents; however, we expect they will reduce the vast majority of negative interactions contributing to user conflicts.

Response: This deep-rooted issue has a long and complex history. It comprises many aspects, including access issues; temporal and spatial dimensions; social and cultural norms and values; aesthetics; user perceptions and attitudes; and economic concerns. Some of these are discussed or summarized in papers and reports (e.g., Jacobson 2008; Magdanz 2007; Steinacher 2006; Georgette and Loon 1988 as cited in Chapter 4 of the final comprehensive plan). The problem has been well documented, attracting the attention, time, and resources of many in the region and the State as reflected in the substantial effort put forward by the GMU 23 Working Group. The Service considers this an unresolved situation of substantial concern in terms of conservation, subsistence, and public use. This situation places the quality and meaning of the hunting experiences of all parties at risk. When problems or conflicts arise related to commercial recreation activities or uses, the refuge may modify a specific activity or use under the special use permit stipulations. Using the Service’s special use permitting process to proactively reduce the effects of this problem is warranted. The Service agrees that the intent of the current permit stipulations referenced in your comment above is to

minimize on-the-ground impacts, primarily to wildlife resources. These stipulations and the operator education programs referenced by the State are very important tools but are not adequate by themselves to minimize and essentially prevent conflicts between commercial hunters and resident subsistence hunters on refuge lands.

Alternative B provides the best balance between public and commercial uses of refuge lands. It provides a proactive, responsible, and transparent means for addressing long-term issues of conflict between commercial and public uses in the Selawik refuge. Alternative B responds to the concerns of members of the public who are intimately familiar with refuge lands and private lands and protects the experiences of those visitors who are not. Alternative B strengthens the special use permitting process by making it public, transparent, and proactive. Of the three alternatives, Alternative B best ensures high quality hunting experiences for both local residents and refuge visitors that use commercial services. In accordance with this final decision (i.e., Finding of No Significant Impact) and the revised management direction in the final comprehensive plan, the Service has added a permit stipulation to proactively manage commercial hunting and to prevent most, if not all, social conflicts related to big game hunting on Selawik refuge lands.

In addition, the new management direction in Chapter 2 of the final comprehensive plan states: “On a case-by-case basis, the refuge manager at Selawik refuge can reauthorize commercial use by special use permit for a specific area or areas within this larger affected area. The refuge manager will use two criteria to evaluate requests for commercial operations in the affected area shown in Map 2-2: (1) a compatibility determination will be completed and (2) an 810 analysis will be conducted.”

Comment: We appreciate that Alternative C differs fundamentally from Alternative B in that it does not proceed directly to a closure; rather it develops a process for considering whether there is a need to regulate these commercial services. We also appreciate the Plan’s stated intent to “develop decision criteria to allow commercial operations” in “close cooperation with the State of Alaska and other partners” while utilizing a public process to do so. We request incorporating established timeframes, periodic reevaluation periods, limits to the length of time a regulation could be in effect, and criteria for reopening an area within Alternative C. Additionally, for reasons previously discussed, restrictions curtailing airplane use should meet the threshold criteria of Section 1110(a) of ANILCA. We reiterate that since wildlife populations remain stable, conservation concerns currently do not exist, and subsistence needs are currently being met, restrictions will be difficult to justify, regardless of the process used. Lastly, should Alternative C be selected, we request an opportunity to meet with refuge staff to review the five zones identified in the Plan.

Response: If any part of the proposal contained in Alternative C is advanced in the future, the Service will fully cooperate with the State, other partners, and the public during planning and implementation.

#### *Compatibility Determinations (CD)*

Comment: Page D-30, Commercial Transporter Services, Description of Uses: The Commercial Transporter Services CD recognizes the important role that Commercial Transporters play in providing access to the refuge.

*“Commercial transporter services contribute to the fulfillment of refuge purposes and the National Wildlife Refuge System mission by providing access to visitors otherwise unable to*

*reach refuge lands. These services facilitate priority public uses such as recreational hunting, fishing, wildlife observation, and other compatible uses and activities.”*

The Togiak Refuge Commercial Transporter Services CD additionally recognizes that commercial transporting is “*a traditional activity that Congress intended to preserve when it established the Refuge with the enactment of ANILCA.*” We request this important recognition be added to the Selawik CD.

Response: The Service has observed that different levels and patterns of use were occurring when Congress established the refuges through enactment of ANILCA than occur today. Congress identified unique purposes for each refuge. Togiak refuge’s enabling legislation and management goals differ significantly from those for Selawik refuge. Unlike Selawik refuge, Togiak refuge has a long history of the public utilizing commercial transporter services for river recreation and angling. This is a different context than commercial hunting of big game species in the Northwest Arctic region. In the case of Selawik refuge, the Service does not support adding this language or believe it necessary to describe use by commercial transporters as a traditional activity to justify it as a compatible use at Selawik refuge. This is not standard language used to address compatibility of commercial transporters on refuges in Region 7 and was not adopted by the refuges near the Selawik refuge (e.g., Innoko and Koyukuk/Nowitna refuges).

Comment: Page D-31, Commercial Transporter Services, Anticipated Impacts of Uses: The following sentences need to be moved into a separate paragraph. “*Commercial transporter services could concentrate public use in the most accessible portions of the refuge. This could lead to loss of opportunities for visitors seeking solitude and wilderness experiences on the refuge.*” In addition, the terms “solitude” and “wilderness experience” imply the discussion is about designated wilderness. We recommend this be clarified in the final CD, using different terminology if the concern applies to non-designated wilderness.

Response: We agreed with this suggested change and moved the sentence to the beginning of a different paragraph, deleted the reference to wilderness and solitude, and rearranged the section to start with general points and end with more specific details.

#### *Page-Specific Comments*

Comment: Page 2-4, Goal 1, Objective 6: Wildlife populations are monitored across GMU 23 in a cooperative effort. By pooling limited personnel, resources, and funds, the State, U.S. Fish and Wildlife Service, National Park Service, and Bureau of Land Management are able to better monitor wildlife populations region-wide, with a general priority to areas mutually identified as areas of greatest concern. This objective unnecessarily establishes a short survey interval of 1-3 years, as opposed to the standard 3-5 year interval utilized in the GMU 23, to the detriment of other areas across the region.

We are not aware of any conservation concerns associated with moose on the Selawik refuge at this time. Moose harvests are closely monitored, and there is no biological reason to survey moose at such a frequency. A survey area may be advanced on the rotation if a biological concern develops, such as a severe winter die-off, dramatic increase in harvest, or significant increased predation.

We request the Service modify this objective and offer the following revision for your consideration.

*At intervals of ~~1-2~~ 3-5 years – or more frequently based on mutually identifiable conservation issues – obtain a moose population estimate for the refuge, including age and sex ratios, by conducting aerial surveys in cooperation with neighboring State and Federal Land managers.*

Response: In 2007, State and Federal biologists in GMU 23 agreed to use a new protocol to estimate moose populations and to expand past survey areas to include entire drainages. The refuge’s goal is to obtain estimates at intervals frequent enough to differentiate the background variation inherent in the Selawik moose population from population changes of conservation concern. We seek to avoid timing survey intervals reactively in response to dramatic events such as die-offs. Such an approach would miss detecting and understanding the influence of factors that change gradually such as habitat or the cumulative effects of minor shifts in predation, harvest, and climate on the population.

The Service, BLM, NPS and ADF&G have a long history of cooperatively obtaining moose data in GMU 23 and the refuge plans to continue in that spirit. We feel it is important to agree on a standardized protocol, share data, and work together when possible. With ADF&G’s unit wide responsibilities for moose and other species typically surveyed at the same time, we recognize that biological concerns may develop for other species and in areas other than the Selawik drainage to which ADF&G will need to respond. Although we continue to strive to work together on surveys, there may be times ADF&G staff will not prioritize collecting data on the Selawik drainage moose population as highly as the refuge will prioritize collecting those data.

Based on this suggestion by the State of Alaska, we made the following changes to Objective 6:

“At intervals of 2-4 years, or more frequently based on conservation concerns, obtain a moose population estimate for the refuge, including age and sex ratios by conducting aerial surveys in cooperation with neighboring State and Federal land managers when possible.”

Comment: Page 2-10, Objective 7: We support the refuge’s intent to conduct a “traditional access” study as part of its near-term priorities. We especially appreciate the intent to begin interviewing elders and other long-term residents that can share first-hand knowledge. We encourage the refuge to embark on these elder interviews as soon as practicable, even if the rest of the study does not get underway quite as quickly, as these living residents are a diminishing source of valuable historic information.

Also, to fine-tune the purpose of the study, we suggest the following revision:

Conduct a ~~traditional access~~ study of pre-ANILCA activities and associated methods of access. The study will be conducted in cooperation with ...

Rational for this technical revision: Since the study is intended to inform management decisions under both Sections 811 and 1110(a) of ANILCA, we recommend avoiding the term “*traditional access study*.” The term “*traditional access*” does not occur in ANILCA. Section 811 addressed methods of access “*traditionally employed*” and Section 1110(a) refers to “*traditional activities*,” such as hunting, fishing, trapping, camping, and overland travel. More importantly, neither Section 811 nor 1110(a) existed prior to ANILCA, so it would be inappropriate to retroactively apply any of these descriptors during the interviews intended to gather raw use information. The main point of the interviews is to find out what people did and what method(s) of access they used. The subsequent review would be the appropriate time to categorize the data for analysis and management purposes.

Response: We appreciate the State’s suggestion and support for this proposed study. We look forward to planning the details of the study with the State and other partners. We also agree that time is of the essence for interviewing the Native elders living in the area. However, to expand the scope of this general objective at this time to include all “pre-ANILCA activities” is beyond what was originally discussed and what the refuge feels is reasonable to accomplish in the agreed upon timeframe. Moreover, the social scientific procedures used to conduct and interpret any interview data collected for this proposed study will not assert predetermined categories onto the data set before a thorough review and assessment of these interviews is conducted. In response to this comment, we revised this objective to read:

“Objective 7: Conduct a historical access study in cooperation with the State of Alaska and Alaska Native tribal elders and leaders living in communities within and adjacent to the refuge and NANA Regional Corporation and Northwest Arctic Borough as necessary.

Rationale: The Alaska National Interest Lands Conservation Act provides that “use for subsistence purposes of snowmobiles, motorboats, and other means of surface transportation traditionally employed” (811(b)) and “use of snowmachines ... motorboats, airplanes, and nonmotorized surface transportation methods for traditional activities” (1110(a)) shall be permitted subject to reasonable regulation. A study of historical access to the lands that now comprise Selawik refuge will help determine where and what activities have occurred on the refuge. An understanding of historical access will assist the refuge in monitoring and managing current and future access.

The preliminary methods for this study will include a thorough review of the Selawik refuge annual narrative reports and 1987 Comprehensive Conservation Plan (USFWS 1987a; USFWS 1987b) and other relevant documents and publications of a historical nature. Elders and other long-term residents of the Selawik area will be interviewed to find out what people did on lands that became refuge lands and what methods of access they used.

Comment: Page 2-12, Objective 4: We understand the intent of this objective; however, we recommend citing an example, other than moose harvest regulations, to illustrate how varying laws and regulations affect public and private land. State of Alaska hunting regulations apply to all lands – both public and private – unless specifically preempted by federal law on federal lands. Airplane access may be a better example to include in the final plan.

Response: In response to this comment, we revised this objective to read:

“Objective 4: Produce an appropriate land status map of the refuge of a detail useful for visitors to identify and make a distinction between public and private lands.

Rationale: Public lands and privately owned lands are both located within the exterior boundary of the refuge. Virtually none of these lands are marked on the ground, making it challenging for the public to become familiar with land ownership and to follow the applicable laws and regulations. The Kobuk delta is a particularly challenging area for the public interested in hunting moose or caribou. Refuge land is limited, often located off the river corridor and interspersed with private land. The refuge occasionally receives inquiries from the public for a refuge map. Historically, unsettled land status has deterred the refuge from producing a high-quality product with a long useable life. Within 5-8 years of publishing this comprehensive plan, the refuge will design and print a quality map for the public to use now

that Alaska Native land conveyances are mostly complete. (In 2011, lands selected by the State of Alaska were not yet conveyed.)”

Comment: Page 2-81, 2-82, Recommending Rivers and Lands as Conservation System Units: We concur with the plan’s assessment that the current goals, objectives, and management policies provide sufficient protection for wilderness and river values in the refuge.

Response: We agree with the State and appreciate their comment.

Comment: Page 2-14, Goal 5, Objective 6: We recognize the value in taking advantage of partnership opportunities. The majority of Friends efforts and activities nationwide support the Refuge System’s mission by providing valuable services and information to the public, such as volunteer weed pulls, assisting with interpretive programs, or providing funds or labor for trail construction. However, the Service needs to maintain an arms-length relationship with the advocacy side of Friends groups to ensure partnership activities are not only consistent with Department of Interior ethics guidelines, but are also transparent and beyond reproach.

Response: We agree with the State and appreciate their comment and advice on this matter.

Comment: Page 2-91, Map 2-4: This map depicts a closure to private lands. While we recognize current NANA Regional Corporation policy does not allow commercial guiding and transporting, closing private lands is outside the scope of refuge authority. We assume this was an oversight and recommend correcting the map in the final plan.

Response: Thank you for pointing out this oversight. We have made the appropriate corrections to this map in the final comprehensive plan.

Comment: Page 3-55, Section 3.3.3.5 Invasive Species: This section references AKEPIC 2005 as a source document. We recommend instead using annually updated data on invasive plant locations, which can be found at <http://akweeds.uaa.alaska.edu/>. Also, past invasive plant surveys for the Kotzebue area were conducted by the National Park Service. We recommend the refuge participate in future surveys and focus on both the general area and refuge access points to identify potential threats and areas that would benefit from active management.

Response: The reference provided is for the annually updated database recommended by the State. We have modified our citation format to follow that recommended by that program. In response to your comment recommending that we work with NPS on invasive plant surveys and focus on the general area and refuge access points: We intend to continue our participation in cooperative programs. The newly formed Western Alaska Landscape Conservation Cooperative is an example. It involves not just NPS, but other Federal, State and private land managers and has identified coordinated work on monitoring areas for invasive species as a program priority related to climate change. We are also active participants in the Alaska Fire Service, another cooperative interagency effort. The fire community is looking at ways to reduce the chance of fire fighting equipment as vehicles for introducing and disseminating invasive terrestrial and aquatic species. This is a new source of entry for invasive species, especially aquatics that had not previously been considered.

Comment: Page 3-88, Section 3.5.1.5 Opportunities for Unconfined Recreation: The second sentence states “*Travel in wilderness usually is by non-motorized and non-mechanical means (e.g. walking or paddling).*” While this may be true elsewhere, Alaska’s vast designated Wilderness is more commonly accessed by airplanes, motorboats and

snowmachines; hence the need for ANILCA's access provisions that specifically protect these modes of access. If this information is carried forward into the final plan, we request this section specifically reference the ANILCA protected modes of access.

Response: In response to this comment, we revised this section to read:

“Unconfined recreation in wilderness settings is characterized by freedom from management restrictions on visitor behavior (Landres et al. 2008). Travel in wilderness usually is by non-motorized and non-mechanical means (e.g., walking). In the Selawik Wilderness Area, access by snowmachines and aircraft is allowed and commonly used by the public. Wilderness recreation may often include the experiences of challenge, risk, self-reliance, and/or freedom. Facilities in wilderness can decrease the challenges of self-reliant recreation. Dispersed travel and camping patterns, in an area with little or no facilities, can enhance opportunities for unconfined recreation.”

Thank you for this opportunity to comment. Please contact me at (907) 269-7529 if you have any questions.

Sincerely,

Susan Magee  
ANILCA Project Coordinator

cc: Sally Gibert, ANILCA Program Coordinator  
Jeffrey Brooks, USFWS, Regional Office

**Appendix L**  
**Decision and Finding of No Significant Impact**



**U. S. Department of the Interior  
Fish and Wildlife Service  
Region 7**

**DECISION AND FINDING OF NO SIGNIFICANT IMPACT**

Environmental Assessment:  
Revised Comprehensive Conservation Plan  
Selawik National Wildlife Refuge, Alaska

**Summary**

The U.S. Fish and Wildlife Service (Service) has completed the Revised Comprehensive Conservation Plan (Plan) for the Selawik National Wildlife Refuge (Selawik refuge, refuge). The draft Plan and environmental assessment (EA) described three alternatives for managing the refuge and analyzed the potential effects of the alternatives on the physical, biological, and human environments of the refuge (USFWS 2010).

Minor changes were made in Alternative B (the preferred alternative) in response to public comments. Technical edits, corrections, and clarifications were also made in response to public comments. After these slight modifications, Alternative B was selected for implementation in the final Plan.

This Finding of No Significant Impact documents my decision that implementing the preferred alternative will not have any significant impacts on the quality of the human environment of the Selawik refuge.

**Purpose of and Need for the Project**

Section 304(g) of the Alaska National Interest Lands Conservation Act of 1980 (ANILCA), as amended, directs the Secretary of the Interior to prepare, and from time to time, revise a Plan for each refuge in Alaska. The Plan is based on guidance found in the ANILCA; the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997; the National Environmental Policy Act of 1969 (NEPA), as amended; and other Federal laws.

The purpose of this planning process was to revise the refuge's original Plan adopted in 1987, which contained no goals or objectives and some outdated management direction. The final Plan was developed to provide broad policy guidance and establish management direction for Selawik refuge. It defines long-term goals and objectives to guide and direct management activities on refuge lands. It identifies which uses may be appropriate and compatible with the purposes of the refuge and mission of the National Wildlife Refuge System. Although the final Plan provides direction for management for the next 15 years, it is considered to be a dynamic, living document that requires monitoring and periodic reviews and updates.

This Plan was developed to address the current and primary needs of the Selawik refuge to:

- update management direction related to national and regional policies and guidelines that are used to implement the Federal laws that govern refuge management;
- incorporate new knowledge and scientific information into refuge management;
- evaluate current refuge management direction based on changing public demand for use of the refuge and its resources, including subsistence use, commercial use, public recreation, and general visitor management;
- develop an updated and comprehensive description of the refuge environment, including ecological and social aspects such as land ownership, physical and biological resources, cultural and historic features, communities in the refuge area, and human activities on refuge lands.

The draft Plan described the current management situation at the Selawik refuge (i.e., Alternative A) and two additional alternatives for managing the refuge in the future that differed from the current management situation. The alternatives were formulated and proposed by the planning team to provide managers and decision makers with a range of options for addressing and resolving specific issues raised by the public and the Service. The alternatives described management actions that could potentially affect the refuge environment. The Service simultaneously prepared an EA as part of the draft Plan as directed by NEPA. The EA analyzed and described potential effects or impacts to the refuge environment that could result from implementing each of the proposed alternatives.

#### **Alternatives Considered**

The ANILCA requires the Service to designate areas according to their respective resources and values and to specify programs and uses. To meet this requirement, the Alaska Region of the Service established management categories for all refuges in Alaska, including Minimal, Moderate, Intensive, Wilderness, and Wild River Management. The draft Plan identified appropriate activities, public uses, commercial uses, and facilities for each management category. Only Minimal, Wilderness, and Wild River Management categories apply to the Selawik refuge. The draft Plan did not propose to change the amount of refuge lands currently designated in these categories.

Alternative A, the no-action alternative, proposed to continue the current management situation at Selawik refuge, largely based on the 1987 Plan.

Alternative B, the preferred alternative, proposed updated management direction that resulted from changes and adjustments to policies and guidelines since completion of the original Plan in 1987. Alternative B proposed a vision statement, goals, and objectives for managing the refuge. Alternative B proposed limiting access to some public lands, which are intermingled with private lands, for commercial guides and transporters whose clients are big game hunting. Alternative B proposed that a formal partnership be created between the refuge and local entities to jointly maintain a shared facility of one or more buildings with capacity for office, meeting, and storage space in a community within the refuge. Alternative B proposed a study of traditional access

methods for subsistence purposes. Alternative B proposed that local public use and access needs be addressed by creating formal partnerships between the refuge and local entities.

Alternative C also proposed to incorporate specific changes or updates in management direction as well as adopt the new vision, goals, and objectives for refuge management. Alternative C proposed that the refuge manager could open or close some public lands, which are intermingled with private lands, to use by commercial guides and transporters whose clients are big game hunting. Alternative C proposed that the refuge independently maintain a facility of one or more buildings with capacity for office, meeting, and storage space in a community within the refuge. Alternative C proposed the same study of traditional access methods for subsistence purposes as described in Alternative B. Alternative C proposed to address local public use and access needs by proposing to expand or improve some opportunities for public use and access on refuge lands.

### **Public Review**

Public comments on the draft Plan and EA were solicited from October 21, 2010 through March 15, 2011. Written comments were received from 30 individuals and organizations: 21 from Alaska, five from outside Alaska, and four unknown. Agencies and organizations commenting included the State of Alaska, the Citizens' Advisory Commission on Federal Areas, NANA Regional Corporation, Northwest Arctic Borough, Native Village of Kotzebue, Native Village of Selawik, Safari Club International, Alaska Professional Hunters Association, Science Now Project, and Friends of Alaska National Wildlife Refuges. Twenty individuals commented, including one registered guide and transporter and at least three residents of communities near the Selawik refuge. Refuge staff attended tribal or city council meetings in Selawik and Noorvik, where oral comments and questions were received from approximately 9 individuals. Refuge staff also held informal conversations with the public about the draft Plan and EA as opportunity allowed.

There were numerous positive comments. The State of Alaska made several helpful suggestions that clarified various parts of the Plan. The State of Alaska "appreciated the considerable efforts of both refuge and regional staff in developing a clear planning document that addresses a variety of management issues identified through the planning process." The Northwest Arctic Borough appreciated our "communication and willingness to work cooperatively with the borough and our residents on the CCP." NANA Regional Corporation stated, "Overall, we are very pleased with the level of local community and regional involvement that went into the creation of this management plan."

Several reviewers were complimentary about the vision and goals. The Northwest Arctic Borough called the goals "very good." The Native Village of Kotzebue said, "It appears from the proposed plan that the refuge understands the needs of the local communities ... The emphasis on communication and building relationships is a positive approach." One individual commented, "I welcome and support the refuge's vision statement. It is refreshing to see its integration of community well-being into the overall vision for this refuge ..."

Alternative B, the Service's preferred alternative, received the most support from reviewers, although many favored modifications to it or one of the other alternatives for certain issues. For

example, on the issue of shelter cabins, Alternative C received more support than Alternative B. The commercial use issue received the most attention and the greatest mix of substantive comments and opinions. Although Alternative B received the most support on this issue, a similar number of reviewers supported either Alternatives A or C for the issue of commercial use of refuge lands for big game hunting.

### **Revisions from Draft Plan**

A number of technical corrections were made in response to comments and many of the editorial suggestions provided by the State of Alaska and others were adopted in the final Plan.

The preferred alternative (Alternative B) was slightly modified as a result of public comments on the draft Plan. Use by commercial guides and transporters for big game hunting is not authorized by permit stipulation on refuge lands in close proximity to or intermingled with private lands in the northwest portion of the refuge where refuge lands are intermingled with private lands. The area affected by this decision is approximately 376,378 acres of refuge lands. This reflects a reduction in the number of acres proposed in Alternative B. In the draft Plan, Alternative B proposed that approximately 444,585 acres be included in the affected area. As the remaining selected land becomes conveyed and other changes occur, the refuge manager will update and revise the land status maps used to show the affected area and provide these maps to commercial operators as part of their permit packages. This language about revising and updating the map was not specified in Alternative B but is now required as part of management direction. In addition, language was added to state: on a case-by-case basis, the refuge manager may authorize commercial use by special use permit for a specific area or areas within this larger affected area. The refuge manager will use two criteria to evaluate requests for commercial operations in the affected area: a compatibility determination will be completed, and an 810 analysis will be conducted.

Another change is reflected in the new language describing the management of shelter cabins on refuge lands: a formal partnership and memorandum of understanding (or other voluntary agreement among partners) will be created between the Service, Selawik refuge, Northwest Arctic Borough, NANA regional corporation, and local search and rescue organizations to formalize the roles and responsibilities of each partner in performing regular maintenance and/or replacement of shelter cabins on refuge lands. Members of the formal partnership will review the need for additional shelter cabins and appropriate location(s) for them, with the option of joint construction of an additional 1-2 shelter cabins or relocation of an existing shelter cabin on refuge lands. Alternative B did not include the option for either construction of additional shelter cabin(s) or the relocation of an existing shelter cabin on refuge lands.

### **Decision and Rational**

Three alternatives were analyzed in the draft Plan and EA. Alternative B was selected because it best meets the purpose and need of the project with no significant impacts to the environment.

Alternative B best accomplishes refuge purposes, best helps achieve the missions of the National Wildlife Refuge System and the Service, and best meets the vision and goals identified in the

Plan. Alternative B provides the best balance between public and commercial uses of refuge lands. It provides a proactive, responsible, and transparent means for addressing long-term issues of conflict between commercial and public uses in the Selawik region. Alternative B responds to the concerns of members of the public who are intimately familiar with refuge lands and private lands and protects those visitors who are not. Alternative B strengthens the special use permitting process by making it public and proactive. Of the three alternatives, Alternative B best ensures high quality hunting experiences for both local residents and refuge visitors that use commercial services. Alternative C would have been substantially more difficult to implement, requiring resource and public use data not currently available. The revised management direction in the final Plan derived from the proposal in Alternative B best addresses the primary concerns that we heard from the local public representing commercial operators.

#### **Finding of No Significant Impact**

The EA analyzed direct, indirect, and cumulative impacts on the physical, biological and socio-economic environment. It included an ANILCA Section 810 subsistence evaluation and found no restrictions of subsistence on refuge lands. The analysis contained in the EA indicates that there will not be a significant impact, individually or cumulatively, to the refuge environment as a result of the management actions proposed in the preferred alternative.

I have determined that approving the final Plan and implementing the preferred alternative is not a major Federal action that would significantly affect the quality of the human environment as defined in Section 102 (2) c of the National Environmental Policy Act of 1969, as amended. Accordingly, the Service is not required to prepare an environmental impact statement. This determination is made after full consideration of the context and scope of the management direction in the Plan.

#### **Supporting Document**

U.S. Fish and Wildlife Service. 2010. Draft Revised Comprehensive Conservation Plan and Environmental Assessment. Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service, Anchorage, AK. 285 pp (plus ten appendices).



Geoffrey L. Haskett  
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5/23/11

Date

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**June 2011**

