



U.S. Fish & Wildlife Service

Revised Comprehensive Conservation Plan

Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges





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 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.

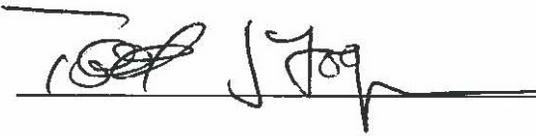
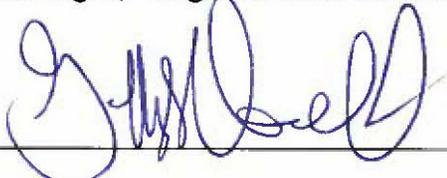
Revised
Comprehensive Conservation Plan
for the
Koyukuk/Northern Unit Innoko//Nowitna
National Wildlife Refuges
July 2009

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Dear Reader:

The Revised Comprehensive Conservation Plan (Plan) for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuge will guide management of the Refuge for the next 15 years. The Plan provides a vision, goals, and objectives for future management of the Refuge. It addresses the issues raised during public scoping and comments received during public review of the draft plan. Based upon comments received we adopted Alternative B (Preferred Alternative) from the draft plan.

Comments received during the public review of the draft plan and our responses to them are included in this document in Appendix R. The environmental assessment and draft plan are on file with our offices in Galena and Anchorage.

Draft compatibility determinations for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuge were included in the draft revised comprehensive conservation plan and comments were accepted as part of the review of this plan. Our responses to comments on those draft compatibility determinations can also be found in Appendix R. The final signed compatibility determinations are in Appendix D. A discussion of compatibility determinations can be found in Chapter 2, section 2.4.6. More information on the compatibility process can be found at the refuge office or at <http://alaska.fws.gov/nwr/planning/completed.htm>.

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

Requests for copies of the plan, CD-ROM, or further information should be directed to:
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We thank everyone who participated in the planning and public involvement process. Your comments helped us prepare a better plan for the future of Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuge.

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Acronyms and Abbreviations

ADF&G	Alaska Department of Fish & Game
AFS	Alaska Fire Service
AHRS	Alaska Heritage Resources Survey
AIWFMP	Alaska Interagency Wildland Fire Management Plan
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act of 1980
ANSEP	Alaska Native Science and Engineering Program
ATV	all terrain vehicle
BIA	Bureau of Indian Affairs
BBS	Breeding Bird Survey
BLM	Bureau of Land Management
C	Centigrade
CBC	Christmas Bird Count
CE	categorical exclusion
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CUA	controlled use area
dbh	diameter at breast height
DNR	Alaska Department of Natural Resources
EA	Environmental Assessment
EIS	environmental impact statement
F	Fahrenheit
FONSI	Finding of No Significant Impact
FMP	Fire Management Plan
FRO	Fisheries Resource Office
FW	Fish and Wildlife Service Manual
FY	fiscal year
GIS	geographic information system
GMH	Galena Mountain herd
GMU	Game Management Unit
I&MP	Inventory and Monitoring Plan
IACUC	Institutional Animal Care and Use Committee
IC	Interim Conveyed
ISER	Institute of Social and Economic Research
MBM	Migratory Bird Management
NEPA	National Environmental Policy Act of 1969

Acronyms and Abbreviations

NWR	National Wildlife Refuge
ORV	off-road vehicle
PHS Plan	U.S. Public Health Service Comprehensive Conservation Plan
RAAWS	remote automated weather stations
RDI	Recordable Disclaimers of Interest in Lands
Refuge	Unless accompanied by specific refuge name, refuge refers to Koyukuk/Northern Innoko/Nowitna Refuges
Refuge System	National Wildlife Refuge
Refuge System Administration Act	National Wildlife Refuge System Administration Act of 1966 (also in places as “Refuge Administration Act”)
Refuge System Improvement Act	National Wildlife Refuge System Improvement Act of 1997 (also in places as “Refuge Improvement Act”)
RIT program	Refuge Information Technician program
RS 2477	Revised Statute 2477 (codified as U.S.C. 932); refers to potential established rights-of-way for construction of highways over public lands not reserved for public use
Service/USFWS stat	U.S. Fish and Wildlife Service statute
SUPE	sample unit probability estimator
System	National Wildlife Refuge System (also seen as Refuge System)
UAA	University of Alaska-Anchorage
UAF	University of Alaska-Fairbanks
U.S.C.	United States Code
USDA	United States Department of
USGS	United States Geological Survey
WAH	Western Arctic caribou herd
WIP	wildlife inventory plan

1. Introduction

This document is a revision of the 1987 Comprehensive Conservation Plans (Plan) for the management of the Koyukuk and Northern Unit Innoko (locally referred to as the Kaiyuh or Kaiyuh Flats) and Nowitna National Wildlife Refuges (the three refuges combined will hereafter be referred to as Refuge or individually as the Koyukuk, Northern Unit Innoko, or Nowitna). The two plans have been combined into one Plan. This revised Plan replaces the management direction for the Refuge described in the Koyukuk and Northern Unit Innoko National Wildlife Refuge Final Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review October 1987 and Nowitna National Wildlife Refuge Comprehensive Conservation Plan/Environmental Impact Statement/ Wilderness Review/Wild River Plan Final 1987 and associated records of decision.

The U.S. Fish and Wildlife Service (Service) administers approximately 7,302,000 acres of land and water in western interior Alaska as the Koyukuk and Northern Unit Innoko and Nowitna National Wildlife Refuges (Figure 1-1). This chapter provides background information that establishes the framework used to develop this document, including (1) the purpose of and need for the Plan; (2) an overview of the Refuge, including historical perspective and refuge establishment; purposes, vision, and goals of the Refuge; and the environmental setting; (3) the legal context of refuge management; and (4) the planning process, including identification of significant planning issues addressed in the Plan.

1.1 Purpose of and Need for Action

The purpose of this planning action is to revise the Koyukuk and Nowitna plans originally developed and adopted in 1987. The Koyukuk and Nowitna Plans provide broad policy guidance and establish management direction for the Refuge. The Plan defines long-term goals and objectives toward which refuge management activities are directed and identifies which uses may be compatible with the purposes of the Refuge and mission of the National Wildlife Refuge System (Refuge System or System). Conservation plans are viewed as dynamic documents, requiring periodic review and updating.

Federal statute, specifically section 304(g) of the Alaska National Interest Lands Conservation Act of 1980, as amended, 16 U.S.C. 140hh-3233, 43 U.S.C. 1602-1784 (ANILCA), directs the Secretary of the Interior to prepare, and from time to time revise, a “. . . comprehensive conservation plan . . . for each refuge (in Alaska) . . .”

Following guidance found in ANILCA and other federal laws—primarily the 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); and the National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321-4347 (NEPA) as implemented by the Council on Environmental Quality’s (CEQ) Regulations for Implementing the Procedural Provisions of NEPA, 40 CFR 1500-1508—the Service revised the Koyukuk and Nowitna National Wildlife Refuge plans to provide direction for management of the Refuge for the next 15 years. Revising the Plans allows the Service to accomplish the following:

- Update management direction related to national and regional policies and guidelines implementing federal laws governing refuge management;
- Incorporate new scientific information on refuge resources; and
- Reevaluate current refuge management direction based on changing public demands for use of the Refuge and its resources.

This document is the Final Koyukuk Nowitna Refuge Comprehensive Conservation Plan. It describes the management of the Refuge for the next 15 years.

In addition to the preceding requirements, a comprehensive conservation plan serves to do the following:

- Ensure that the purposes of the Refuge and the mission of the Refuge System are being fulfilled;
- Ensure that national policy direction is incorporated into the management of the Refuge;
- Ensure that opportunities are available for interested parties to participate in the development of management direction;
- Provide a systematic process for making and documenting decisions about refuge resources;
- Establish broad management direction for refuge programs and activities;
- Provide continuity in refuge management;
- Provide a basis for budget requests; and
- Provide a basis for evaluating accomplishments.

1.2 Planning Context

The Refuge is part of the National Wildlife Refuge System. The Service places an emphasis on managing individual refuges in a manner that reflects national priorities of the Refuge System. As a result, the final plan must contribute to meeting the mission and goals of the entire Refuge System.

1.2.1 The U.S. Fish and Wildlife Service

Part of the Department of the Interior, the Service is the principal federal agency responsible for conserving, protecting, and enhancing the nation's fish, wildlife, plants, and their habitats. In addition to the Refuge System, the Service 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 Federal Aid in Wildlife Restoration program, which distributes to state fish and wildlife agencies hundreds of millions of dollars derived from excise taxes on fishing and hunting equipment.

The mission of the U.S. Fish and Wildlife 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 (602 FW 1.6W).

1.2.2 The National Wildlife Refuge System

The National Wildlife Refuge System comprises more than 96 million acres of federal lands, encompassing more than 545 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 Refuge System was created to conserve fish, wildlife, plants, and their habitats. This conservation mission includes providing Americans with opportunities to participate in compatible wildlife-dependent recreation, including fishing and hunting, on Refuge System lands and to better appreciate the value of and need for fish and wildlife conservation.

Alaska contains 16 national wildlife refuges (see 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 National Wildlife Refuge System.

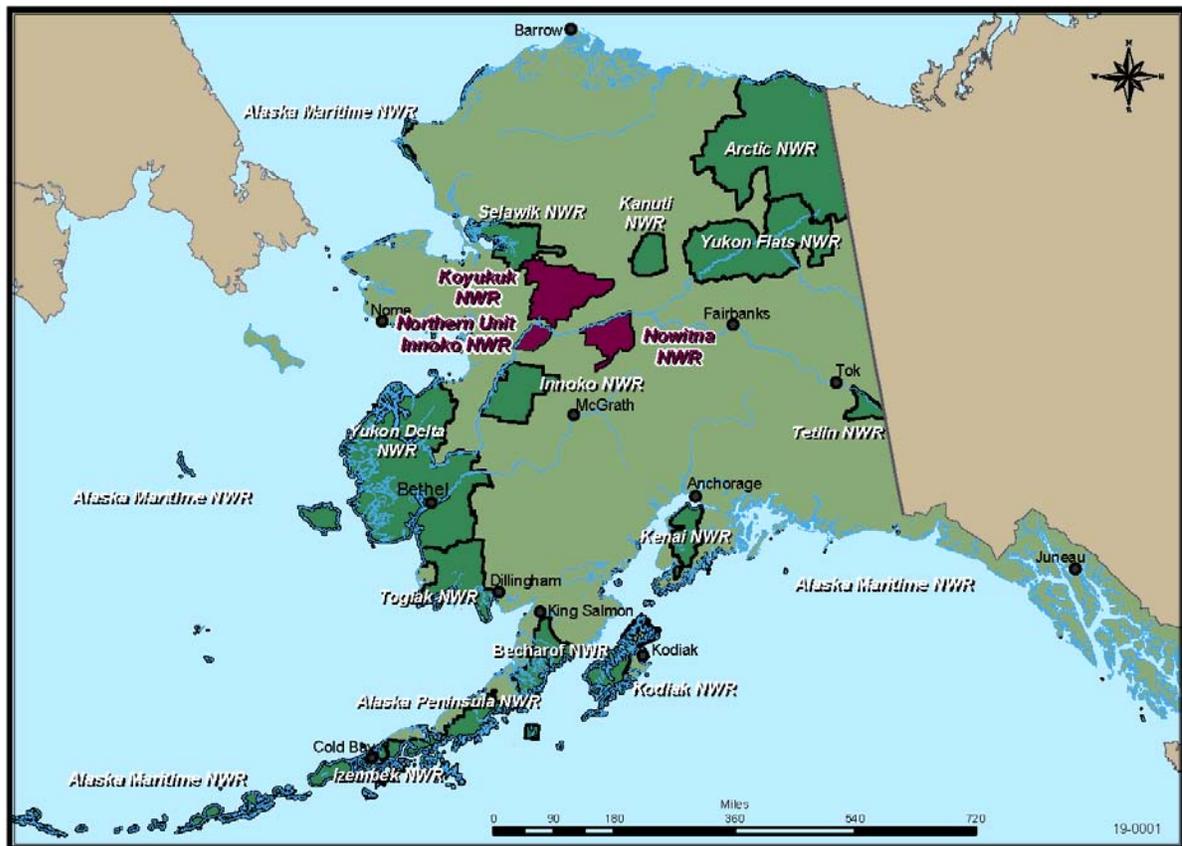


Figure 1-1. Refuge location within Alaska

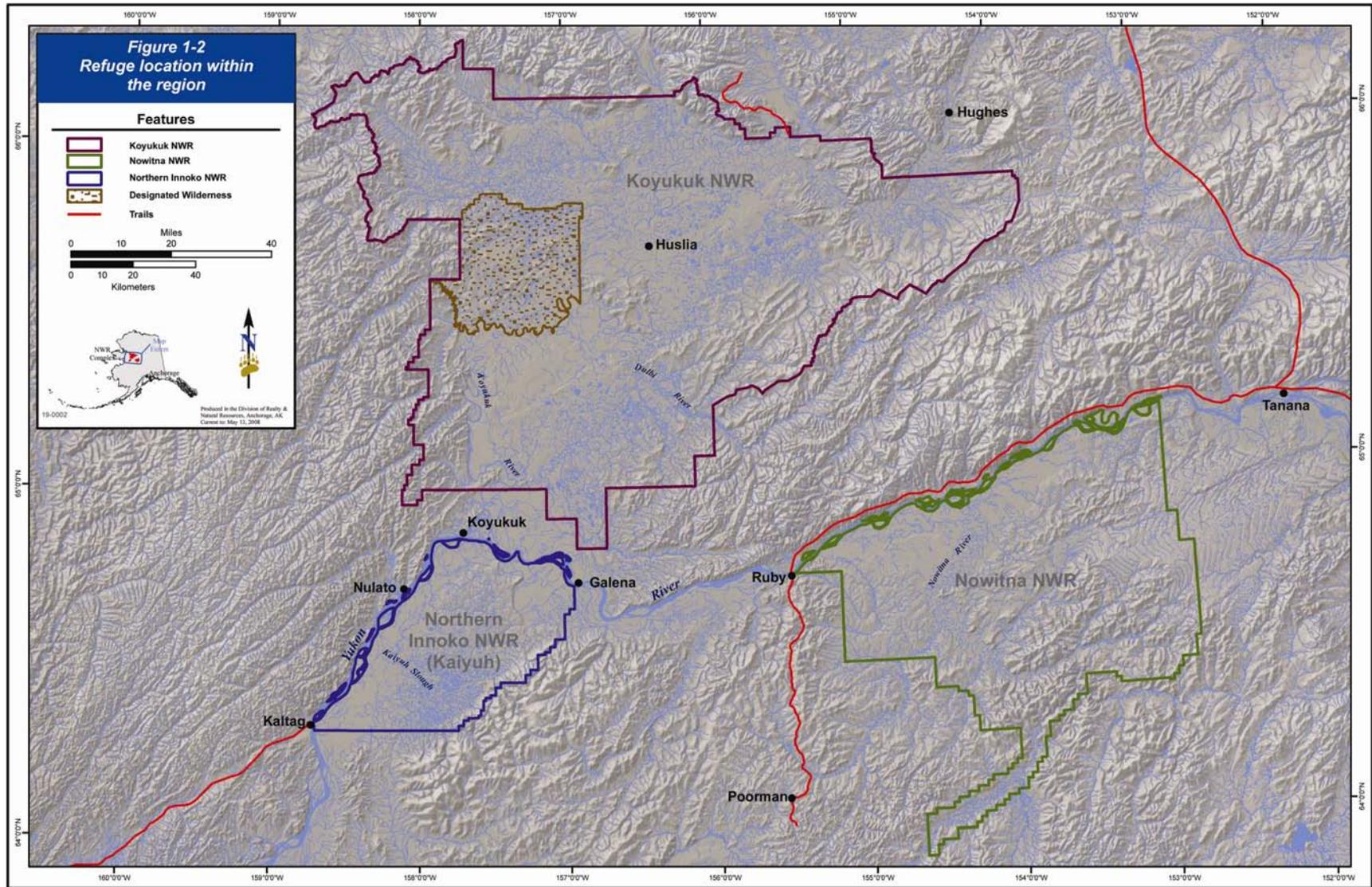


Figure 1-2. Refuge location within the region

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 Administration Act; 16 U.S.C. 668dd(a)(2)].

1.2.3 Principles for Managing the National Wildlife Refuge System

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 the individual refuge was established. It requires that any use of a refuge be a compatible use (one that will not materially interfere with or detract from fulfillment of the mission of the System or the purposes of the refuge, based on sound professional judgment).

The 1997 amendments to the Refuge Administration Act identified a number of principles to guide management of the Refuge System:

- Conservation of fish, wildlife, and plants, and their habitats within the Refuge System;
- Maintenance of biological integrity, diversity, and environmental health of the Refuge System;
- Carrying out the mission of the Refuge System and the purposes of each refuge (except that if a conflict exists, refuge purposes are protected first);
- Effective coordination, interaction, and cooperation with adjacent landowners and state fish and wildlife agencies;
- Maintenance of adequate water quantity and water quality to meet refuge and system purposes and acquisition of necessary water rights under state law;
- Recognition of hunting, fishing, wildlife observation and photography, and environmental education and interpretation as the priority general public uses of the Refuge System;
- Provision of opportunities for compatible priority wildlife dependent public uses within the Refuge System;
- Provision of enhanced consideration for priority wildlife-dependent uses over other public uses in planning and management within the Refuge System;
- Provision of increased opportunities for families to experience compatible wildlife-dependent recreation, particularly traditional outdoor activities such as fishing and hunting; and
- Monitoring of the status and trends of fish, wildlife, and plants within each refuge.

To maintain the health of individual refuges, and the National Wildlife Refuge System as a whole, managers must anticipate future conditions. Managers must endeavor to avoid adverse impacts and take positive actions to conserve and protect refuge resources. Effective management also depends on acknowledging resource relationships and acknowledging that refuges are parts of larger ecosystems. Refuge managers work together with partners—including other refuges, federal and State agencies, tribal and other governments, Native organizations and entities, and nongovernmental organizations and groups—to protect, conserve, enhance, or restore all native fish, wildlife, plants, and their habitats.

1.3 Legal and Policy Context and State Coordination

The Service manages national wildlife refuges pursuant to various legal and administrative requirements. Management of the Refuge is dictated, in large part, by ANILCA, which established the Refuge and identified the purposes for which it was established. However, numerous other laws, treaties, executive orders, and agreements with other parties (e.g., the State of Alaska) also guide management of the Refuge.

1.3.1 Legal Guidance

Operation and management of refuges throughout the Refuge System are influenced by a wide array of laws, treaties, and executive orders and the regulations and policies developed to implement them. Among the most important are the Refuge System Administration Act as amended by the Refuge System Improvement Act, the Refuge Recreation Act, the Alaska Native Claims Settlement Act (ANCSA), and the Endangered Species Act. Brief descriptions of these and other pertinent legal documents that influence management of the Refuge are found in appendix A.

For national wildlife refuges in Alaska, ANILCA, as amended, provides key management direction. ANILCA sets forth the purposes for each refuge and provides administrative direction for management of the refuges, including requiring development of comprehensive conservation plans for each refuge. Additional provisions authorize studies and programs related to wildlife and wildland resources, subsistence opportunities, and recreation and economic uses. How ANILCA influences management of the Refuge is reflected throughout this document.

After reviewing the requirements for Wilderness reviews, we determined that the comprehensive planning requirements of section 304(g) of ANILCA have been satisfied by the Wilderness recommendation of the 1987 Plans.

A similar approach was taken with Wild and Scenic River reviews. We determined that we would meet the intent of the Wild and Scenic Rivers Act of 1968 by focusing our efforts on describing river values and providing direction regarding the protection of these values.

Wilderness values and river-related values are discussed in chapter 3, sections 3.5 and 3.6 of this Plan. Programs and actions to protect all refuge-related values are discussed in the management direction sections of chapter 2.

1.3.2 Policy Guidance

Programmatic guidance and policy documents provide additional direction for management of national wildlife refuges throughout the Refuge System. These documents include the U.S. Fish and Wildlife Service Manual, director's orders, national and regional policy issuances, handbooks, director's memorandums, and regional directives. Although it is not practical to provide information about all of these documents in this Plan, they are critical to management of the Refuge and the Refuge System as a whole. Much of the management direction described in chapter 2, and in other parts of this Plan, is derived from these programmatic and policy documents.

Several of these documents direct that an ecosystem approach be used in refuge management. We must consider the health of the entire ecosystem when managing the Refuge. This concept requires close coordination with others. Appendix A provides a brief description of this concept and of several of the national and regional management plans and programs that were considered during the development of this Plan. Other key policies, such as the compatibility policy, are described in later chapters, as they provide guidance in this Plan.

1.3.3 Coordination with the State of Alaska

The Alaska Department of Fish and Game (ADF&G) has primary responsibility for managing Alaska's fish and resident wildlife populations. The Service has primary responsibility for management of migratory birds, endangered species, and other species mandated by federal law. On all refuge lands, the Service and ADF&G share a concern for all fish and wildlife resources and their habitats, and both are engaged in fish and wildlife conservation, management, and protection programs. In 1982, the Service and ADF&G signed a Master Memorandum of Understanding that defines the cooperative management roles of each agency and sets the framework for cooperation between the two agencies (see appendix B).

The State of Alaska (State) establishes fishing, hunting, and trapping regulations at the direction of the Alaska Boards of Fisheries and Game. These regulations apply to federal public lands unless superseded by federal regulations. If Service restrictions on hunting were needed, they would be done through a rule-making or through closures or restrictions under 50 CFR 36.41. The State is divided into 26 game management units (GMUs); see Figure 1-3. Management objectives are developed for populations within each GMU. The Refuge is within GMU 21 and 24. The ADF&G management objectives for big-game and fish populations on the Refuge are described in chapter 3.

The Alaska Department of Natural Resources (DNR) and its divisions are key management partners. DNR manages all State-owned land, water, and surface and subsurface resources except for fish and wildlife. The DNR - Division of Mining, Land, and Water manages the State's water and land interests, including any within national wildlife refuges in Alaska. These interests will become increasingly significant in the next 15 years, especially with regard to water rights, navigable waters, ownership of submerged lands, and rights-of-way over refuge lands. The division is responsible for development of plans for management of State lands (e.g., the plan currently being developed).

Additional information about key State programs is provided in appendix B.

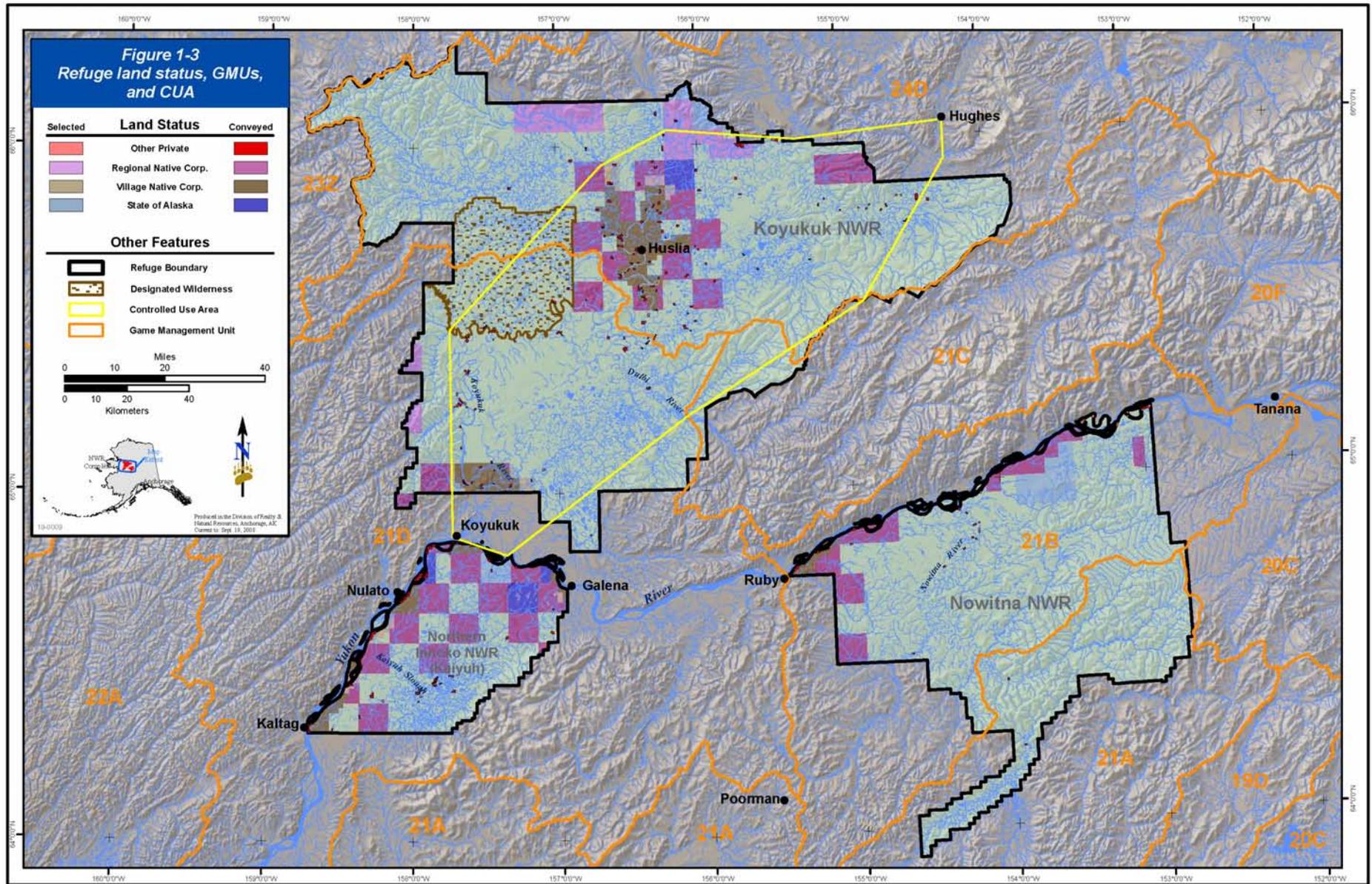


Figure 1-3. Refuge land status, GMUs, and CUA

1.4 Refuge Purposes and Vision Statement

1.4.1 Purposes of Koyukuk National Wildlife Refuge

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

“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(5) (B) of ANILCA states:

“The purposes for which the Koyukuk National Wildlife Refuge is established and shall be managed include—

- (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to waterfowl, raptors and other migratory birds, furbearers, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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;
- (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 purpose of the Koyukuk Wilderness is to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to 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 wilderness.

Major purposes for which the Innoko Refuge was established and shall be managed were set forth in section 302(3) (B) of ANILCA. Only the first purpose differs from those for the Koyukuk Refuge. This purpose is:

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl, peregrine falcons, other migratory birds, black bear, moose, furbearers, and other mammals, and salmon.

Major purposes for which the Nowitna Refuge was established and shall be managed were set forth in section 302(6) (B) of ANILCA. Only the first purpose differs from those for the Koyukuk Refuge. This purpose is:

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to trumpeter swans, white-fronted geese, canvasbacks and other waterfowl and migratory birds, moose, caribou, martens, wolverines, and other furbearers, salmon, sheefish, and northern pike.

The lower 223 miles of the Nowitna River is managed as a Wild River under the Wild and Scenic Rivers Act. This segment of the river was recognized for its outstandingly remarkable scenic, geologic, wildlife, historic, and recreational values.

1.4.2 Refuge Vision Statement

Service Planning Policy (Service Manual 602 FW 3.4G) directs each national wildlife refuge to develop a vision statement for the refuge during the comprehensive conservation planning process. A vision statement is “[a] concise statement of what the planning unit (refuge) could be, or what we could do, in the next 10 to 15 years, based primarily upon the Refuge System mission and specific refuge purposes, and other relevant mandates (Service Manual 602 FW 1.6S).” The following statement provides this vision for the Refuge:

The National Wildlife Refuges in the Koyukon region of Alaska encompass a vast area of boreal forest, wetlands, lakes and rivers that is home to an abundance of waterfowl, songbirds, mammals, and fish. An experience of solitude in this intact ecosystem imparts the sense that this place is completely untouched by man. And yet, the land is thoroughly known and essential to people whose lives are intertwined with its bounty. We use our understanding of the respect, value, and love of this place by the people who live in, use, or simply treasure this wild land and sound biological research and monitoring to ensure proper stewardship of the Koyukuk, Northern Unit Innoko, and Nowitna National Wildlife Refuges.

1.5 Refuge Overview

1.5.1 Historical Perspective and Refuge Establishment

On December 2, 1980, President Jimmy Carter signed into law the Alaska National Interest Lands Conservation Act. Section 302 of this act established the Innoko, Koyukuk, and Nowitna refuges as part of the National Wildlife Refuge System.

1.5.2 Physical Environment

The Koyukuk Refuge contains 4,500,000 acres. The southern boundary is located seven miles north of Galena, which is located on the Yukon River. The refuge is situated in a circular floodplain basin of the Koyukuk River just north of its confluence with the Yukon River. The variably forested floodplain is surrounded by the Nulato Hills on the west, the Purcell Mountains

and Zane Hills on the north, Galena Mountain on the east, and the Yukon River on the south. Numerous lakes, sloughs, and rivers are prominent across the refuge with the Koyukuk River being the dominant natural feature.

The Northern Unit Innoko contains 751,000 acres. It is located southeast of the village of Nulato situated in an area known locally as the Kaiyuh or Kaiyuh Flats. The refuge lies within an extensive floodplain with over 80 percent of the area being either water or wetlands and is bounded on the north and west by the Yukon River and on the east and south by the Kaiyuh Mountains.

The Nowitna Refuge contains 2,051,000 acres and is located less than two miles east of Ruby and south of the Yukon River. The refuge is bounded by the Yukon River on the north, the Boney Creek Bench lands on the east, the upper slopes of the Nowitna River Canyon on the south, and the Poorman Road Mountains on the west.

The Koyukuk and Northern Unit Innoko, along with the Nowitna, are managed out of the Galena office.

1.5.3 Biological Resources

Black spruce forest with inclusions of tundra, willow-dominated brush fields, and muskeg dominates the vegetation across the Koyukuk. White spruce is common along the major rivers. The combination of wetlands and terrestrial habitats supports a relatively high population of moose, furbearers, waterfowl, and fish. These resources are important to local subsistence users. The Koyukuk Wilderness encompasses the Nogahabara sand dunes.

Wetlands dominate the landscape of the Northern Unit Innoko. Black and white spruce and low shrubs dominate the vegetation. Waterfowl utilize the refuge for nesting and brood rearing. Moose and especially beaver are common to the area. Northern pike are common to most lakes, ponds, and streams.

The Nowitna Refuge consists primarily of black spruce forests, wetlands, ponds and streams, bench lands, and foothills. The Nowitna River floodplain is the Refuge's most productive area. It supports the majority of the Refuge's waterfowl, furbearers, wolves, moose, and bear. The Nowitna River is a congressionally designated Wild River. It forms a wide, meandering floodplain except for the Nowitna River Canyon.

A fire disturbance regime dominates all three refuges.

1.5.4 Human Uses

The majority of the use on the refuges is by local residents from the surrounding communities of Galena, Hughes, Huslia, Kaltag, Koyukuk, Nulato, Ruby, and Tanana for subsistence activities. Ten outfitters, guides, and transporters currently operate on the Refuge annually. The Kaiyuh Flats has a rich history of local Athabascan use.

1.6 Special Values of the Refuge

Section 304(g) of ANILCA directs the Secretary of the Interior 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 **Koyukuk and Northern Unit Innoko Refuges**.

1.6.1 Mosaic of Early Successional Habitats

The incidence of fire on the Refuges is one of the highest in Alaska. The Refuge’s fire return interval is 275 years based on the past 57 years of fire history. The mosaic of seral vegetation stages reflects the strong influence of fire. Early seral habitats are present over a large area of the Refuge. Ice scouring in the floodplain has created a significant amount of early seral stage willow, which provides the major source of winter moose browse. The abundance of such habitats, which are dominated by herbaceous and shrub species, supports a relatively high density of moose and other wildlife in some areas.

1.6.2 Diverse System of Streams, Lakes, and Wetlands

The relatively natural free-flowing waters of the Refuge result from an ecological process that creates a mosaic of continuously evolving habitat and maintains a diversity of fish and wildlife populations. These free-flowing waters recharge lakes and wetlands during periods of flooding and move sediment and nutrients throughout the riparian area. The Koyukuk Refuge was created in large part to protect the wetlands adjacent to the Koyukuk River and its tributaries. These wetlands include an estimated 15,000 lakes and 5,500 miles of rivers and streams.

1.6.3 Kaiyuh Flats

This area is unique because over 80 percent of the refuge is water or wetlands. It is one of the few areas along the Yukon River that has a water level that fluctuates with the rise and fall of the Yukon River. The area is widely used by local Athabaskan people and has a very rich history.

1.6.4 Nogahabara Sand Dunes

The Nogahabara sand dunes are one of the largest active sand dunes in Alaska. It is a small portion of a Pleistocene dune field that is now mostly inactive. The active area is about 16,000 acres and consists primarily of dunes 20 to 50 feet high and 100 feet or more in length. The dunes form the central core of the Koyukuk Wilderness, which encompasses 400,000 acres.

1.6.5 Salmon Habitat

The Koyukuk River and its major tributaries, the Gisasa, Kateel, Huslia, and Dulbi rivers, provide migration corridors and spawning and rearing habitat for chum salmon. A smaller population of Chinook and coho salmon use these rivers for migration and spawning and rearing habitat. Chinook, coho, and chum salmon, whitefish, sheefish, and northern pike comprise an important subsistence fisheries resource.

1.6.6 Boreal-nesting White-fronted Goose Habitat

The Koyukuk and Northern Unit Innoko provide significant nesting, rearing, and molting habitat for white-fronted geese.

1.6.7 Trumpeter and Tundra Swan Habitat

Trumpeter and tundra swan range overlaps on the Koyukuk Refuge. The Refuge lies at the northwestern limit of trumpeter swan habitat. Swans of both species nest in significant numbers on the Refuge, making the area ecologically unique. The population of both species has been steadily increasing.

1.6.8 Subsistence Harvest on the Koyukuk and Northern Unit Innoko

One of the purposes for the refuges set forth in ANILCA is to provide the opportunity for continued subsistence use by local residents. Residents of nearby villages continue to depend upon the Refuge for their subsistence needs. Moose and salmon comprise the most used refuge resources. Trapping provides additional income to some individuals but not to the degree it did two decades ago. Annually, a variety of berries are picked, and some medicinal plants are harvested. The Refuge issues up to four special use permits for cabin logs each year. This subsistence-based socioeconomic system characteristic of the Refuge is dynamic. The system depends on the continuing relationship between subsistence users and the resources used.

1.6.9 Caribou Herds

The Western Arctic caribou herd is the largest caribou herd in Alaska, which numbered an estimated 377,000 animals in 2007. The Koyukuk Refuge is part of the herd's traditional caribou range. The Galena Mountain caribou herd utilizes the Koyukuk for winter habitat. Its population is estimated to be between 150 and 200 animals.

The following special values have been identified for the **Nowitna Refuge**.

1.6.10 Nowitna River

The Nowitna River is a congressionally designated Wild River. The meandering nature of the Nowitna River has created a diversity of terrestrial and aquatic habitats that are very productive areas for waterfowl, moose, furbearer, and northern pike. The river changes courses by forming and then cutting through oxbows, creating isolated oxbow lakes that are ideal nesting areas for swans, geese, and ducks. River erosion destroys mature terrestrial habitat on the outside of bends and forms—on the inside of bends—new gravel and sand bars that are quickly vegetated by willows, sedges, grasses, and forbs. All seral stages of terrestrial and aquatic habitats are represented in the Nowitna River floodplain. Spring flooding enriches the oxbow lakes and sloughs with nutrients and carbonates from the limestone bedrock in the river's canyon area. As a result, the lakes are less acidic and more productive than most other Alaskan waters.

1.6.11 Sheefish

The population of sheefish found in the Nowitna River is currently being studied to unravel all of the unknowns surrounding this species. The population is anadromous, following a sinuous path before heading to the Yukon River. Sport fishing for trophy-size sheefish is an established activity on the Nowitna River.

1.6.12 Agates

The gravel bars on the upper Nowitna River are rich in agates. Agate hunting is a popular visitor activity there. The agates are believed to have originated in a layer of volcanic flows along the Nowitna River upstream from its confluence with the Sulukna River.

1.6.13 Palisades

The Palisades site on the Yukon River is comprised of a series of silt bluffs rising up to 300 feet above the river and extending for about seven miles along the river. The bluffs are commonly referred to as the Boneyards because fossil remains of Pleistocene mammals periodically emerge from the eroding frozen silt. Preserved within the bluffs are layers of prehistory reaching back at least two million years (Matheus et al. 2003). The site is unmatched in Alaska for paleo-environmental study. The bluffs contain one of the oldest series of datable volcanic ash layers in the State. It preserves at least three buried forest layers representing interglacial periods within the early, middle, and late Pleistocene. The presence of datable layers, interspersed with buried ice wedges and abundant fossil plant and animal remains, provides researchers with detailed information about local past environments. Fossil collection is prohibited other than by researchers working under permit.

1.6.14 Boney Creek Dissected Bench Land Formation

This landscape feature consists of dissected bench lands and is unique to interior Alaska. The area has a canyon-land landscape with flat-topped mesa or plateau-like areas dissected by small parallel streams. The bench lands consist of vegetated sand dunes that have been modified by erosion and show a northeast-southwest orientation. The unusual drainage patterns are at various angles to the orientation of the dunes and seem to be unrelated to any underlying bedrock.

1.6.15 Waterfowl

The refuge contains very productive areas for trumpeter swans, white-fronted geese, and ducks.

1.6.16 Furbearers

The abundance of mature trees provides some of the best marten habitat found in Alaska. Beaver are abundant, particularly in the oxbow lakes in the Nowitna River lowlands and in grass lakes lying along the Yukon River.

1.7 Planning Requirements

Section 304(g) of ANILCA directs that comprehensive conservation plans be developed for each refuge. It also specifies procedures to follow while developing these plans.

The following must be identified and described prior to developing a plan for any refuge:

- the populations and habitats of the fish and wildlife resources of the refuge;
- the special values of the refuge and any other archeological, cultural, ecological, geological, historical, paleontological, scenic, or wilderness values of the refuge;
- 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;
- present and potential requirements for access with respect to the refuge, as provided for in ANILCA title XI; and
- significant problems which may adversely affect the populations and habitats of fish and wildlife identified.

Each comprehensive conservation plan shall:

- be based upon the identifications and the descriptions in the previous planning requirements—
 - (i) designate areas within the refuge according to their respective resources and values;
 - (ii) specify the programs for conserving fish and wildlife and the programs relating to maintaining the values of the refuge that are proposed to be implemented within each area; and
 - (iii) specify the uses within each such area that may be compatible with the major purposes of the refuge; and
- set forth those opportunities which will be provided within the refuge for fish and wildlife- oriented recreation, ecological research, environmental education, and interpretation of refuge resources and values, if such recreation, research, education, and interpretation is compatible with the purposes of the refuge.

While preparing the plans, the Service is required to ensure adequate interagency coordination and public participation. Any interested and affected parties such as State agencies, Native corporations, local residents, and political subdivisions that would be affected by decisions in the plan must be provided meaningful opportunities to present their views. Prior to adopting a plan, the Service will issue notice of its availability in the *Federal Register*, make copies available in regional offices of the Fish and Wildlife Service throughout the U.S., and provide an opportunity for public review and comment.

1.8 The Planning Process for the Refuge

This section describes the process used to develop the Final Comprehensive Conservation Plan. The process is consistent with the planning requirements specified in section 304(g) of ANILCA; the Refuge System Administration Act, as amended by the National Wildlife Refuge System Improvement Act; 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 Refuge Plan:

- 1) Design the planning process (preplanning)
- 2) Initiate public involvement and scoping
- 3) Determine significant issues
- 4) Develop and analyze alternatives
- 5) Prepare draft comprehensive conservation plan and environmental assessment
- 6) Prepare and adopt a final plan by issuing a Finding of No Significant Impact or proceed in the development of an environmental impact statement
- 7) Implement the plan and monitor and evaluate it
- 8) Review and revise the plan

1.8.1 Design the Process

In 2007, the Service began reviewing the Koyukuk and Northern Unit Innoko and the Nowitna National Wildlife Refuge Plans to determine how they should be revised. The Service found that, in most cases, on-the-ground management actions were meeting refuge objectives. However, some management direction needed to be updated. New laws (such as the Refuge System Improvement Act), new regulations and policies, and other changes (such as federal management of subsistence on Alaska refuges) needed to be included in the Plan. The Service decided to combine the refuge Plans into one because the three refuges are administered out of the same office.

The Service then identified all relevant laws, regulations, policies, and other direction that would have to be considered during revision of the Plan. These were discussed in the legal and planning context sections earlier in this chapter, and additional detail can be found in appendix A. The Service also reviewed data available on refuge resources and uses and identified some areas in which additional work was required.

1.8.2 Initiate Public Involvement and Scoping

This step informed people that the Plan revision process was beginning and that we were soliciting ideas on what should be addressed in the revision. Formal scoping began with publication of the Notice of Intent to revise the Koyukuk and Northern Unit Innoko and the Nowitna National Wildlife Refuge Comprehensive Conservation Plans and prepare an environmental assessment (EA), which was published in the *Federal Register* on October 9, 2007 (Vol. 72 No. 194, pp. 53343-53344).

In November 2007, a newsletter announcing the revision and seeking comments was mailed to numerous individuals and organizations on the mailing list developed by the regional office. Copies of the newsletter were also sent to all post office box holders in Galena. The newsletter contained information about the Refuge, described issues identified by the refuge staff and a group of village leaders, and provided an opportunity for the public to identify other issues that should be addressed during the revision of the Plan.

Public meetings to gather input were held in eight communities adjacent to and lying within the Refuge. Attendance at these meetings ranged from 8 to 26 individuals. Individuals and organizations provided 60 written and oral comments. Topics identified by the public included wildlife populations; competition between local and non-local users for refuge resources; the public feeling not listened to; being sensitive to cultural traditions; future public use; climate change; the cabin permitting policy; timber harvest; mining, oil and gas leases; the effects of off-refuge mining activities on refuge land; and future development on and off the Refuge.

1.8.3 Determine Significant Issues

The planning team reviewed the issues raised by the public, refuge staff, other Service divisions, tribal governments, and the State to determine the significant planning issues to be addressed in the revised Plan. Significant issues are those that are within the range of control of the Refuge and may be handled differently in the alternatives. Eight issues were identified. Section 1.9 describes the process used to identify the significant planning issues.

1.8.4 Develop and Analyze Alternatives

Following the determination of significant planning issues in January 2008, the planning team developed a set of draft alternatives for management of the Refuge. A planning update was sent to over 300 individuals, State agencies, and local government agencies in the affected area asking for comments, suggestions, and questions. Sixty comments were received, and the refuge staff made minor revisions to the draft alternatives. The final set of alternatives along with an analysis of the environmental effects was presented in the draft revised Plan.

1.8.5 Prepare Draft Plan and Environmental Assessment

The purpose of this step was to produce the draft revised Plan. This document described two alternatives (including the current management) for managing the Refuge over the next 15 years. It included an analysis of the potential impacts of implementing each alternative and described how the Service determined its preferred alternative (Alternative B). Also included was a description of the management that would remain the same no matter which alternative is implemented. There was a 90-day public review and comment period. During this period, the Service held public meetings in the eight villages (Hughes, Huslia, Galena, Kaltag, Koyukuk, Nulato, Tanana, and Ruby) near the Refuge. A summary of the draft revised Plan was mailed to over 1,400 individuals and organizations. The summary announced the comment period for the draft revised Plan.

1.8.6 Prepare and Adopt a Final Plan

The planning team reviewed and analyzed all of the comments received on the draft revised Plan, modified the draft as needed, and developed the final revised Comprehensive Conservation Plan. A Finding of No Significant Impact (FONSI) was submitted to the regional director for approval and signature. Following approval, a Notice of Availability will be published in the *Federal Register*, and the final revised Plan and FONSI will be distributed to interested parties.

1.8.7 Implement Plan, Monitor, and Evaluate

After the final revised Plan is distributed, the refuge staff will begin implementing any management changes called for in the Plan. A critical component of management is monitoring—measuring resource and social conditions to make sure that progress is being made toward meeting refuge purposes, goals, and objectives. Monitoring includes determining if the Refuge is implementing the plan and if actions being taken are effective in meeting the objectives. The Refuge will use an adaptive management approach (i.e., information gained from monitoring will be used to evaluate and, as needed, modify refuge objectives and management direction).

1.8.8 Review and Revise Plan

Service policy directs that the Refuge review the Plan annually to assess any need for change in management direction. The Refuge will revise the Plan when important new information becomes available, when ecological conditions change, or when the need to do so is identified during the next review. If major changes are proposed, public meetings may be held and a new environmental assessment (or an environmental impact statement) may be needed. Consultation with appropriate State agencies and others will occur during any future revisions. Full review and revision of the Plan will occur every 15 years or more often if deemed necessary. The Refuge will continue to inform and involve the public through the appropriate means (such as reporting on activities at annual village meetings and refuge update mailings) throughout the implementation and monitoring process.

1.9 Planning Issues

The Service defines an issue as any unsettled matter that requires a management decision, such as an initiative, opportunity, resource management problem, threat to refuge resources, conflict in uses, public concern, or presence of an undesirable resource condition. Issues were initially identified by the refuge staff in April 2007. Several other means were used to identify issues. We obtained input from the public through a “village leaders” meeting in August 2007, at “open houses” in the villages, through issue worksheets that were distributed with the first planning update, and through visits with village elders and community leaders. We identified eight issues for consideration during revision of the refuge Plan. Some of the issues have already been addressed through existing laws, regulations, or policies or are outside the scope of the Plan. The remaining issues were addressed through the development of the alternatives. The environmental analysis completed for the draft revised Plan discussed the effects of implementing each alternative. The following discussion briefly describes each of the issues. The Refuge’s role in identifying and analyzing the issues is to objectively consider a wide range of approaches that could be taken to address each issue.

1.9.1 How will the Refuge maintain and manage wildlife populations, especially moose, in the face of competition between users and predators?

The number and range of general comments about moose hunting and salmon fishing regulations indicates that this is a major concern of a large proportion of refuge users. Many people expressed concern for moose and salmon numbers, the difficulty of getting a moose, competition with non-locals for moose and salmon, predation of moose by black bear and wolf,

the need for changes in both the moose hunting season and the salmon fishing season, and the concern for retaining as much of a subsistence lifestyle as is possible in today's society.

1.9.2 How will the Refuge address future (off-refuge) mining, oil, and gas development and its effect on the refuge environment?

Local and non-local residents expressed concern for future mining and its affect on the environment, especially water quality. There is a fair amount of concern regarding the development of future oil and gas leases on and off the Refuge.

1.9.3 How will the Refuge identify and address contaminants that affect the wild food we eat and water quality?

There are two concerns. (1) Is the food we eat that is gathered from the land contaminated? (2) How are off-refuge mining activity and the abandoned Air Force sites affecting water quality on the Refuge?

1.9.4 How will the Refuge monitor and address the effects of climate change?

This was a general issue brought up in each village we visited during the scoping period. One village, Huslia, has been actively discussing climate change for the past five years and working with various groups to document it. Climate change is predicted to have far reaching impacts on the boreal forests across the world.

1.9.5 How will the Refuge address maintaining the wild character of the Refuge and wilderness quality?

This concern was shared by local and non-local residents alike. One of the reasons for visiting the Refuge is because of its wild character and the experience it offers. Several of the refuge users have visited the Koyukuk Wilderness and value the experience they obtained there.

1.9.6 How will the Refuge address future public use of the Refuge?

Two areas of concern were expressed regarding future uses of the Refuge. Most of the comments focused on the use of all terrain vehicles (ATVs) for recreational use and air boats for moose hunting. Concern for future development, such as an interior road system and oil and gas exploration, was expressed.

1.9.7 How can the refuge fire management program help villages address their hazardous fuel accumulations?

People in the villages continue to express concern for adequate wildland fire protection. They recognize fire as a necessary natural process but are concerned for the protection of life, property, and natural and cultural resources.

1.9.8 How will the Refuge address the need for more outreach and better communication with the public?

People in the village expressed the need for more outreach in the schools, sharing of refuge Inventory and Monitoring results, and a better understanding of overall refuge activities and policies.

2. Goals and Objectives, Management Direction

This chapter includes sections addressing two major topics: Refuge Goals and Objectives and Regional Management Direction. Section 2.1 identifies refuge goals and objectives that will be implemented under this Plan. Section 2.2 provides an overview of the regional management direction. Section 2.3 describes the management categories on Alaska's National Wildlife Refuges. Section 2.4 describes regional management policies and guidelines. Section 2.5 includes a table comparing permitted activities, uses, and facilities by management category.

2.1 Goals and Objectives

The refuge vision and purposes (chapter 1, section 1.4) provides a framework for developing goals and objectives for managing the Refuge. Objectives are often applicable to more than one goal. To avoid duplication, the objectives have been listed under the most applicable goal. Following each objective is the rationale for that objective.

The full range of objectives is presented here to provide an overview of the topics that are currently being addressed or might be addressed during the life of this Plan. Some of these objectives may not be addressed during the life of the Plan due to funding and/or staffing.

Cooperation with the State and federal agencies and other organizations is a critical component to successfully meeting most of the objectives. This cooperation can take a variety of forms, ranging from reviewing and revising study plans and reports to cooperating on data collection and report completion.

2.1.1 Goal 1: Conserve fish and wildlife populations and habitats in their natural diversity in a manner consistent with natural ecological processes.

Objective 1: Continue to implement and update the current Inventory and Monitoring Plan (I&MP). Finalize the updates of the plan by January 2009 to reflect changes in techniques; add new projects focused on invasive species, climate change, water quality, and wetlands; and include new and ongoing cooperative efforts.

Rationale: The Inventory and Monitoring Plan is a step-down plan that is the core of the refuge biological program. It outlines an annual cycle of wildlife and habitat surveys designed to detect trends in populations and productivity of selected species, assess health of populations and ecosystems, and provide data for decision makers and the public regarding regulatory issues. Listed below are projects included in the plan. A summary of the I&MP can be found in appendix C.

- Moose Trend Counts (annual)
 - 5 areas on Koyukuk
 - 3 areas on Northern Unit Innoko
 - 2 areas on Nowitna
- Moose Population Estimation Surveys (approximately every five years)
- Moose Spring Twinning Surveys (annual)
- Moose Hunter Check Station on the Nowitna and Koyukuk (annual)
- Caribou Distribution Survey (annual)
- Caribou Telemetry, Productivity, and Habitat (monthly)
- Wolf Abundance Surveys (annual)
- Furbearer Aerial Track Counts (in development)
- Breeding Pair Duck Production Aerial Surveys (annual)

- Duck Banding on the Koyukuk/Northern Unit Innoko (annual)
- Goose Production Float Surveys (annual)
- Goose Aerial Molting Survey (annual)
- Swan Production
 - Aerial Trend Survey (annual)
 - Statewide Census (every five years)
- Yukon River Peregrine Nesting (annual)
- Beaver Abundance Aerial Survey (annual)
- Passerines Surveys (annual)
 - Breeding Bird Survey Trend Monitoring
 - Spring Migration/Phenology Monitoring
 - Off-Road Point Count (Koyukuk)
 - Christmas Bird Count

Objective 2: Continue to work cooperatively with the Fisheries Resource Office (FRO) of the Service in Fairbanks, ADF&G, non-governmental organizations, and the public to identify key fisheries resource issues, and implement specific studies to address concerns and fill in gaps in the Refuge's knowledge of fisheries resources.

Rationale: Currently, we cooperate closely with FRO to operate the Gisasa River salmon weir and to conduct two research projects on sheefish. Fish populations are extremely important components of both a healthy functioning ecosystem and a healthy subsistence lifestyle. The cooperative weir project has led to vast improvements in our knowledge of Chinook salmon movements, spawning locations, and run timing. Past projects on pike have improved our knowledge of habitat use, survival, and heavy metal contaminants.

Objective 3: Upon funding, hire a new full time fisheries biologist/hydrologist to fully integrate the refuge biological program with FRO projects and expertise.

Rationale: The addition of a fisheries biologist/hydrologist to the refuge staff would add tremendously to our operational capabilities and knowledge base. This position would be responsible for developing and implementing I&MP programs for fish, wetlands, and streams on the Refuge. Fisheries issues are (and will continue to be) of paramount importance to local users and to the ecosystem. This position would provide a vital communication link between rural users and biological experts in the FRO. A dedicated fisheries biologist/hydrologist at the Refuge would be able to focus on regulatory and other refuge-specific issues, and enhance FRO work.

Objective 4: Continue to work cooperatively with the University of Alaska, U.S. Geological Survey, ADF&G, tribal organizations, and others to develop and implement research on global climate change, and (upon adequate funding) incorporate new monitoring efforts into our existing I&M that focus on detecting long-term changes to refuge ecosystems.

Rationale: Climate change has become a part of our daily language. The effects of a changing climate on arctic and subarctic ecosystems, people, and the health of refuge resources are not well understood. We have already initiated cooperative projects investigating (1) regional historic weather patterns and potential impacts to wildlife populations and subsistence use; and (2) patterns and causes of lake drying on portions of the Refuge. We would continue to pursue projects that would increase our understanding of how changes in climate may affect refuge ecosystems. Cooperative projects allow us to share expertise and limited funds across multiple organizations and to coordinate regional projects. Efforts would be made to enhance

the existing I&MP with projects designed to detect long-term changes in refuge ecosystems caused by climate change as time and funding allow.

Objective 5: Upon adequate funding, restore the wildlife biologist position that was removed in 2006 due to organizational changes.

Rationale: The Refuge has employed four biologists in the past. Our current staff cannot effectively accomplish requirements of the I&MP, cooperative research projects, and other mandatory tasks. A fourth biologist would greatly enhance our capabilities with the existing biological programs and allow us to initiate new work on topics such as global climate change and wetland ecology.

2.1.2 Goal 2: Ensure the natural character, vigor, and species diversity of the refuge boreal forest and tundra ecosystems by perpetuating a fire regime both natural and prescribed, which maintains a mosaic of habitats native to interior Alaska.

Objective 1: Continue to implement the Refuge Fire Management (FMP) and Communication Plans.

Rationale: Fire is the main driver of ecosystem change within the Refuge. New fire management practices need to continually be integrated into refuge habitat management. The FMP provides management strategies that enable the Refuge to conserve, protect, and enhance habitats. Objectives within the FMP address ecological relationships and human health and safety. Due to the important role that fire plays in refuge ecosystems, implementation of the FMP is a fundamental step in addressing Goal 2.

Objective 2: Continue to refine the understanding of the Refuge's fire history by maintaining the most current fire history geographic information system (GIS) layer, incorporating information from other fire history studies, working collaboratively with other federal and State fire management agencies and universities, utilizing climate change research findings and the most current fire technology, taking advantage of local knowledge, and participating in studies of Alaska fire regimes.

Rationale: Fire is the Refuge's dominant disturbance regime, resulting in major changes to and renewal of wildlife habitat. Our current knowledge of interior Alaska fire regimes is rudimentary and will continue to evolve as new research is conducted, furthering our understanding of the inner workings of these regimes and how climate change will affect them.

2.1.3 Goal 3: Maintain a fire management program that helps achieve other refuge goals and objectives while providing for the protection of human life, private property, and identified cultural and natural resources.

Objective 1: Within one year of the final Plan being approved, combine the Koyukuk, Nowitna, and Northern Unit Innoko fire management plans and incorporate changes resulting from this plan along with current fire policy in a single updated fire management plan.

Rationale: Combining the Koyukuk, Nowitna, and Northern Unit Innoko FMPs simplifies the fire management program and eliminates redundancy. Using one document makes it more efficient for the fire management officer to manage the fire program. The new FMP would allow other agencies and the public to easily understand and follow the refuge fire management program.

Objective 2: Within five years of the final Plan being approved, contact the tribal and local governments in Galena, Hughes, Huslia, Kaltag, Koyukuk, Nulato, Ruby, and Tanana to

assess the need for assistance in reducing hazardous fuel accumulations and developing a mitigation plan (i.e., Comprehensive Wildland Fire Protection Plan). Within 10 years of the final Plan being approved, evaluate the effectiveness of the fuels reduction projects implemented to-date in each village.

Rationale: A need to reduce hazardous fuel accumulations around some of the villages has been identified. Hazardous fuels reduction work will help protect villages from wildland fire and reduce the likelihood of a fire within or adjacent to a village, provided this work is maintained over time. Fuel reduction projects, already begun in some of the villages, have served to strengthen relationships between the Refuge and village organizations and residents. Evaluating each fuels reduction project for the need of re-treatment will help the fire management officer determine the most effective means of treating hazardous fuel accumulations in the surrounding villages.

Objective 3: Within five years of the final Plan being approved, update the Refuge's GIS layer, which includes cultural resource values at risk.

Rationale: Up-to-date information is needed by the fire management officer, the refuge manager, and the protection agency to make an informed decision regarding the appropriate management response to each wildland fire start.

Objective 4: Continue to develop partnerships with other federal and State agencies and local governments to further the understanding of fire interactions in interior Alaska.

Rationale: Combining efforts to understand interior fire interactions is one way of gaining knowledge while dealing with limited staff and budgets. Cooperative work can diminish the separation that sometimes exists between agencies and local governments and build a healthy working relationship.

Objective 5: Upon funding, hire an assistant fire management officer to assist the refuge fire management officer with wildland and prescribed fire planning, monitoring, and administration.

Rationale: At current personnel and funding levels, the Refuge cannot fully implement the refuge FMP.

2.1.4 Goal 4: Ensure the natural function and condition of water resources necessary to conserve fish and wildlife populations and habitats in their natural diversity.

Objective 1: Within 10 years of final Plan approval, develop a wetland inventory and monitoring program to be incorporated into the current I&MP. Inventory and monitoring will address aquatic plants, fish, wetland-dependent wildlife, aquatic invertebrates, and physical and chemical properties of lakes and wetlands. Projects will be implemented as staff and funding become available.

Rationale: Data derived from wetland inventory and monitoring would greatly advance the understanding of wetland ecosystems, including the plants and wildlife dependent on them, and would establish a baseline for comparison of future conditions. Changes in wetland characteristics can affect the diversity and abundance of fish, wildlife, and plants within the Refuge. Existing conditions are currently not being assessed or monitored. The refuge staff will work with specialists from other Service branches or outside the Service to design and implement feasible and productive studies.

Objective 2: Within 10 years of final Plan approval, work with the Service's Water Resources Branch to develop a river and stream resources inventory and monitoring program to be

incorporated into the current I&MP. Inventory and monitoring should address aquatic plants, river-dependent fish and wildlife, aquatic invertebrates, riparian and floodplain habitat, and physical and chemical properties of rivers and streams. Projects will be implemented as staff and funding become available.

Rationale: We currently know very little about existing conditions. Data derived from river and stream resources inventory and monitoring will greatly advance our understanding of refuge water and help the Refuge meet legal mandates pertaining to the protection and management of water quality and quantity. Projects will describe and monitor water flowing throughout the Refuge, including natural hydrologic processes that create the dynamic habitat necessary to support plants, wildlife, and fisheries. Changes in rivers and streams can affect the diversity and abundance of fish, wildlife, and plants within the Refuge. The refuge staff will work with specialists from other Service branches or outside the Service to design and implement useful and feasible studies.

Objective 3: Within five years of final Plan approval, review the Refuge's 1986–1988 baseline evaluation of placer mining sedimentation and occurrence of heavy metals on associated aquatic ecosystems of the Refuge, and develop and implement a repeat survey (when additional funding is obtained).

Rationale: Although all placer mining activities are taking place outside refuge boundaries, potential impacts to the Refuge exist due to downstream sediment transportation, stream flow disturbance, and accelerated release of heavy metals associated with placer mining operations. Project assessment, development, implementation, and review will be coordinated with current Service environmental contaminants and fisheries resource programs, tribal watershed management programs, and the river and stream resources portion of the I&MP.

2.1.5 Goal 5: Provide information and maintain open communication for a greater understanding and appreciation of fish and wildlife ecology, habitat preservation, and refuge management that assists in addressing resource issues important to local residents, the Service, and others.

Objective 1: Conduct school programs and/or community meetings in Galena, Hughes, Huslia, Kaltag, Koyukuk, Nulato, Ruby, and Tanana at least once a year. Presentations can cover topics such as local wildlife, habitats, and management; wildlife surveys and current population status or trends; subsistence foods, health benefits, and contaminant risks; fire ecology and management; and climate change.

Rationale: Face-to-face interaction with students and other local residents continues to be the most efficient and requested form of outreach. Refuge staff will continue to coordinate with local village organizations and schools to develop and schedule public presentations that highlight current biological research and issues of concern for local residents. These programs build community awareness and support of the Refuge, its resources, and the purposes of the National Wildlife Refuge System.

Objective 2: Maintain the existing refuge resource library and continue to work with local schools to develop resources for environmental education, including curricula, teaching kits, and teacher workshops on natural resources and other refuge-related topics.

Rationale: The Refuge has been successful in developing locally relevant teaching resources and facilitating their use in schools and should continue to support and expand these efforts. Outreach to schools provides a tremendous opportunity to instill in young people awareness

and support of the local environment, refuge resources and programs, and responsible environmental stewardship. Today's students are potential future users of the Refuge, local community leaders, and decision makers. By providing teachers with resources and skills to bring conservation knowledge to their students, refuge capabilities for outreach are expanded.

Objective 3: Continue to provide the public with timely and accurate information about the Refuge through a variety of communication tools such as informational kiosks, displays, radio programs, newsletters, brochures, and web sites. Information provided using these tools should be evaluated and updated at least once a year by the environmental education/outreach coordinator and the refuge manager.

Rationale: The Refuge has successfully developed a variety of tools to provide the public with accurate, up-to-date information relevant to refuge resources and programs. These tools will continue to be effective only if they are periodically evaluated and updated to provide the most accurate information. The Refuge should continue to explore possibilities for development of new avenues for outreach.

Objective 4: Maintain the partnership with the Galena City Schools and Loudon Tribal Council to annually conduct the Galena Science Camp. Participate in other local science and cultural camps when opportunities arise.

Rationale: Since 2000, the Galena Science Camp has provided local students with opportunities to learn about local wildlife, plants, ecosystems, geology, prehistory, and environmental stewardship. Staff participation in other area youth programs, including camps organized by local schools and tribal organizations, provides similar opportunities throughout the region. These efforts should continue as funding and personnel are available.

Objective 5: Increase cooperation with the Friends of Alaska National Wildlife Refuges, and the Central Representatives in particular, to develop new materials and outlets for interpretation and environmental education.

Rationale: Friends of Alaska National Wildlife Refuges, a non-profit organization, was formed in 2005 to provide public education, assistance to refuges, and funding for refuge-oriented projects in any of Alaska's 16 national wildlife refuges. Recently a family residing near the Nowitna Refuge became a Central Representative for the group and expressed interest in cooperating with the Refuge on research, education, and invasive species projects. This partnership would provide the Refuge with new opportunities for outreach and project funding.

2.1.6 Goal 6: Continue to provide quality opportunities for hunting, fishing, wildlife observation and photography, and other outdoor recreation in a natural setting.

Objective 1: Within five years of final Plan approval, review current public use monitoring methods and implement new methodology if needed. At a minimum, continue to annually compile and summarize data from the Koyukuk River (Ella's Cabin) check station, Nowitna River check station, and the refuge guide and air taxi reports to assess levels of public use.

Rationale: Accurate public use data is a critical component in evaluating existing levels of service to the public, documenting results of public use programs, determining if the Refuge is meeting its resource management goals, and ensuring public uses remain compatible with the purposes of the Refuge. The highest level of use of the Refuge occurs during the fall moose season. By gathering data through the check stations and guide and air taxi reports, we gain a minimum amount of public use data for the Refuge during this peak use period. Summarizing

the data would allow the Refuge to inform the users of the levels of use and any potential conflicts that the Refuge may need to address. The Refuge should continue to support these efforts in order to sustain the current level of information.

Objective 2: Working with communities, and State and federal authorities, continue to develop the refuge law enforcement program through activities such as hunter education, village visits, aerial surveillance, and annual special use permit reviews. Produce annual summaries of activities.

Rationale: To enhance visitor experiences and help protect refuge resources, the Refuge needs a good strategy for ensuring visitor safety and compliance with existing rules and regulations. Violations that do occur are often due to misunderstanding, misinformation, or lack of knowledge. Outreach efforts will be helpful in reducing such incidents.

2.1.7 Goal 7: Provide and promote the opportunity for local residents to continue their subsistence activities on the Refuge, consistent with the subsistence priority and with other refuge purposes.

Objective 1: Continue the Refuge Information Technician (RIT) program to enhance information exchange with local communities on refuge issues, particularly those dealing with subsistence. Restore the second RIT position the Refuge had until 2006 (dependent upon funding).

Rationale: Due to remoteness, most village residents in and adjacent to the Refuge generally have less contact with refuge staff than do residents of Galena. In the past, the RITs have been able to bridge this gap. RITs are able to devote time to contacting tribes, corporations, and individuals who do not have ready access to the refuge office. The RIT prepares information specifically for the village and visits villages on a regular basis. While in the village, the RIT can personally deliver information, answer questions, and return with feedback for the refuge staff.

Objective 2: Continue to conduct annual informational meetings in each village associated with the refuge biological program. Regularly attend other subsistence-related meetings, providing information regarding the status of subsistence resources and their use and commenting on proposals related to subsistence management within the Refuge. Maintain a respectful dialogue with refuge resource stakeholders and subsistence users.

Rationale: The Refuge is mandated by ANILCA to provide a continued opportunity for subsistence uses by local residents, when consistent with other refuge purposes. However, it is essential that affected parties work cooperatively towards common subsistence goals. Face-to-face meetings in local villages are the most effective forum for reviewing and explaining federal subsistence harvest regulations and discussing issues of concern with local subsistence users.

Objective 3: Continue to work closely with tribal councils, State fish and game advisory committees, the Federal Subsistence Western Interior Regional Advisory Council, other local and regional working groups, Alaska Department of Fish and Game, and the Office of Subsistence Management to address issues and concerns of local subsistence users.

Rationale: The Refuge is mandated by ANILCA to provide a continued opportunity for subsistence uses by local residents, when consistent with other refuge purposes. It is essential that affected parties work cooperatively toward achieving common subsistence goals.

Objective 4: Continue to coordinate with and assist the Division of Migratory Bird Management in completing the annual Migratory Bird Harvest Survey (dependent upon available funding).

Rationale: The Migratory Bird Treaty Act Protocol Amendment specified a need for harvest surveys. The amendment provides for the harvest of migratory birds during spring and summer; however, the amendment states that there would not be a significant increase in the number of birds harvested relative to their continental population sizes. Harvest survey data documents the annual harvest level and helps ensure that harvest does not significantly increase over the coming years. The Refuge is committed to continued work with the Migratory Bird Management Office and assisting with harvest surveys to obtain this critical information.

Objective 5: Continue to coordinate with and assist the Yukon River Drainage Fisheries Association in completing its annual In-Season Fish Harvest Assessment.

Rationale: The primary purpose of Yukon River Drainage Fisheries Association is to coordinate in-season subsistence fishing by hosting teleconferences with people participating in personal use and commercial fishing and the State and federal managers along the Yukon River. Teleconferencing gives the fishermen a voice on current salmon runs, harvest needs and success, management strategies, and anticipated management based on preseason projections. Teleconferencing gives an interim goal to allow subsistence and aboriginal harvest by Alaskan and Canadian fishermen.

Objective 6: Cooperate with village organizations and other agencies to develop opportunities to educate local youth and adults in traditional subsistence ways related to fish, wildlife, and plants of the Refuge. Continue to develop outreach tools that make subsistence regulations understandable to the public.

Rationale: The Refuge can play an important role in perpetuating the continued use of subsistence resources by providing opportunities for the public to learn from those skilled in traditional subsistence activities. Clear communication of subsistence regulations facilitates the continuance of subsistence activities and encourages compliance with regulations.

Objective 7: Monitor and assess the use of off-road vehicles (ORVs) such as 4-wheelers and ARGOs on refuge lands by federally qualified subsistence users. Within three years of final Plan approval, produce a report that determines if ORVs were traditionally used for subsistence access and examines the need for regulation of ORV use.

Rationale: Current evidence suggests that ORVs were not traditionally used for subsistence access to the Refuge. The Refuge has concerns that ORV use will expand beyond the existing off-refuge trails onto refuge land. The Refuge is concerned that ORV use could have adverse effects on habitat and wildlife populations.

2.1.8 Goal 8: Maintain the special values of the Nowitna Wild River and Koyukuk Wilderness and the wild character of the Refuge.

Objective 1: Continue to monitor activities on the Nowitna Wild River and in the Koyukuk Wilderness for compliance with the Wild and Scenic Rivers and Wilderness acts and ANILCA. If problems are detected, appropriate actions would be taken.

Rationale: This approach is a practical way of maintaining these values given the existing staffing level of the Refuge.

2.1.9 Goal 9: Conserve, appreciate, and interpret the cultural, historic, and prehistoric resources of the Refuge.

Objective 1: Prepare a Cultural Resources Management Plan by 2010.

Rationale: A Cultural Resources Management Plan would assist the refuge staff in meeting legal requirements to manage, protect, and interpret cultural resources on the Refuge. The plan will include management needs and projects identified by the refuge staff, in consultation with the regional archaeologist, to set priorities for future research. This will enable the Refuge and regional office cultural resource staff to derive the most benefits from limited funding and personnel resources.

Objective 2: Provide Archaeological Resources Protection Act and National Historic Preservation Act training to all permanent refuge personnel every 2–5 years.

Rationale: Training will provide all employees with information on their roles and responsibilities for managing cultural resources. Cultural resource trainers will become acquainted with refuge staff and better understand their specific issues and interests.

Objective 3: Identify sites at risk from vandalism and erosion and monitor with annual inspections to document physical condition.

Rationale: Sites in the region are at risk from a number of threats, including looting and increased soil erosion due to the effects of climate change.

Objective 4: Identify priority areas to inventory for archaeological and other cultural sites, and conduct surveys as time and personnel allow.

Rationale: Perform surveys at a level sufficient to evaluate the eligibility of identified sites for inclusion in the National Register of Historic Places. Nominate selected sites to the National Register of Historic Places. Identify sites or areas at risk for vandalism and monitor with periodic law enforcement patrols. The National Historic Preservation Act requires federal agencies to inventory cultural resources and evaluate them for eligibility in the National Register of Historic Places.

Objective 5: Work with local tribes, elders, the University of Alaska Fairbanks, and regional archaeological staff to compile a place name directory and atlas of cultural and historic sites. This should include the production of a comprehensive GIS layer of sites for use in refuge management. Create a working database within two years of final Plan approval.

Rationale: Place names contain an enormous amount of information on traditional uses, culturally significant locations, historic camps and settlements, and other culturally important information. Resources for this work include published material and local knowledge. As elders pass away, their tremendous in-depth knowledge of local history and place names is lost to future generations if not properly documented. Cultural resource mapping is necessary to protect sites from fire, recreational use, and other refuge activities. The National Historic Preservation Act and Service Policy require that the Refuge protect sites of cultural importance.

Objective 6: Develop an active bibliography and library collection of published and unpublished materials relating to cultural, paleontological, and natural history of the Refuge. This may include books, interviews, and journals, maps, and photos collected by explorers, missionaries, biologists, and researchers. An initial bibliography would be completed within two years of final Plan approval.

Rationale: Valuable cultural, historic, and scientific information about the Refuge is contained in existing published and unpublished material. This information is an untapped archive that could potentially benefit both the Refuge and surrounding communities. Compiling all known information would make it possible to evaluate information needs and set priorities for surveys and research. This work would facilitate Objective 2.

Objective 7: Continue to work with regional archaeology staff, the University of Alaska Fairbanks, and other researchers to investigate and evaluate known cultural sites and identify new sites within the Refuge.

Rationale: Cooperative projects with museums, universities, and other institutions allow pooling of limited funding and resources and increases the amount of work completed. It allows the Service to receive the advantages of working with recognized experts in the region, which greatly increases the value of completed work. The Refuge has been successful in developing partnerships that have resulted in considerable advances in the understanding of early human activities in the region.

Objective 8: Continue to work with research partners to explore the unique paleontological resources of the Palisades site.

Rationale: The Palisades site is an extensive silt-loam bluff complex located on the south bank of the Yukon River in the Nowitna Refuge. The bluffs contain substantial paleontological material, including flora and faunal remains and ancient volcanic ash layers. Scientists from the University of Alaska Fairbanks and other institutions have led investigations resulting in several publications and illumination of an outstanding record of past ecological communities and conditions present at the site. The Refuge will continue to facilitate this research (dependent upon funding).

Objective 9: Continue to cooperate with tribes, other agencies, universities, KIYU radio, and local residents to develop and enhance programs that capture the 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 of on-the-ground 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 knowledge about refuge environments for comparison with current and future conditions. The Refuge should continue to support programs such as Raven Story (oral history radio pieces) whenever funding and personnel are available.

2.1.10 Goal 10: Promote close working relationships through effective coordination, interaction, and cooperation with other federal agencies, State agencies, local communities, tribes, organizations, industries, the public, and the landowners within and adjacent to the Refuge whose programs relate to refuge management activities.

Objective 1: Continue to collaborate with staffs of other refuges, federal and State agencies, research institutions, schools, tribal and city councils, and others to facilitate resource management, inventory and monitoring, biological research, public outreach, and education at the Refuge and in the region. See Objectives 2 and 4 of Goal 2.1.1, Objective 2 of Goal 2.1.2, Objectives 2 and 5 of Goal 2.1.3, Objectives 4 and 5 of Goal 2.1.5, Objectives 1 and 2 of Goal 2.1.6, Objectives 2, 3, and 6 of Goal 2.1.7, and Objectives 2, 4, 5, and 6 of Goal 2.1.9.

Rationale: Partnering is a cost-effective means of accomplishing necessary inventory and monitoring work, research projects, day-to-day management of refuge resources, and public outreach and education goals. Cooperative arrangements allow the refuge staff to obtain information they would not normally be able to collect and provides an opportunity for the Refuge to contribute to regional programs.

2.1.11 Goal 11: Provide and maintain adequate facilities and equipment in Galena to ensure a safe and secure working environment to accomplish refuge purposes, goals, and mandates.

Objective 1: Secure funding for construction or purchase of an administrative office, shop, and warehouse that provide sufficient facilities for refuge personnel and property in Galena.

Rationale: Since 1991, the refuge staff has operated out of leased space (main office and shop/warehouse). A national directive has specified that refuges move toward owning their facilities. Our current office does not comply with various health and safety standards. The Refuge is unable to perform necessary upkeep or upgrades to comply with these standards because it is a leased facility. The shop and warehouse are inadequate for long-term refuge maintenance needs.

Objective 2: Maintain and upgrade the quarters, bunkhouse, and administrative cabins to provide safe and secure living accommodations for employees in subarctic conditions. Continue to explore alternative energy sources for refuge facilities to reduce costs to the government and lessen the environmental impact.

Rationale: Preventive maintenance is the best way to keep refuge real property assets in working condition. To conserve resources and reduce environmental impacts, the Refuge should continue to become more energy and water use efficient. By policy, refuges are required to use “green” products when cost effective or feasible.

Objective 3: Explore options and secure funding to acquire an adequate float plane facility and operations site on Alexander Lake in Galena.

Rationale: Currently our float plane operations occur on Alexander Lake behind Quarters #3. Occupants of this home have limited personal yard space because an aircraft fuel tank and maintenance shed are stationed behind the house. Frequent summer traffic in and out of the residence driveway can occasionally cause an inconvenience for the family occupying this house. The float dock currently extends into private property and could cause a potential future conflict.

2.1.12 Goal 12: Ensure the Refuge has adequate personnel to meet operational needs.

Objective 1: Seek funding to restore the Refuge’s wildlife biologist position and second refuge information technician position. Create and fill positions for a fisheries biologist/hydrologist and an assistant fire management officer.

Rationale: Due to regional budget cuts and downsizing, those two positions at the Refuge were cut in 2006. The restoration of these positions, and the addition of the two new positions, is necessary for the full implementation and success of refuge operations.

Objective 2: Seek funding to hire an additional biological technician to assist the refuge biologists conducting inventory and monitoring projects.

Rationale: As additional projects are developed, especially to meet the increasing demand for information regarding climate change and its effect on interior Alaska ecosystems, biological staff would need greater assistance with project implementation.

Objective 3: Work with regional high schools and universities in recruiting and educating diverse candidates for positions as they become available. This includes providing internship opportunities such as the cooperative Alaska Native Science and Engineering Program (ANSEP) in which the University of Alaska promotes the educational development of Alaska Natives in scientific fields.

Rationale: Recruitment of individuals with knowledge of the local area and culture facilitates refuge efforts to interact as well as possible with local residents and resource users. Staff familiarity with local areas and ecosystems is a tremendous asset to the refuge biological program.

Objective 4: Maintain a minimum of three pilots on staff, and add staff with piloting expertise as biological, habitat, and/or fisheries positions are developed and funded.

Rationale: The Refuge is remote and roadless. The nature of biological and other programs require the use of aircraft. The current staffing of three pilots is generally sufficient to cover program needs but will need reconsideration as additional projects are developed. Use of local air taxi services may alleviate some shortfalls in project needs (point-to-point flights) but are not always cost effective and are inadequate for many of the specialized flights such as aerial surveys.

2.2 Regional Management Direction Introduction

Sections 2.3, 2.4, and 2.5 present an overview of the management direction for national wildlife refuges in Alaska. The primary sources of this management direction are the laws governing the National Wildlife Refuge System and the regulations, policies, and other guidance, both national and regional, developed to implement these laws. Although each refuge is unique, it is only one piece of this 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 region-wide management policies and guidelines are likely to appear in each refuge comprehensive conservation plan, given differing establishing orders or refuge purposes. Any refuge-specific departures will be clearly described, along with supporting rationale, in each revised comprehensive conservation plan.

These sections contain the following:

- Descriptions of the management categories and their associated general management intent
- Policies and guidelines specific to each category
- A table that displays activities, public uses, commercial uses, and facilities by management category

Until the final revised comprehensive conservation plan is adopted for a refuge, if there is any conflict between the existing refuge plan and these management guidelines, the direction in the existing plan will take precedence over that contained in these guidelines, unless the conflict is the result of changes in law, judicial rulings, or other non-discretionary guidance.

2.3 Management Categories

The management category descriptions in this final Plan are not the same as those in the 1987 Plan. These management category descriptions will remain constant for all of the comprehensive conservation plans unless a well-justified exception is warranted.

Five management categories (Intensive Management, Moderate Management, Minimal Management, Wilderness, and Wild and Scenic Rivers) are used to describe the management levels throughout all Alaska refuges. A management category is used to define the level of human activity appropriate to a specific area of a refuge. It is a set of refuge management directions applied to an area, in light of its resources and existing and potential uses, to facilitate management and the accomplishment of refuge purposes and goals. Lands within the Refuge fall into three of these five management categories: Minimal Management, Wild and Scenic Rivers, and Wilderness (see Figure 2-1, Figure 2-2, and Figure 2-3). The Management Activities Table (Table 2-1) shows the management activities, public uses, commercial uses, and facilities that may be allowed in each management category and under what conditions.

2.3.1 Intensive Management

This category is designed to allow compatible management actions, public facilities, and economic activities that may result in alterations to the natural environment. In Intensive Management areas, the presence of human intervention 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 the intended uses. When Intensive Management is proposed for an area, the specific purposes for its establishment will be described.

Natural processes or habitats may be modified through human intervention. Habitats may be highly modified to enhance conditions for one or more animal species. For example, water regimes may be artificially controlled to improve habitat for waterfowl.

High levels of public use may be accommodated and encouraged through modifications to the natural environment such as paving, buildings, developed campgrounds, and other facilities that could alter the natural environment in specific areas. Public facilities are designed to provide a safe and enjoyable experience of the natural environment and an increased understanding of refuge resources for a wide range of visitors. Facilities may accommodate a large number of visitors while protecting refuge resources from damage through overuse.

Compatible economic uses of refuge resources that result in alterations to the natural environment may be authorized in Intensive Management areas. All economic uses are subject to the compatibility standard, must contribute to the purposes of the refuge, and require official authorizations such as special use permits.

2.3.2 Moderate Management

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

Management actions in this category will focus on maintaining, restoring, or enhancing habitats to maintain healthy populations of plants and animals where natural 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 needed to understand and manage resources and natural systems of the refuges. Structures will be designed to minimize overall visual impact.

Public facilities provided in Moderate Management will, while protecting habitats and resources, allow the public to enjoy and use refuge resources in low numbers over a large area, or they will encourage the short-term enjoyment of the refuge in focused areas. The emphasis is on small facilities that encourage outdoor experiences. Facilities such as public use cabins, rustic campgrounds, kiosks, viewing platforms, trails, and toilets may be provided. Facilities will be designed to blend with the surrounding environment.

Compatible economic activities may be allowed where impacts to natural processes and habitats are temporary (e.g., small-scale logging where an earlier seral stage meets management goals; facilities in support of 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.

2.3.3 Minimal Management

Minimal Management is designed to maintain the natural environment with very little evidence of human-caused change. Habitats should be allowed to change and function through natural processes. Administration will ensure that the resource values and environmental characteristics identified in the Comprehensive Conservation Plan are conserved. Public uses, economic activities, 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 natural systems and monitoring the health of refuge resources. Generally, no roads or permanent structures are allowed (except cabins). Temporary structures may be allowed in situations in which removal is planned after the period of authorized use, and the site can be rehabilitated using plants native to the immediate area. Existing cabins may be allowed for administrative, public use, subsistence, or commercial or economic (e.g., guiding) purposes. New subsistence or commercial cabins may be authorized if no reasonable alternative exists. Public use or administrative cabins may be constructed if necessary for health and safety.

Public use of the refuge for wildlife-dependent recreation and subsistence activities is encouraged. 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 Management 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.

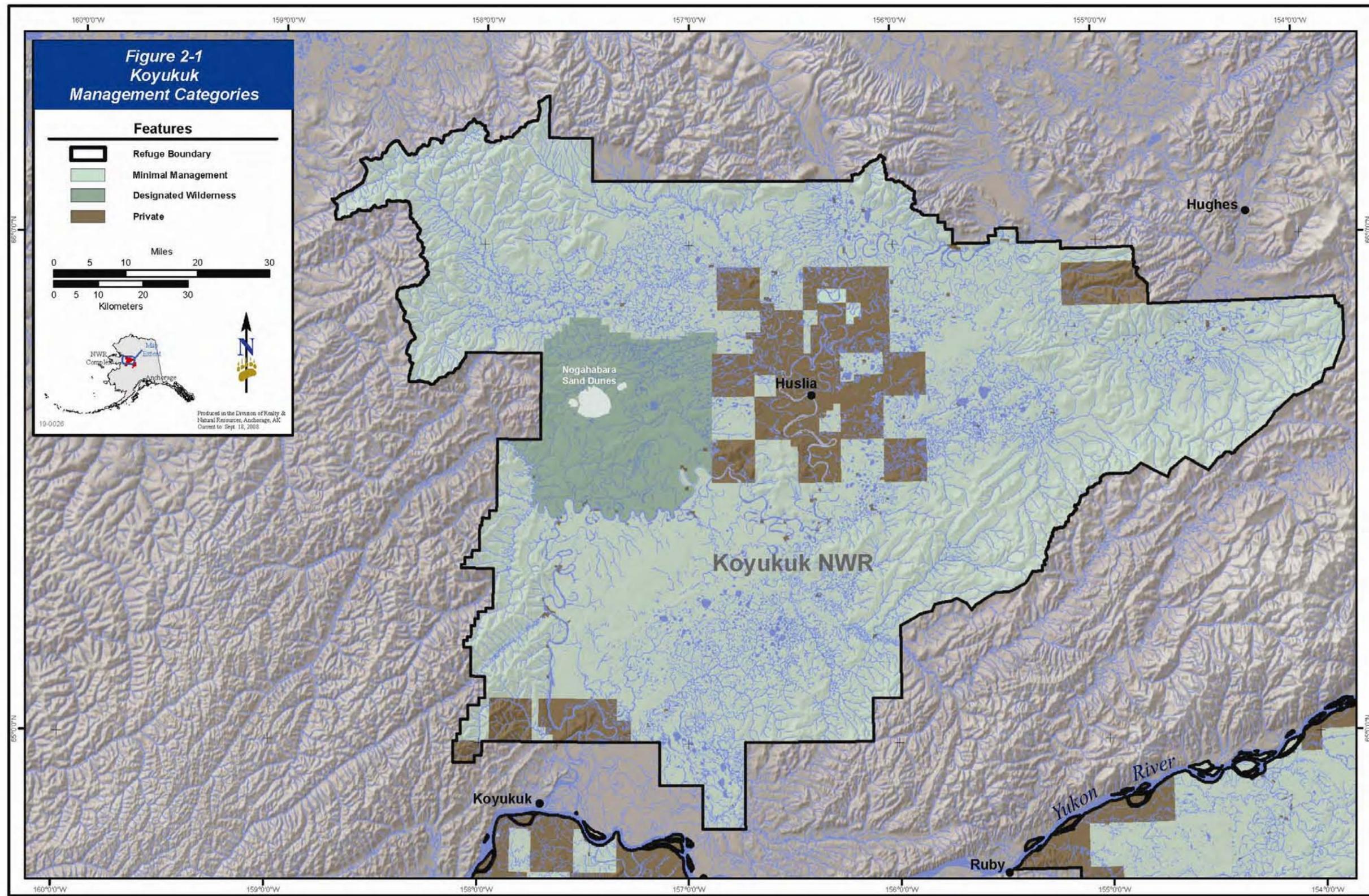


Figure 2-1. Koyukuk Management Categories

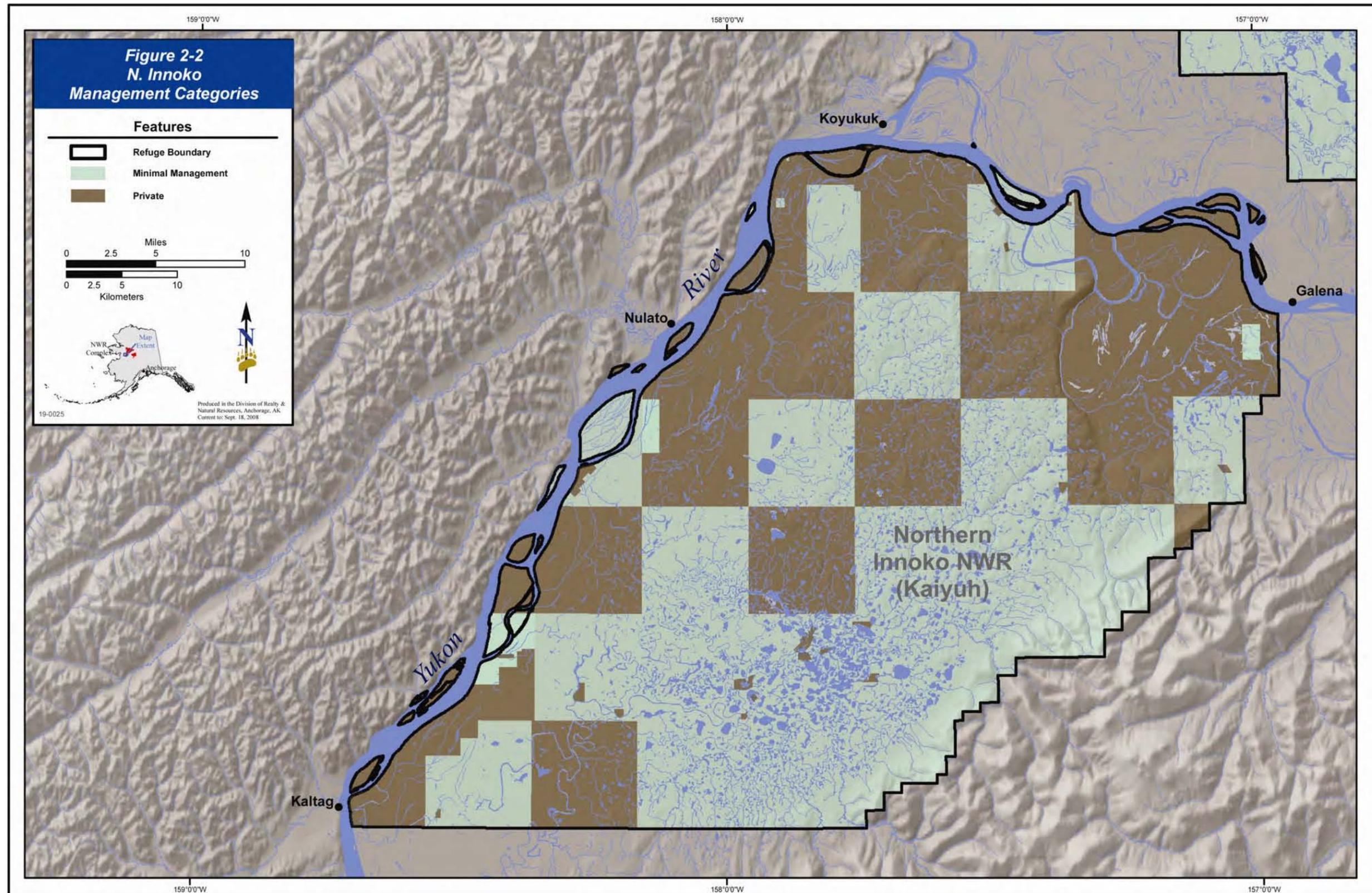


Figure 2-2. N. Innoko Management Categories

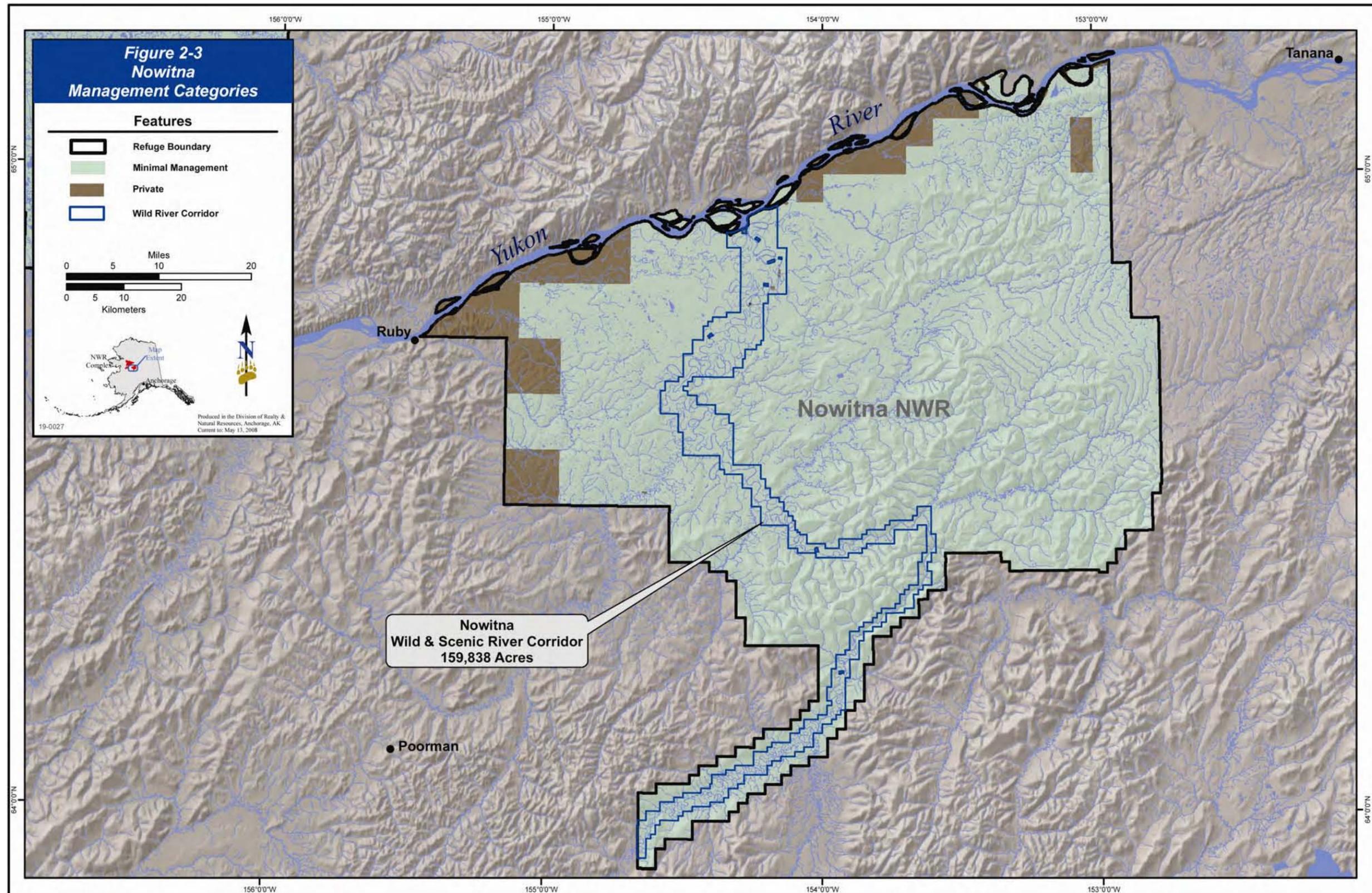


Figure 2-3. Nowitna Management Categories

2.3.4 Wilderness

This category applies only to areas designated by Congress as units of the National Wilderness Preservation System. The Refuge manages the Koyukuk Wilderness Area, a 400,000-acre Wilderness designated in 1980. The Nogahabara sand dunes is the most notable feature of the Wilderness Area. 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 Koyukuk Wilderness Area is part of a nationwide, multi-agency system, the Service recognizes that responsibilities for managing the 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 individual refuges were established. See also section 2.4.19 for additional guidelines on management of Wilderness Areas in Alaska.

The history and intent behind the Wilderness Act make Wilderness more than just another category of land management. Wilderness encourages having a broadened perspective of the refuge landscape, one that extends beyond managing it solely as wildlife habitat. Wilderness is managed as an area “retaining its primeval character and influence.” In addition, Wilderness provides human visitors with opportunities for solitude or a primitive and unconfined type of recreation, which may be characterized in terms of experiential dimensions such as discovery, self-reliance, and challenge.

Wilderness Areas are managed to preserve their experiential values as well as aesthetic, scientific, and other related values. Research has shown that some values of Wilderness extend beyond their boundaries to people who may never visit but who benefit from the protection of natural ecological processes—benefits such as clean air and water and the simple knowledge that such places exist. In managing Wilderness, 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; examples of exceptions are historic and cultural resources and, in certain circumstances, administrative structures or cabins that predate ANILCA, cabins that are necessary for trapping, and public use cabins necessary for the protection of human health and safety. Facilities and structures are rustic and unobtrusive in appearance.

Compatible commercial uses of Wilderness Areas are generally limited to those activities that facilitate wilderness recreation (e.g., guided fishing, hunting, and wilderness trips). 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 wilderness values. Management activities in Wilderness must be found to be the minimum requirements for the administration of the area as Wilderness.

2.3.5 Wild and Scenic Rivers

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 possess outstandingly remarkable scenic, recreational, geologic, fish and 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. Emphasis is placed on maintaining the natural function of the river system, and the appearance and sense of wildness are preserved. Evidence of human activities is minimal.

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 resources, natural ecosystem function, and aesthetics of the river corridor.

The lower 223-mile section of the Nowitna River corridor has been designated as a Wild River within the Nowitna Refuge. The river contains outstandingly remarkable scenic, geologic, hydrologic, fish and wildlife, cultural, historic, and recreational values identified informally by refuge staff during this planning process:

- **scenic** – forested river corridor, diverse landscape, and different examples of succession,
- **geologic** – agates;
- **hydrologic** – free-flowing state, oxbow lakes, and wetlands;
- **fisheries** – sheefish and whitefish populations;
- **wildlife and habitats** – nationally significant species of migratory waterfowl and large game;
- **cultural/historic/prehistoric** – transportation corridor and abandoned camps;
- **subsistence** – hunting, trapping, house logs, berry picking, and firewood;
- **recreational** – hunting, fishing, wildlife observation and photography, floating, fishing, and camping trips.

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 will be visually shielded from the river wherever possible. Where shielding is not practical, facilities and structures are as rustic or unobtrusive in appearance as possible. Public use facilities would provide opportunities for primitive recreation experiences.

Compatible uses of the Nowitna Wild River corridor will be allowed where those activities do not detract from the values for which the corridor was designated. Primary commercial uses are likely to be recreation services such as guided float, sightseeing, fishing, and hunting trips. A variety of management actions may be taken to maintain the values and classification of the corridor. All commercial activities and facilities require authorizations such as special use permits.

2.3.6 Special Management

Special management lands are managed within one of the categories described previously but have additional requirements because of their status (e.g., research natural areas).

2.3.6.1 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 these lands will be the same as for adjacent refuge lands.

2.4 Management Policies and Guidelines

2.4.1 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 (P.L. 105-57) - an amendment to the Refuge Administration Act (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. Under Service regulations implementing this direction, “[p]ublic 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 other related activities. The Refuge Administration Act, as amended, 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 uses are encouraged and would receive emphasis in the management of public use on refuges.

2.4.2 Management Emergencies

It may be necessary, when emergencies occur on the Refuge, to deviate from policies and guidelines discussed in the Comprehensive Conservation Plan. Activities not allowed on the Refuge or under a specific management category, as shown in Table 2-1, may occur during or as a result of emergencies. For example, if a naturally occurring or human-caused event (e.g., landslide, flood, fire, or drought) adversely affected refuge resources, 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.

2.4.3 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. The Service can also purchase conservation easements or enter into cooperative management agreements to meet these objectives.

2.4.4 Land Protection Plans

Department of Interior and Service policies require development of a land protection plan—a step-down plan which addresses the 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:

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

The Service only acquires land from willing landowners. It is Service policy to acquire land only 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 Refuge would work with all landowners to ensure that overall fish and wildlife and habitat values within the refuges are conserved.

A land protection plan for the Refuge is scheduled to be completed at an unspecified future date.

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).

2.4.5 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 uses under the Appropriate Refuge Uses Policy (Service Manual 630 FW 1). An appropriate use of a national wildlife refuge is a proposed or existing use on a refuge 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 (hunting, fishing, wildlife observation and photography and 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 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 Plan identifies those existing and proposed uses that are found appropriate and compatible in appendix D. The following uses were found appropriate:

- Alaska Department of Fish and Game Management and Bureau of Wildlife Enforcement Activities
- Commercial Big Game Hunting Guide 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
- Commercial Recreational Guide Services
- Research and Surveys
- Subsistence Activities
- Native Allotment Surveys
- Commercial Transporter Services
- Trapping

All current appropriate use documentation is on file at the refuge headquarters and the Alaska Regional Office. If additional uses not addressed in this 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.

2.4.6 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 uses must contribute to achieving refuge purposes and the Refuge System mission.

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.

If a use is found to be incompatible, the refuge would follow normal administrative procedures for stopping the action. If the use was a new use requiring a special use permit, the refuge manager would not issue a permit. If the use was an existing use already under permit, the refuge manager would work with the permittee to modify the use to make it compatible or would terminate the permit.

Ending incompatible uses that do not require a special use permit or other formal authorization, or that cannot be addressed by other federal or State agencies, would require the refuge to go through the normal rule-making process. This would include publishing the proposed regulations in the *Federal Register* and providing 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 conservation plan or at least every 15 years, whichever is earlier. Refuge compatibility determinations for all other uses must be re-evaluated every 10 years or earlier if conditions change or significant new information relative to the use and its effects becomes available.

To review completed compatibility determinations for all refuges in Alaska, go to <http://alaska.fws.gov/nwr/planning/completed.htm>.

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).

2.4.7 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 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. 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-specific, 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.

2.4.8 Cooperation and Coordination with Others

2.4.8.1 Federal, State, and Local Governments

The 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 cooperatively manage fish and wildlife resources within the refuges. The Master Memorandum of Understanding between the Service and the Alaska Department of Fish and Game, dated March 13, 1982, defines the cooperative management roles of each agency (see appendix B). In this agreement, the Alaska Department of Fish and Game 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 Alaska Department of Fish and Game 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 individual rogue animals), 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) specifying how the two agencies will 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.

2.4.8.2 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, and the Department of the Interior–Alaska Policy on Government-to-Government Relations with Alaska Native Tribes, issued January 18, 2001. The Refuge will maintain government-to-government relationships with tribal governments. The Refuge will also work directly with regional and village corporations and respect Native American cultural values when planning and implementing refuge programs.

2.4.8.3 Owners of Refuge Inholdings and Adjacent Lands

The 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).

2.4.8.4 Fish and Wildlife Service Jurisdiction over Waters within the Koyukuk, Northern Unit Innoko, and Nowitna National Wildlife Refuges

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 federally owned. 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 Service manages the federal subsistence program on all inland waters within and adjacent to the external boundaries of the Refuges (50 CFR 100.3(b)).

2.4.8.5 Other Constituencies

The 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 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.

2.4.9 Ecosystem and Landscape Management

Species do not function alone; they function together in the environment as part of an ecosystem. Refuge resources will be managed by employing ecosystem-management concepts. 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 Alaska Department of Fish and Game.

Inventorying, monitoring, and maintaining a comprehensive database of selected ecosystem components are critical for making refuge management decisions and for ensuring 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, and water bodies. All monitoring will employ appropriate disciplines, new technologies, and scientific capabilities whenever practical.

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

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 Wildlife 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).

2.4.9.2 Water Resources (Hydrology) Management

Every national wildlife refuge in Alaska shares the common purpose of ensuring that water resources are maintained and protected. ANILCA mandates that the Service safeguard water quality and necessary water quantity within refuges and to conserve fish and wildlife populations and habitats in their natural diversity.

Although the Service has reserved water rights sufficient 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, 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 water resource investigations 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 within 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 appropriate water rights, for in-stream water reservations, and for water withdrawals to meet the Service's needs. Establishing State water rights is only a part of a management strategy to protect refuge resources and to understand ecosystem processes. Collection of hydrologic data allows the Service to accomplish the following:

- Plan floodplain and riparian zone management
- Estimate flow for ungauged streams within the refuges
- Supplement historical or current fisheries and wildlife studies
- Detect and evaluate future natural or human-induced 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 decision making about commercial operations on 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.

2.4.9.3 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 Refuge will identify and maintain scenic values and will, within the constraints imposed by the Comprehensive Conservation Plan, minimize the visual impacts of refuge development 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.

2.4.9.4 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”; 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 potentially eligible for the National Register of Historic Places. All significant historic, archaeological, cultural, and paleontological resources on the Refuge will be protected and managed in accordance with federal and State law.

A cultural resource management guide for the Refuge was completed in October 1995 to provide guidance for cultural resource management on the Refuge. It outlines legal mandates and considerations, reviews current information about resources, and establishes goals and objectives for the program. The cultural resource guide should be updated every five years.

It is illegal to collect archaeological materials and/or paleontological remains on the 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. The Refuge will encourage archaeologists, historians, ethnologists, and paleontologists from educational institutions and other government agencies to pursue their research interests on refuge lands as long as these research interests are compatible with refuge purposes. Research that collects data from threatened sites and minimizes disturbance to intact sites will be encouraged.

When any federal undertaking—including any action funded or authorized by the federal government and having the potential to directly or indirectly affect any archaeological or historic site—is planned, a consultation must be initiated with the State Historic Preservation Officer, under section 106 of the National Historic Preservation Act. 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. To protect archaeological and historic sites, other uses may be precluded. Private interests proposing to conduct commercial uses on the 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 Resource Management Handbook (USFWS 1992).

2.4.10 Fish and Wildlife Habitat Management

2.4.10.1 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 natural diversity and processes. However, in some cases, habitats are manipulated to maintain or improve conditions for selected fish and wildlife populations, to control invasive plant species, or to manage accumulations of natural fuels on refuge land. These habitat management and manipulation activities will be carried out in support of the purposes, goals, and objectives of the 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 natural diversity of native (indigenous) wildlife species and habitat types.

Habitat management and manipulation may be achieved by mechanical, chemical, and/or manual methods, including the use of natural and prescribed fire, or by a combination of methods. 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 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. Pest control, including integrated pest management, is discussed in subsequent text.

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 or the cutting of vegetation).

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.

2.4.10.2 Fire Management

Fire management is the full range of activities necessary to protect human life and property, cultural resources, and other identified values and to conserve, protect, and enhance habitat and to maintain desired ecological conditions for the benefit of fish and wildlife. Fire management activities include preparedness, emergency suppression operations, wildland fire use, fire prevention, education and outreach, monitoring, research, prescribed fire, hazardous fuel reduction, and mechanical treatments. All activities will be conducted in accordance with refuge, Service, and Department of Interior policies and approved interagency and refuge-specific fire management plans. Additional guidance on fire management can be found in the 2001 Federal Fire Policy, Department Manual 620 DM 1 and 2, Service Manual 621 FW 1 through 3, the Service Fire Management Handbook, and the Refuge Fire Management Plan.

A specific fire management plan (FMP) provides the basis for integrating fire as a critical natural process into other refuge plans and activities at a landscape scale. The Koyukuk FMP (November 2005) and the Nowitna FMP (January 2006) provide specific information on the application and management of fire on the Refuge. The Alaska Interagency Wildland Fire Management Plan (AIWFMP, amended October 1998) provides a cooperative framework and operational guideline for the suppression and management of wildland fires. The suppression of human-caused and unwanted wildland fires along with the use of wildland fire use and prescribed fire are important and critical fire management tools.

Wildland Fire Suppression: Fire suppression activity is the work of confining, constraining, controlling, or monitoring a fire or a portion of a fire to protect, prevent, or reduce the loss of identified values. Suppression takes place, with the highest priority being the safety of firefighters and the public, using an appropriate management response based on values to be protected. The AIWFMP and the refuge FMP is the guiding document for suppression actions. The AIWFMP establishes four management options—critical, full, modified, and limited—that direct a range of wildfire management responses. Refuge lands have been classified using these fire management options. Values at risk have been identified and mapped.

The Bureau of Land Management - Alaska Fire Service (AFS) provides emergency suppression services on refuge lands in Alaska (Memorandum of Agreement for Wildland Fire Suppression Services and Related Activities, August 2006), as directed by the refuge manager. Through a cooperative agreement with AFS, the State of Alaska Division of Forestry provides emergency suppression services on refuge lands in State protection zones, as directed by the refuge manager. The Refuge is located in the AFS Galena and Tanana Fire Management Zones, with suppression services provided solely by the Alaska Fire Service.

Use of Wildland Fire: Use of wildland fire is the application of a management response to naturally ignited wildland fires to accomplish beneficial resource management objectives as outlined in the refuge fire management plan. Wildland fires may be used to protect, maintain, and enhance natural and cultural resources and, as nearly as possible, wildland fires will be allowed to function in their natural ecological role. Optional management is described in the Refuge Fire Management Plans.

Prescribed Fire: Prescribed fires are ignited by management action to meet specific wildland fuel, vegetation, and/or habitat management objectives. Prior to each ignition, a written,

approved burn plan outlining prescription conditions is required. Use of prescribed fires must also comply with the Alaska Enhanced Smoke Management Plan for Prescribed Fire. This plan provides guidance and direction concerning smoke management issues related to prescribed fire.

2.4.11 Fish and Wildlife Population Management

Conservation of habitats is a key element in maintaining the natural diversity of fish and wildlife populations on the Refuge. Management of these populations is an important component of maintaining healthy ecosystems. The Refuge will be managed in accordance with their respective purposes and consistent with the Policy on Maintaining Biological Integrity, Diversity, and Environmental Health of the National Wildlife Refuge System (Service Manual 601 FW 3) to ensure native species are managed in their natural diversity and abundance.

The 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 to maintain the genetic variability of wild, native fish stocks.

2.4.11.1 Wildlife Inventory and Monitoring Plan

To assess presence, relative abundance, distribution, and trends in populations of fish, wildlife, and plants, the Refuge completed a Wildlife Inventory and Monitoring Plan (I&MP) in 2002 and revised it in 2008. The I&MP describes objectives, justification, methods, management implications, geographic scale, report schedules, and database management for studies on species targeted for inventory and monitoring. The I&MP includes studies that address environmental parameters (weather) and hydrology, soils, and fire history to explain potential changes in the distribution, relative abundance, and populations of fish, wildlife and plants. The Refuge will review the I&MP every two years. Regional office review is required every five to eight years. Updates to the I&MP will be made as indicated from these reviews.

2.4.11.2 Scientific Peer Review

Biologists, ecologists, botanists, and other refuge personnel conducting scientific investigations will adhere to refuge, regional, Service, and Department of Interior policies on scientific conduct, including the 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.

2.4.11.3 Compliance with the Animal Welfare Act

The Animal Welfare Act of 1996, as amended, established legal standards for animal care and use. To prescribe methods and set standards for the design, performance, and conduct of animal care and use, research facilities and federal agencies must establish an Institutional Animal Care and Use Committee (IACUC). 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 of field work. Note that a scientific collection permit is also required from the Alaska Department of Fish and Game under 5 Alaska Administrative Code 92.033.

2.4.11.4 Marking and Banding

These activities include fish and wildlife capture, marking, banding, radio-collaring, release, tracking, and other information-gathering techniques. Cooperation with appropriate partners, including the Alaska Department of Fish and Game, will be stressed, and specific protocols will be followed, taking advantage of all appropriate disciplines and new technologies wherever possible.

2.4.11.5 Threatened or Endangered Species

The Refuge will consult with the U.S. Fish and Wildlife Service Ecological Services field office on 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, section 7 Consultation Handbook 1998).

2.4.11.6 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 Appendix O.

Reintroductions can be useful tools for restoring species to natural ranges and reestablishing a refuge's natural fish, wildlife, and habitat diversity. Reintroductions would require appropriate NEPA compliance; a review to ensure consistency with the Policy on Maintaining Biological Integrity, Diversity, and Environmental Health of the National Wildlife Refuge System; 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 need to 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. Consideration should be given to whether there have been significant habitat changes since the species' extirpation (e.g., is the area still within the species' natural range?).

2.4.11.7 Fish and Wildlife Control

These activities involve the control, relocation, and/or removal of native species, including predators, to maintain natural diversity of fish, wildlife, and habitats. These management actions may be employed 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. Appendix E describes what it

would take to implement a predator control program on the Refuge. The key requirements are that a predator management program be ecologically sound and biologically justified. In keeping with the Service's mandate to first and foremost maintain the biological integrity, diversity, and environmental health of fish and wildlife populations at the refuge scale, a predator population will not intentionally be reduced below a level consistent with the low end of natural population cycles (see Service Manual 601 FW 3).

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 Alaska Department of Fish and Game, local communities, tribal governments, and adjacent landowners and/or managers. Predator management activities must be monitored and evaluated 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 to be “predator management.” The control or extirpation of non-native predators is not considered to be “predator management” (see section 2.4.11.8).

2.4.11.8 Management of Non-native, Invasive, and Pest Species

In general, the presence of non-native species (including feral domestic animals) on the Refuge is not compatible with refuge purposes or with Refuge System policies. When a non-native species (fish, wildlife, or plants) 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 or detract from the fulfillment of the mission of the Refuge System or the purposes of the Refuge, the species may be managed as part of the Refuge's diverse ecosystems.

Pests are defined as those organisms (vertebrates, invertebrates, plants, and microorganisms and their vectors), which are detrimental to fish, wildlife, human health, fish and wildlife habitat, or to 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 whose introduction causes or is likely to cause economic or environmental harm or harm to human health. 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 plan. Refuge integrated pest management planning will address the advantages and limitations of potential techniques including chemical, biological, mechanical, and cultural techniques. 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).

By definition, invasive species cause significant impacts to the land and water resources or to the species of plants and animals that use these habitats. To manage invasive plants, the refuge will include weed inventories as part of all habitat inventories. The refuge will review a proposed action's potential to introduce or spread invasive plants and will take measures to reduce the hazards (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 occurred without vertebrate predators. Presence of these invasive species may interfere with attainment of refuge purposes and management goals.

Pests on refuges may also be controlled to prevent damage to private property, and routine protection of 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 requires regional office review and approval of a pesticide-use proposal (Administrative Manual 30 AM 12 and Refuge Manual 7 RM 14).

2.4.11.9 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). If chemical controls are used, a pesticide-use proposal must be approved.

2.4.11.10 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 historical biologic 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.

Where fishery resources have been severely adversely affected, the Refuge will work with the State of Alaska, local tribes, and other partners to restore habitats and populations to appropriate, sustainable conditions. Restoration emphasis will focus on strategies that are the least intrusive to ecosystems 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 or Wild River areas, as long as the facilities will not significantly detract from the values for which those areas were established.

2.4.11.11 Fishery Enhancement

Fishery enhancement is any management action or set of actions that is applied to a fishery stock to supplement numbers of harvestable fish to a level beyond that which could be naturally produced based on a determination or reasonable estimate of historic levels. This

could be accomplished by 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 naturally diverse ecosystems. Fishery enhancement facilities for the purpose of artificially increasing fish populations normally will not occur within any management category.

Proposals for fishery enhancement projects will be subject to the provisions of NEPA regulations, an ANILCA section 810 determination, and a refuge compatibility determination. Only temporary fishery enhancement facilities may be authorized in Minimal, Wild River, and Wilderness management areas. Proposals for facilities within designated Wilderness require a minimum-requirements analysis to determine if the facilities are necessary within the Wilderness Area and would not significantly detract from the values for which those areas were established.

2.4.12 Subsistence Use Management

Providing the opportunity for continued subsistence use by local residents is one of the purposes of the Refuge, as stated in title III of ANILCA. Title VIII of ANILCA further provides that rural Alaska residents 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. Many aspects of subsistence management are addressed outside of refuge comprehensive conservation plans. The Federal Subsistence Board, through its rule-making process, addresses seasons, harvest limits, and customary and traditional use determinations. The Federal Subsistence Board has established Regional Subsistence Advisory Councils to provide for meaningful public input to the rule-making process.

The Refuge will work with others 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 uses. 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 local State fish and game advisory committees, tribes, and other entities. Refuge staff will attend various subsistence-related meetings, including those of local fish and game advisory committees and Regional Subsistence Advisory Councils, 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 uses 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 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 (4 ½ 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, and no more than one tree in five may be cut in any specific stand. Cutting of live trees less than three inches dbh does not require a special use permit. Timber stocks subject to subsistence use will also 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 generally would occur only after other consumptive uses competing for the resources were restricted or eliminated.

2.4.12.1 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, four-wheelers, 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.

2.4.12.2 Section 810 Evaluations

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

2.4.13 Public Access and Transportation Management

2.4.13.1 Snowmobiles, Motorboats, Airplanes, and Non-motorized Surface Transportation

Section 1110(a) of ANILCA allows the use of snowmobiles (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 refuges (43 CFR 36.11). Specific areas may be closed, in accordance with these regulations, to such uses. The refuge manager is responsible for determining when snow cover is adequate to protect the underlying vegetation and soil from damage by snowmobile use.

2.4.13.2 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 four-wheelers may be allowed only on designated routes or areas within Intensive and Moderate Management areas or by special use permit.

2.4.13.3 Helicopters

The use of a helicopter 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 is prohibited (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 initial-attack fire suppression must comply with the Refuge fire management plan and operational guidance in the Alaska Interagency Wildland Fire Management Plan. Helicopter landings by commercial operators and for public access are generally not allowed in designated Wilderness. Where such use was established prior to Wilderness designation, it may be allowed to continue.

2.4.13.4 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. When a right-of-way permit is necessary under this provision (e.g., construction of permanent or long-term facilities), the Service will review and process the application in accordance with regulations at 43 CFR 36 and 50 CFR 29. Such permits are subject to terms and conditions as specified in the regulations.

2.4.13.5 Temporary Access

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 uses of non-federal lands and where access is not otherwise provided for 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 three refuges were established, that it complies with the provisions of section 810 of ANILCA, and that it ensures that no permanent harm will result to refuge resources.

2.4.13.6 Subsistence Access

See Access for Subsistence Purposes under Subsistence Use Management (section 2.4.12.1).

2.4.13.7 Transportation and Utility Systems

Transportation and utility systems include 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 (section 1102 of ANILCA). Anyone seeking to acquire a right-of-way across refuge lands for a transportation or utility system, consistent with 43 CFR 36, must file an application with the regional office. Regulations (43 CFR 36 and 50 CFR 29) establish specific procedures and time constraints for application review, compliance with NEPA, decision making, and appeals.

The Service will decide whether to approve or disapprove that portion of a transportation or utility system 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 transportation or utility system across refuge lands can be granted only if the system meets the compatibility standard, the criteria outlined in section 1104(g)(2) of ANILCA, and the 43 CFR 36.7(a)(2) regulations, and if there is no economically feasible and prudent alternative route for the system. If approved, permits issued for a transportation or utility system will contain terms and conditions as required under regulations 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 (section 1107(b) of ANILCA and 43 CFR 36.9(c) and (d) regulations). 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 43 CFR 36.9(d) regulations.

When considering an application for a transportation or utility system, the authorization process would incorporate a corresponding comprehensive conservation plan amendment to update the desired management category(s) of the affected area if the system were to be approved.

2.4.13.8 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 transportation planning process and provide input regarding environmental considerations of proposed projects affecting refuge lands and resources. See sections 3.1.1.8 and 3.4.6 of this Plan for a discussion of State-identified potential transportation and utility systems that cross refuge lands.

2.4.13.9 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 means. The State of Alaska has currently identified in Alaska Statute 19.30.400 three routes on the Refuge it claims may be asserted as rights-of-way under RS 2477 (see appendix F and Figures 3-1 through 3-3).

2.4.13.10 17(b) Easements

Section 17(b) of the Alaska Native Claims Settlement Act, December 18, 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, route, and general location of 17(b) easements are identified on maps filed with conveyance documents. Conveyance documents also specify the terms and conditions of use, including the acceptable periods and methods of public access. See appendix G and Figures 3-1 through 3-3 for additional information.

2.4.13.11 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 also provided for within designated Wilderness areas.

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.

2.4.14 Recreation and Other Public Use

Public recreation activities compatible with refuge purposes are authorized unless specifically prohibited (50 CFR 36.31). Compatible recreation uses of the 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 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 uses are appropriate. Some recreational uses are incidental to others. For example, camping and hiking may be related to hunting, fishing, wildlife photography, or other recreational uses.

There is often a fine line between subsistence and recreational use (e.g., berry picking). Subsistence uses are addressed under Subsistence Use Management (section 2.4.12). 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 uses on refuges shall be accorded priority over the taking of fish and wildlife for other purposes, in accordance with title VIII of ANILCA.

The Refuge will be managed to provide recreational experiences in a generally natural wildland setting. Recreational use is managed consistent with the designated management category. Areas designated as Intensive and Moderate Management will be managed for greater concentrations of visitors than those designated as Minimal Management, Wilderness, or Wild River. The Refuge will manage all recreational use to avoid crowded conditions and to minimize adverse effects to cultural resources, fish and wildlife, wilderness, and other special values of the Refuge. “Leave No Trace” principles will be the standard.

The least intrusive means of managing recreational use 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 natural or other values of the Refuge.

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

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

2.4.15 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.

2.4.15.1 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 (see appendix N). 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.

2.4.15.2 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 refuge resources. Permits for these facilities within the Refuge will only be required for tent frames located in the Nowitna Wild River corridor and the Koyukuk Wilderness Area.

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 temporary facility special use permits:

- 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 areas of significant public use.

2.4.16 Outreach

Outreach is two-way communication between the 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 these services, 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 key to the success of many of the management activities outlined in this 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 Refuge will ensure that these 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 news media; attend public meetings and workshops; develop informational displays, brochures, web pages, and teaching materials; invite the public to the Refuge (open houses); visit local schools and communities; and foster one-on-one communication.

2.4.17 Commercial-use Management

Commercial uses are activities involving use of a refuge or its resources for a profit. Subsistence uses are not included in commercial uses. Refer to section 2.4.12 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 Refuge, other activities where specific property rights are held by entities other than the federal government, or where specifically exempted by law, all commercial 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 use. Prior to authorizing any economic use of a natural resource, the refuge manager must determine that each 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.

2.4.17.1 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 activities are compatible with refuge purposes and reduce the potential for impacts to resources and to other refuge users. If problems arise relating to commercial recreation activities—such as disturbance of active nests, conflicts with subsistence use, chronic incidence of bears getting into food, or violations of State or federal regulations—the Refuge may modify or terminate 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 use.

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

2.4.17.2 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 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 Refuge will work closely with lease

holders to minimize adverse effects of mineral exploration and extraction on refuge resources and recreation opportunities.

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 under 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(c) 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.

2.4.17.3 Commercial Fishing and Related Facilities

Under section 304(d) of ANILCA, the Service will continue to allow individuals with valid commercial fishing rights or privileges to operate on the Refuge. The use of campsites, cabins, motor vehicles, and aircraft on the Refuge in support of commercial fishing is 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.” The Service recognizes that fishery levels are cyclic and will take that into consideration when applying the 1979 level criteria. Any new fishery and related facilities and equipment will have to meet the compatibility standard.

Aquaculture and mariculture support facilities may be allowed in Intensive Management areas, subject to provisions of State and federal laws. Seafood processing plants will not be allowed.

2.4.17.4 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 (Alaska Forest Resources & Practices Act, as amended) guidelines for timber management will be followed. Commercial harvest of timber and firewood is not allowed in designated Wilderness.

2.4.17.5 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.

2.4.17.6 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 a refuge 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. 4601-6d(e)).

2.4.17.7 Other Commercial Uses

Generally, other commercial 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 2.4.13.9 for transmission lines, pipelines, and other rights-of-way mentioned in title XI of ANILCA.

2.4.18 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 a 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 comprehensive conservation plan revisions, existing information will be reviewed. The decommissioned Galena Air Force Base and the demolished Campion Base are known contaminants sites. An assessment of potential contaminants threats will be completed and a report prepared at a future date.

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)—would be followed during remediation work.

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.

2.4.19 Management of Designated Wilderness

Designated Wilderness within the Refuge will be managed in accordance with the Wilderness Act of 1964, as modified by provisions of ANILCA; Service guidelines as found in the Refuge Manual (6 RM 8) and part 610 of the Service Manual, when approved; and regional policy. Preserving the wilderness character of the area is the management focus for designated Wilderness. A minimum requirements analysis will be conducted for administrative activities proposed in Wilderness areas. This two-step decision process involves determining if an activity should be conducted in the Wilderness Area and, if so, determining the minimum tool, which is the least intrusive tool, equipment, device, force, regulation, or practice deemed necessary to achieve a management objective in Wilderness.

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 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. Following are some of the ANILCA provisions and their applicable sections affecting public use of Wilderness areas:

- Access for subsistence purposes (section 811)
- Access for traditional activities and to and from villages and home sites (section 1110(a))
- Access to state- or privately-owned lands (including subsurface rights), valid mining claims, or other valid occupancy (section 1110(b))
- Construction and use of cabins for traditional and customary uses (section 1303)
- Use of facilities associated with the exercise of valid commercial fishing rights (section 304(d))

Other provisions of ANILCA affect the administrative uses of 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 50 CFR 35.5(b), regional policy allows local residents engaged in subsistence activities to use chainsaws. Other motorized equipment not related to transportation (such as generators and water pumps) are not allowed.

Granting rights-of-way for transportation or utility systems through designated Wilderness requires Presidential and congressional approval (section 1106(b) of ANILCA; see also section 2.4.13.7).

A step-down Wilderness Stewardship Plan may be prepared for the Koyukuk Wilderness to address in greater detail its resources, uses, and management. Specific details would be included on how the broad management direction provided in the Comprehensive Conservation

Plan would be applied to the Wilderness Area to preserve the wilderness character. The step-down plan would be prepared in cooperation with the State and other partners. Public involvement would be an essential part of preparation of the stewardship plan.

2.4.20 Administration of the Koyukuk, Northern Unit Innoko, and Nowitna National Wildlife Refuges

2.4.20.1 Administrative Sites and Visitor Facilities

Administrative sites include temporary and permanent field camps, residences, offices, 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 they are constructed. Administrative field camps or other administrative facilities within Minimal, Wilderness and Wild River 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 that "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 use, 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 refuges. In the case of the Koyukuk, Northern Unit Innoko, and Nowitna National Wildlife Refuges, these sites are primarily located in the village of Galena.

2.4.20.2 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 general strategies

identified in this Plan. Additional information on the step-down planning process can be found in 602 FW 3 of the Service Manual.

A list of refuge step-down management plans is found in section 4.1 and Appendix J of this Plan.

2.4.21 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 hard rock 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. See section 2.4.17.2 for more information.

2.5 Management Categories Table

2.5.1 Introduction

Table 2-1 lists activities, public uses, commercial 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. Those management categories and activities, public uses, commercial uses, and facilities that generally do not apply to the Refuge are shaded in gray.

2.5.1.1 Definitions for Management Categories Table

The following are definitions for terms used in the table.

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 be allowed; a special use permit or other authorization is required.

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 effects 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 uses over which the Service has jurisdiction must be determined to be appropriate following direction in Service Manual 630 FW 1. Hunting, fishing, wildlife observation and photography, and environmental education and interpretation are considered appropriate by national policy with no further analysis required. See section 2.4.5 for a description of the criteria used to determine if other uses are appropriate.

Compatibility—All activities, uses, and facilities allowed on a refuge, except management actions undertaken by or for the Service, must be compatible with the purposes of the refuge and the mission of the Refuge System. The analysis performed results in a refuge compatibility determination. Management activities undertaken by the Service or 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 appropriate topic in the Management Policies and Guidelines section of this chapter. For some activities, other federal agency and/or State regulations may also apply.

Temporary—A continuous period of time that does 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 and uses 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 refuge resources or human health and safety.

Management emergencies—Activities, uses, and facilities not allowed on a refuge or in specific management categories may be allowed if naturally-occurring or human-caused actions adversely affect refuge resources or threaten human health and safety.

Table 2-1. Activities, public uses, commercial uses, and facilities by management category.

Note: Those management categories that do not apply to the Refuges are shaded grey.

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
ECOSYSTEM, HABITAT, AND FISH AND WILDLIFE MANAGEMENT					
Ecosystem and Landscape Management					
Collecting Information on and Monitoring Ecosystem Components Data gathering, monitoring, and maintaining a comprehensive data base of selected ecosystem components (plants, animals, fish, water, and air). (See sections 2.4.11 and 2.4.11.2)	Allowed*; see section 2.4.19	Allowed	Allowed	Allowed	Allowed
Research and Management Access and collection of data necessary for management decisions or to further science by the Service. (See section 2.4.11)	Allowed*; see section 2.4.19	Allowed	Allowed	Allowed	Allowed
Access and collection of data necessary for management decisions or to further science by ADF&G.	Allowed*; see section 2.4.19	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 2.4.19	May be authorized	May be authorized	May be authorized	May be authorized

* Subject to minimum requirements analysis

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
Research and Management Facilities May be permanent or temporary structures or camps, including weirs, counting towers, and sonar counters. (See section 2.4.20.1)	May be allowed*; consistent with section 2.3.4	May be allowed	May be allowed	May be allowed	May be allowed
Fish and Wildlife Habitat Management					
Describing, Locating, and Mapping Habitats Development of quantitative, written, and graphic descriptions of fish and wildlife habitat, including water, food, and shelter components. (See section 2.4.10.1)	Allowed*; see section 2.4.19	Allowed	Allowed	Allowed	Allowed
Habitat Management (See section 2.4.10.1) <i>Mechanical Treatment:</i> Activities such as cutting, crushing, or mowing of vegetation; water control structures; fencing; and artificial nest structures.	Not allowed*; with exceptions consistent with sections 2.3.4. See also section 2.4.19	May be allowed; with exceptions consistent with section 2.3.5	Not allowed; with exceptions consistent with section 2.3.3	May be allowed	May be allowed
<i>Chemical Treatment:</i> Use of chemicals to remove or control non-native species. (See section 2.4.11.8)	May be allowed*; see section 2.4.19	May be allowed	May be allowed	May be allowed	May be allowed
<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).	May be allowed*; see section 2.4.19	May be allowed	May be allowed	May be allowed	May be allowed

* Subject to minimum requirements analysis

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
<p>Aquatic Habitat Modifications Activities such as stream bank restoration, passage structures, fish barriers, or removal of obstacles which result in physical modification of aquatic habitats to maintain or restore native fish species. (See section 2.4.10.1)</p>	<p>May be allowed*; consistent with section 2.3.4. See also section 2.4.19</p>	<p>May be allowed; consistent with section 2.3.5</p>	<p>May be allowed</p>	<p>May be allowed</p>	<p>May be allowed</p>
<p>Fire Management—Prescribed Fires Fire ignited by management actions to meet specific management objectives. (See section 2.4.10.2)</p>	<p>May be allowed*; see section 2.3.4</p>	<p>May be allowed</p>	<p>May be allowed</p>	<p>May be allowed</p>	<p>May be allowed</p>
<p>Fire Management—Wildland Fire Use The planned use of naturally occurring fires to meet management objectives. (See section 2.4.10.2)</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>Fire Management—Fire Suppression Management actions intended to protect identified resources from a fire, extinguish a fire, or alter a fire’s direction of spread. (See section 2.4.10.2)</p>	<p>Allowed</p>	<p>Allowed</p>	<p>Allowed</p>	<p>Allowed</p>	<p>Allowed</p>
<p>Non-native and Pest Plant Control Monitoring, extirpation, control, removal and/or relocation, and other management practices for pest and non-native plant species. (See section 2.4.11.8)</p>	<p>May be allowed*; see section 2.4.19</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

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
Water Quality and Quantity Management Monitoring of water quality and quantity to identify baseline data and for management purposes; includes installation of gauging stations. (See section 2.4.9.2)	Allowed*; see section 2.4.19	Allowed	Allowed	Allowed	Allowed
Fish and Wildlife Population Management					
Reintroduction of Species The reintroduction of native species to restore natural diversity of fish, wildlife, and habitats. (See section 2.4.11.6)	May be allowed*; see section 2.4.19	May be allowed	May be allowed	May be allowed	May be allowed
Fish and Wildlife Control The control, relocation, sterilization, removal, or other management of native species including predators, to maintain natural diversity of fish, wildlife, and habitats; favor other fish or wildlife populations; protect reintroduced, threatened, or endangered species or to restore depleted native populations. (See section 2.4.11.7)	May be allowed*; see section 2.4.19	May be allowed	May be allowed	May be allowed	May be allowed
Non-native Species Management The removal or control of non-native species (including predators). (See section 2.4.11.8)	May be allowed*; see section 2.4.19	May be allowed	May be allowed	May be allowed	May be allowed

* Subject to minimum requirements analysis

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
<p>Pest Management and Disease Prevention and Control 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 2.4.11.9)</p>	May be allowed*; see section 2.4.19	May be allowed	May be allowed	May be allowed	May be allowed
<p>Fishery Restoration 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 2.4.11.10)</p>	May be allowed*	May be allowed	May be allowed	May be allowed	May be allowed
<p>Fishery Restoration Facilities Fisheries facilities may be permanent or temporary and may include hatcheries, fish ladders, fish passages, fish barriers, and associated structures. (See sections 2.4.11.10 and 2.4.20.1)</p>	May be authorized*	May be authorized	May be authorized	May be authorized	May be authorized
<p>Fishery Enhancement 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 2.4.11.11)</p>	May be allowed*; consistent with section 2.4.19	May be allowed	May be allowed	May be allowed	May be allowed

* Subject to minimum requirements analysis

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
Fishery Enhancement Facilities May be permanent or temporary and may include hatcheries, egg incubation boxes, fish ladders, fish passages, fish barriers, and associated structures. (See sections 2.4.11.11 and 2.4.20.1)	May be authorized*	May be authorized	May be authorized	May be authorized	May be authorized
Native Fish Introductions Movement of native fish species within a drainage on the Refuge to areas where they have not historically existed. (See section 2.4.11.6)	May be allowed*	May be allowed	May be allowed	May be allowed	May be allowed
Non-native Species Introductions Introduction of species not naturally occurring within the Refuge. (See section 2.4.11.6)	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
SUBSISTENCE (See section 2.4.12)					
Subsistence Activities					
Fishing, Hunting, Trapping, and Berry Picking The taking of fish and wildlife and other natural resources for personal consumption, as provided by law.	Allowed	Allowed	Allowed	Allowed	Allowed
Collection of House Logs and Firewood Harvesting live standing timber greater than 6 inches diameter at breast height for personal or extended family use.	May be authorized	May be authorized	May be authorized	May be authorized	May be authorized

* Subject to minimum requirements analysis

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
Collection of House Logs and Firewood 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 2.4.12	20 trees or less per year allowed; more than 20 trees per year may be authorized; consistent with section 2.4.12	20 trees or less per year allowed; more than 20 trees per year may be authorized; consistent with section 2.4.12	20 trees or less per year allowed; more than 20 trees per year may be authorized; consistent with section 2.4.12	20 trees or less per year allowed; more than 20 trees per year may be authorized; consistent with section 2.4.12
Collection of Plant Materials 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
Temporary Facilities Establishment and use of tent platforms, shelters, and other temporary facilities and equipment directly related to the taking of fish and wildlife. (See section 2.4.15.2)	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
Subsistence Cabins – See Cabins (See also section 2.4.15.1)					
Subsistence Access – subject to reasonable regulations under provisions of section 811 of ANILCA (See section 2.4.12.1)					
Use of snowmobiles, motorboats, four-wheelers, and other means of surface transportation traditionally employed for subsistence purposes.	Allowed	Allowed	Allowed	Allowed	Allowed

* Subject to minimum requirements analysis

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
ACCESS (See sections 2.4.12.1 and 2.4.13) Restrictions subject to provisions of section 1110 of ANILCA as applicable; see also Subsistence Access section above.					
Foot	Allowed	Allowed	Allowed	Allowed	Allowed
Dogs and Dog Teams	Allowed	Allowed	Allowed	Allowed	Allowed
Other Domestic Animals Includes horses, mules, llamas, etc. (certified weed-free feed required).	Allowed	Allowed	Allowed	Allowed	Allowed
Nonmotorized Boats Includes canoes, kayaks, rafts, etc.	Allowed	Allowed	Allowed	Allowed	Allowed
Motorized					
Use of snowmobiles, motorboats, airplanes, and nonmotorized surface transportation methods for traditional activities and for travel to and from villages and home sites.	Allowed	Allowed	Allowed	Allowed	Allowed
Highway Vehicles	Not allowed	Not allowed	Not allowed	May be allowed on designated roads	Allowed on all-weather roads
Off-Road Vehicles (All-Terrain Vehicles) Includes air boats and air-cushion vehicles. (See section 2.4.13.2)	Not allowed; with exceptions consistent with section 2.4.12	Not allowed; with exceptions consistent with section 2.2.12.2	Not allowed; with exceptions consistent with section 2.4.12.2	May be allowed	May be allowed
Helicopters Includes all rotary-wing aircraft. (See section 2.4.13.3)	May be authorized; consistent with sections 2.3.4 and 2.4.19	May be authorized	May be authorized	May be authorized	May be authorized

* Subject to minimum requirements analysis

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
PUBLIC USE, RECREATION, and OUTREACH ACTIVITIES Also see ACCESS and Commercial Recreation sections.					
Hunting, Fishing, Wildlife Observation, Wildlife Photography, Interpretation and Environmental Education Note: All activities listed are priority public uses. (See sections 2.4 and 2.4.14)	Allowed	Allowed	Allowed	Allowed	Allowed
Trapping, Walking, Hiking, Camping at Undeveloped Sites, and Dog Sledding (See sections 2.4 and 2.4.14)	Allowed	Allowed	Allowed	Allowed	Allowed
General Photography See also COMMERCIAL USES. (See sections 2.4.1 and 2.4.14)	Allowed	Allowed	Allowed	Allowed	Allowed
Outreach Activities (See sections 2.4.1 and 2.4.16)	Allowed	Allowed	Allowed	Allowed	Allowed
Public Use and Recreation Facilities – level of development is consistent with management intent of the category (See section 2.4.15)					
All Weather Roads And associated developments including bridges.	Not allowed	Not allowed	Not allowed	May be allowed	May be allowed
Unimproved Roads Note: while unimproved roads are not allowed in Minimal management, Wilderness, and Wild Rivers, 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
Designated Off-Road Vehicle (All-Terrain Vehicle) Trails and Routes	Not allowed	May be allowed	Not allowed	May be allowed	May be allowed
Roadside Exhibits and Waysides	Not applicable	Not applicable	Not applicable	May be allowed	May be allowed

* Subject to minimum requirements analysis

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
Constructed and Maintained Airstrips	Not allowed	Not allowed	Not allowed	May be allowed	May be allowed
Cleared Landing Strips and Areas Includes unimproved areas where airplanes land. Minor brush cutting or rock removal by hand is allowed for maintenance.	Existing strips allowed to remain*; new strips not allowed; see section 2.4.19	May be allowed	May be allowed	May be allowed	May be allowed
Constructed Hiking Trails Includes bridges, boardwalks, trailheads, and related facilities.	May be allowed*	May be allowed	May be allowed	May be allowed	May be allowed
Designated Hiking Routes Unimproved and unmaintained trails; may be designated by signs, cairns, and/or on maps.	Allowed	Allowed	Allowed	Allowed	Allowed
Boat Launches and Docks Designated sites for launching and storing watercraft or tying up a float plane.	May be allowed*	May be allowed	May be allowed	May be allowed	May be allowed
Visitor Contact Facilities 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 2.4.15)	Generally not allowed*; see sections 2.3.4 and 2.4.19	May be allowed	May be allowed	May be allowed	May be allowed
Campgrounds Developed sites accessible by highway vehicles.	Not applicable	Not applicable	Not applicable	May be allowed	May be allowed

* Subject to minimum requirements analysis

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
<p>Hardened Campsites 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 2.4.15)</p>	Allowed*; consistent with section 2.4.19	Allowed	Allowed	Allowed	Allowed
<p>Temporary Facilities Includes tent frames, caches, and other similar or related facilities; does not include cabins. See also SUBSISTENCE, COMMERCIAL USES, and Administrative Facilities. (See section 2.4.15.2)</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
Cabins – also other related structures such as outdoor toilets, food caches, storage sheds, and fish drying racks (See section 2.4.15.1)					
<p>Public Use Cabin 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 2.4.19	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>Administrative Cabin Any cabin primarily used by refuge staff or other authorized personnel for the administration of the Refuge. (See section 2.4.20.1)</p>	May be allowed*; consistent with section 2.4.19	May be allowed	May be allowed	May be allowed	May be allowed

* Subject to minimum requirements analysis

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
Subsistence Cabin Any cabin necessary for health and safety and to provide for the continuation of ongoing subsistence activities; not for recreational use.	Existing cabins allowed to remain; new cabins may be authorized; consistent with section 2.4.19	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
Commercial Cabin Any cabin which is used in association with a commercial operation, including but not limited to commercial fishing activities and recreational guiding services.	Existing cabins allowed to remain; new cabins not allowed consistent with section 2.4.19	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
Other Cabins Cabins associated with authorized uses by other government agencies.	May be authorized; consistent with section 2.4.19	May be authorized	May be authorized	May be authorized	May be authorized
Administrative Facilities (See section 2.4.20.1)					
Administrative Field Camps 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.	May be allowed*	May be allowed	May be allowed	May be allowed	May be allowed

* Subject to minimum requirements analysis

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
<p>Administrative Field Sites 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 2.3.4 and 2.4.19	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>Refuge Administrative Office Complex 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
<p>Hazardous Materials Storage Sites, including appropriate structures and equipment, necessary for the storage and transfer of fuels and other hazardous materials used 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>Residences 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

* Subject to minimum requirements analysis

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
Bunkhouses Quarters to house temporary and similar employees, volunteers, visitors, and other agency personnel.	Not allowed	Not allowed	Not allowed	May be allowed	May be allowed
Aircraft Hangars and Facilities for Storage of Aircraft	Not allowed	Not allowed	Not allowed	Not allowed	May be allowed
Boat Launches and Docks Designated sites for launching and storing watercraft or tying up a float plane.	May be allowed*	May be allowed	May be allowed	May be allowed	May be allowed
Radio Repeater Sites Sites used to maintain radio communications equipment; may include helispots for access.	May be allowed*	May be allowed	May be allowed	May be allowed	May be allowed
COMMERCIAL USES					
Except as noted, a special use permit or other authorization is required for economic use of a refuge.					
Commercial Recreation – includes all forms of guiding, including those operated by nonprofit, educational, and other noncommercial groups (See section 2.4.17.1)					
Guiding and Outfitting	May be authorized	May be authorized	May be authorized	May be authorized	May be authorized
Transporting	May be authorized	May be authorized	May be authorized	May be authorized	May be authorized
Fixed-Wing Air Taxis	May be authorized	May be authorized	May be authorized	May be authorized	May be authorized
Helicopter Air Taxis	Not allowed; with exceptions consistent with section 2.4.13.3	May be authorized	May be authorized	May be authorized	May be authorized
Bus and Auto Tours	Not applicable	Not applicable	Not applicable	May be authorized	May be authorized
Mineral Exploration (See section 2.4.17.2) See section 2.4.21 for information on the Alaska Mineral Resource Assessment Program.					

* Subject to minimum requirements analysis

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
Surface Geological Studies 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
Geophysical Exploration and Seismic Studies 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

* Subject to minimum requirements analysis

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
Core Sampling Using helicopter transported motorized drill rig to extract subsurface rock samples; does not include exploratory wells; includes sampling conducted for Department of the Interior.	Not allowed	May be authorized	May be authorized	May be authorized	May be authorized
Other Geophysical Studies Helicopter-supported gravity and magnetic surveys and other minimal impact activities that do not require mechanized surface transportation.	Not allowed	May be authorized	May be authorized	May be authorized	May be authorized
Mineral Development (see section 2.4.17.2)					
Oil and Gas Leasing Leasing, drilling, and extraction of oil and gas for commercial purposes. Includes all associated above and below ground facilities.	Not allowed	Not allowed	Not allowed	Not allowed	May be authorized
Sale of Sand, Gravel, and Other Common Variety Minerals Extraction of sand, gravel, and other saleable minerals for commercial purposes; includes commercial use by federal, State, and local agencies.	Not allowed	Not allowed	Not allowed	May be authorized	May be authorized
Other Mineral Leasing 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 2.4.17.2.	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed

* Subject to minimum requirements analysis

Chapter 2: Goals and Objectives, Management Direction

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
Mining of Hardrock Minerals 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.	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
Other Commercial Activities					
Commercial Filming, Videotaping, and Audio taping (See section 2.4.17.6)	May be authorized	May be authorized	May be authorized	May be authorized	May be authorized
Grazing (See section 2.4.17.7)	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
Agriculture (Commercial) (See section 2.4.17.7)	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
Commercial Fishery Support Facilities At or below 1979 levels. (See section 2.4.17.3)	Allowed	Allowed	Allowed	Allowed	Allowed
Commercial Fishery Support Facilities Above 1979 levels. (See section 2.4.17.3)	Not allowed	May be authorized	May be authorized	May be authorized	May be authorized
Seafood Processing (See section 2.4.17.3)	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
Aquaculture and Mariculture Support Facilities (See section 2.4.17.3)	Not allowed	Not allowed	Not allowed	Not allowed	May be authorized
Commercial Timber and Firewood Harvest (See section 2.4.17.4)	Not allowed	May be authorized	May be authorized	May be authorized	May be authorized
Commercial Gathering of Other Refuge Resources (See section 2.4.17.5)	Not allowed	Not allowed	Not allowed	May be authorized	May be authorized

* Subject to minimum requirements analysis

ACTIVITY	MANAGEMENT of WILDERNESS	MANAGEMENT of WILD RIVERS	MINIMAL MANAGEMENT	MODERATE MANAGEMENT	INTENSIVE MANAGEMENT
<p>Transportation and Utility Systems 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 2.4.13.7)</p>	May be authorized by Congress	May be authorized; would require a plan amendment	May be authorized; would require a plan amendment	May be authorized	May be authorized
<p>Navigation Aids and Other Facilities 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 2.4.13.11)</p>	May be authorized*	May be authorized	May be authorized	May be authorized	May be authorized
<p>Major Hydroelectric Power Development Hydroelectric dams creating a change in stream flow with an elevation change and reservoir behind the dam. (See section 2.4.17.7)</p>	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
<p>Small Hydroelectric Power Development Hydroelectric generation by low-head or in-stream structures that do not change the flow of the river. (See section 2.4.17.7)</p>	Not allowed	Not allowed	Not Allowed	May be authorized	May be authorized

* Subject to minimum requirements analysis

3. Refuge Resources

Established in 1980 by the Alaska National Interests Lands Conservation Act, the Refuge was created primarily to protect the natural diversity of fish and wildlife populations and their habitats. This chapter describes the physical, biological, social, and economic components of the ecosystem that could be affected by actions associated with management of the Refuge. This chapter is divided into seven major headings: Geographic Setting, Physical Environment, Biological Environment, Human Environment, Wilderness Values, Wild River Values, and Refuge Infrastructure and Administration. Scientific names of all plants and animals are provided in appendix H.

3.1 Geographic Setting

3.1.1 Land Status

Three acts of Congress, the Alaska Statehood Act, the Alaska Native Claims Settlement Act of 1971 (ANCSA) and the Alaska National Interest Lands Conservation Act of 1980 (ANILCA), determined the current land ownership patterns of the Refuge. ANCSA authorized the formation of village and regional Native corporations and enabled them to select and gain title to federal land. ANILCA established the Refuge.

Refuge boundaries are often straight lines but were also drawn along or near major topographical features, such as mountain tops, rivers, or watershed boundaries, regardless of existing land ownership patterns. Consequently, the refuge boundaries incorporated lands that are owned or selected by individuals, Native corporations, or the State of Alaska (Figure 3-1, Figure 3-2, and Figure 3-3; Table 3-1)

The exterior boundary of the Koyukuk encompasses approximately 4,519,952 acres. The State owns 21,662 acres. Regional and village native corporations own 412,850 acres. There are 15,725 acres under private ownership, including 130 Native allotments. The remaining 4,069,715 acres of land is national wildlife refuge (Table 3-2).

The exterior boundary of the Northern Unit Innoko encompasses approximately 750,991 acres. The State owns 37,839 acres. Regional and village native corporations own 285,045 acres. Private property, including 25 Native allotments, totals 6,206 acres. The remaining 421,901 acres of land is national wildlife refuge (Table 3-3).

The exterior boundary of the Nowitna Refuge encompasses approximately 2,058,057 acres. Regional and village Native corporations own 154,644 acres. Private property, including 25 Native allotments, totals 2,048 acres. The remaining 1,901,361 acres of land is national wildlife refuge (Table 3-4).

3.1.1.1 Village Native Corporation Land

Three village Native corporations, Gana-A'Yoo Limited, Zho-Tse Corporation, and Dineega Corporation, have land holdings within the refuge boundaries. Each corporation has a total land entitlement of 121,507 acres, and each has taken some of this entitlement outside the refuge boundary as well as within. As of May 2008, about 37,222 in the Koyukuk and 43,847 acres in the Northern Unit Innoko had been conveyed to Gana-A'Yoo Limited, and an additional 11,720 acres in the Koyukuk and 5,997 acres in the Northern Unit Innoko had been selected. Zho-Tse Corporation has selected 853 acres inside the Northern Unit Innoko. The Dineega Corporation owns 14,631 acres in the Nowitna. Land status within the Refuge will

Table 3-1. Surface land status of the Refuge, as of May 2008.

Land Status	Koyukuk		Northern Unit Innoko		Nowitna	
	Selected	Conveyed	Selected	Conveyed	Selected	Conveyed
USFWS	3,830,724		387,109		1,826,645	
State of Alaska	21,415	21,662	18,968	37,839	73,457	0
Regional Native Corporation	204,025	375,628	8,521	241,198	0	140,013
Gana-A'Yoo Limited	11,720	37,222	5,997	43,847	0	0
Zho-Tse Incorporated	0	0	853	0	0	0
Dineega Corporation	0	0	0	0	0	14,631
Native Allotment (number)	1831 (15)	15,713 (115)	453 (3)	62066 (49)	1259 (9)	2048 (16)
Other Private	0	12	0	0	0	4

 Table 3-2. Surface land status^a of the Koyukuk, as of June 2008. (See Table 3-4 for notes)

Category	Landowner	Area in Acres ^b		
		Conveyed ^c	Selected	Total
Federal – Refuge	United States	3,830,724	0	3,830,724
State Government	State of Alaska	21,662	21,415	43,077
Native Allotments	Many (130 landowners)	15,713	1,831	17,544
Regional Native Corporation	Doyon Ltd.	375,628	204,025	579,653
Other Private		12	0	12
Village Native Corporation	Gana-A'Yoo Limited	37,222	11,720	48,942

 Table 3-3. Surface land status^a of the Nowitna, as of June 2008. (See Table 3-4 for notes)

Category	Landowner	Area in Acres ^b		
		Conveyed ^c	Selected	Total
Federal – Refuge	United States	1,826,645	0	1,826,645
State Government	State of Alaska	0	73,457	73,457
Native Allotments	Many (25 landowners)	2,048	1,259	3,307
Regional Native Corporation	Doyon Ltd.	140,013	0	140,013
Other Private		4	0	4
Village Native Corporation	Dineega Corporation	14,631	0	14,631

Table 3-4. Surface land status^a of the Northern Unit Innoko, as of June 2008.

Category	Landowner	Area in Acres ^b		
		Conveyed ^c	Selected	Total
Federal – Refuge	United States	387,109	0	387,109
State Government	State of Alaska	37,839	18,968	56,807
Native Allotments	Many (52 landowners)	6,206	453	6,659
Regional Native Corporation	Doyon Ltd.	241,198	8,521	249,719
Other Private		0	0	0
Village Native Corporation	Gana-A'Yoo Limited	43,847	5,997	49,844
	Zho-Tse Corporation	0	853	853

^a Acreage figures do not include submerged beds of meanderable water bodies (rivers of 198 feet or more in width and lakes of 50 acres or more). Ownership of the submerged lands beneath 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 water bodies is implied in this table.

^b 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.

^c Includes patented and Interim Conveyed (IC) lands. Only land claims within the Refuge boundary are reported.

change as selected lands are conveyed, relinquished, or rejected. However, land status should be resolved by 2009 under the provisions of the Alaska Land Transfer Acceleration Act of 2004 (P.L. 108-452).

3.1.1.2 Regional Native Corporation Lands

Doyon Limited (Doyon) holds title to 375,628 acres of land in the Koyukuk; 241,198 acres in the Northern Unit Innoko; and 140,013 acres of land in the Nowitna. They have selected an additional 204,025 acres within the Koyukuk and 8,521 acres within the Northern Unit Innoko (see Table 3-1, Table 3-2, and Table 3-3).

According to the conveyance rules of ANCSA section 14(f), Doyon is granted the subsurface rights to the lands conveyed to both Zho-Tse and Dineega village corporations. This provision gives the regional corporation the rights to potentially valuable mineral interests but gives the village control of the surface lands necessary to supply its subsistence and economic needs.

3.1.1.3 Native Allotments

Until its repeal in 1971, the Native Allotment Act of 1906 authorized Alaskan 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 Alaskan 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, a total of 115 allottees in the Koyukuk, 49 allottees in the Northern Unit of Innoko, and 16 allottees in the Nowitna have been deeded a total of 15,713 acres within the Koyukuk, 6,206 acres within the Northern Unit Innoko, and 2,048 acres within Nowitna (Table 3-1, Table 3-2 and Table 3-4). Another 1,831 acres (15 parcels on the Koyukuk), 453 acres (3 parcels on the Northern Unit Innoko), and 1,259 acres (9 parcels on the Nowitna) have been selected, including a total of 207 Vietnam veteran allotment claims.

3.1.1.4 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 is only one private patent within the boundaries of the Refuge. This patent was issued for a trade and manufacturing site, totaling about 12 acres. The Trade and Manufacturing Act of 1898 allowed cash entry for up to 80 acres of land to be used as a place of business.

3.1.1.5 State of Alaska

The State of Alaska owns 21,662 acres in the Koyukuk and 37,839 acres in Northern Unit Innoko (Table 3-1). There are no State lands within the Nowitna. The Alaska Statehood Act (PL 85-508) entitled the State to select 102,550,000 acres of vacant, unappropriated, and unreserved land 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 (Public Law 86-70).

3.1.1.6 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. However, 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 U.S. did not reserve or withdraw submerged lands, then 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).

Undoubtedly, the 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.

Although judicial action through the Quiet Title Act has been the primary means of clearing title to submerged lands, recent Bureau of Land Management (BLM) regulation changes regarding Recordable Disclaimers of Interest in Lands (RDI) provide an administrative means to clear title to submerged lands. The RDI process allows the Secretary of Interior, acting through the BLM, to disclaim land interests that have terminated or are invalid. In February 2003, the State filed its first disclaimer application for submerged lands beneath the Black River in northeast Alaska. An RDI for the Black River was issued later that year. The State has filed numerous subsequent applications and cleared title to large areas of lands, but none have been for submerged lands within the Refuge.

Adjudicating the extent and boundaries of navigable waterways may take many years to resolve. In the meantime, the Service is cooperating with the State on a case-by-case basis regarding management of major waterways that may be determined navigable.

3.1.1.7 7(b) Easements

Section 17(b) of ANCSA requires the federal government to reserve easements for access to public lands or waters whenever land is conveyed to Native corporations. Easements are reserved to ensure access to public lands and waters that would otherwise be completely blocked by conveyed Native corporation lands. Easements can be linear (i.e., roads and trails), or

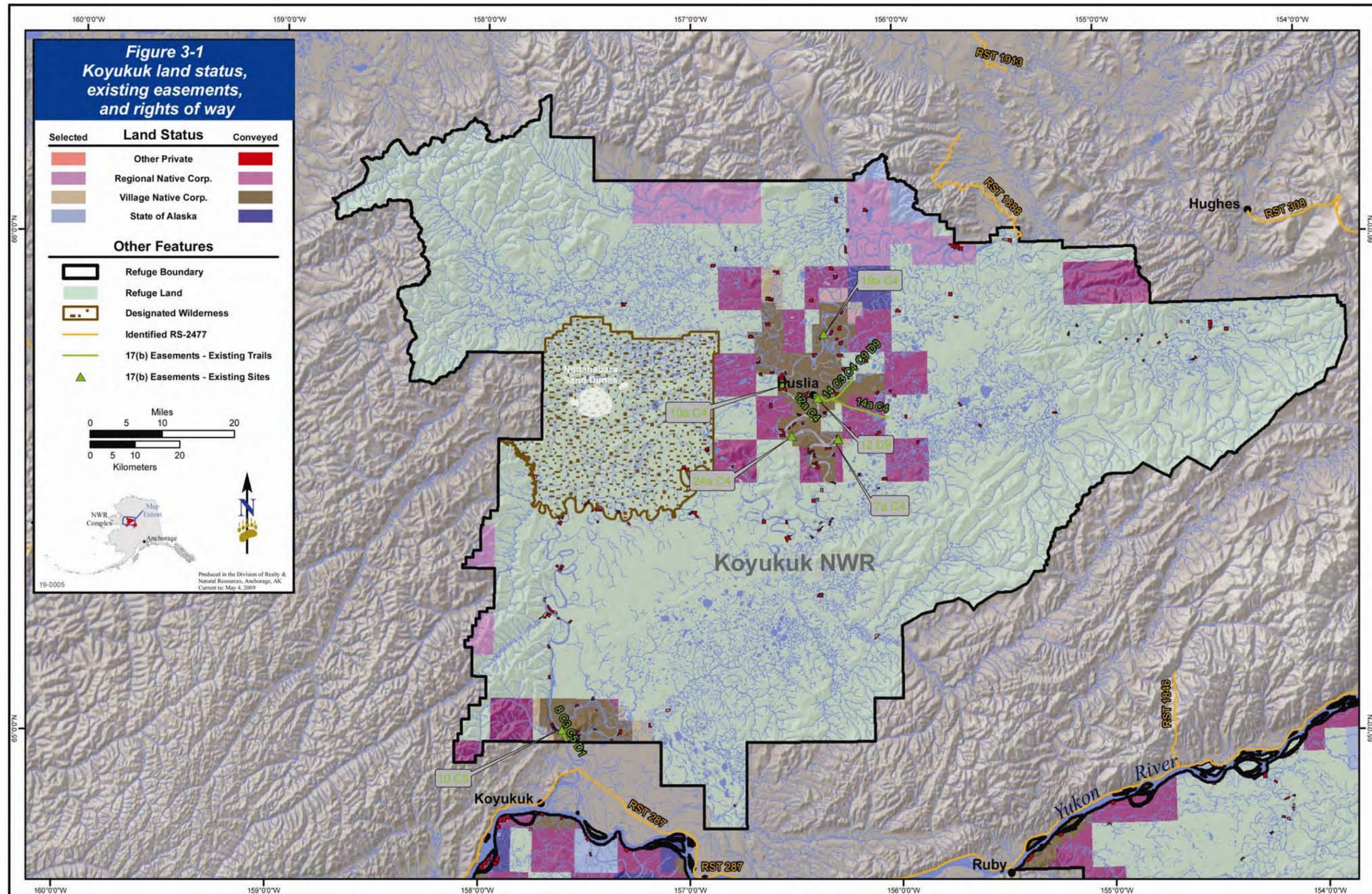


Figure 3-1. Koyukuk land status, existing easements, and rights of way

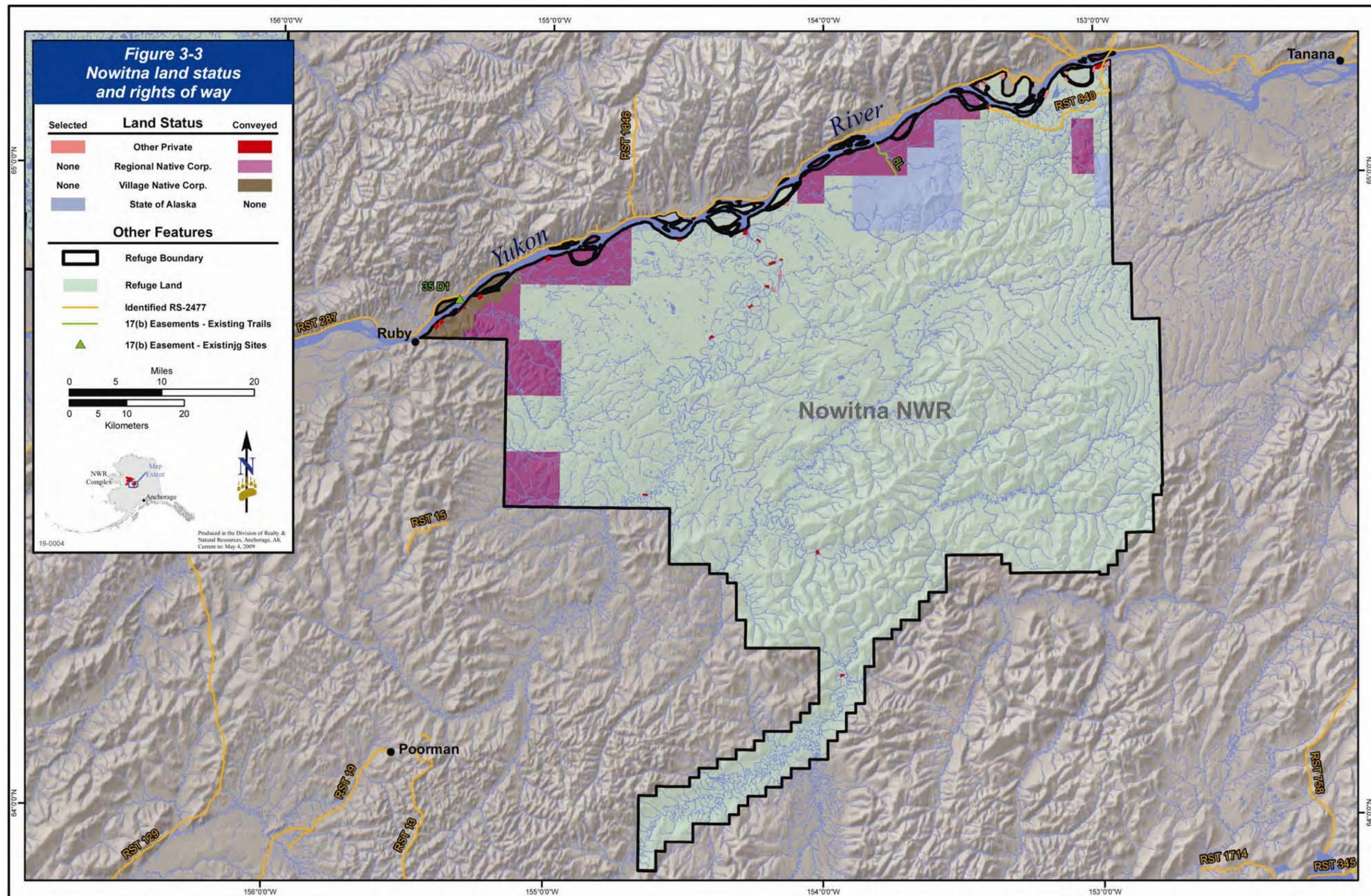


Figure 3-3. Nowitna land status, existing easements, and rights of way

one-acre sites for use as temporary campsites and/or to change modes of transportation. Each 17(b) easement reserves a right to use land owned by another for a specified purpose. Public activities, such as recreation and hunting, are not authorized on the easement or on the private lands surrounding the easement or through which the easement passes. The conveyance document describes in detail each 17(b) easement and the specific use(s) reserved by that easement. See appendix G for a complete list of trails and easements listed with the State.

3.1.1.8 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 means. The State of Alaska has identified in Alaska Statute 19.30.400 three routes on the Refuge it claims may be asserted as rights-of-way under RS 2477 (see appendix F): RST #1888 – Hogatza Road (Koyukuk), RST #840 – Palisades Portage Trail (Nowitna), and RST #161 (also known as DOT 97-152) – Nulato-Dishkaket Trail (Northern Unit Innoko). The three trails total 137 miles in length, but not all of the trails are entirely located on refuge land.

3.1.2 Ecosystems

An ecosystem approach to refuge management was initiated by the 1997 National Wildlife Refuge System Improvement Act. This management strategy acknowledges that living organisms, their physical surroundings, and the natural cycles that sustain them are all interconnected. Ecosystems are not limited by land ownership or conservation unit boundaries. From this perspective, the ecosystem level is an appropriate level for refuge planning. Hence, refuge lands are to be managed in the context of, and in concert with, surrounding public and private lands. Most Alaskan ecosystems are intact, and refuge management should contribute to maintaining the health of these natural systems.

The U.S. Fish and Wildlife Service ecosystem map defines 10 ecosystems in Alaska. The source for this map was the U. S. Geological Survey’s Hydrologic Unit Map based upon the delineation of watersheds. The Service then grouped these watersheds based on vegetation cover types, physiography, and optimum size. The Refuge is located within the western portion of the Service’s Interior Alaska Ecosystem (Figure 3-4).

The Interior Alaska Ecosystem is an inter-montane plateau bounded by the Alaska Range on the south and east and by the Brooks Range on the north. It extends west to the Nulato hills, and encompasses approximately 528,000 square miles (Van Cleve et al. 1983). This vast region is characterized by small, isolated mountain ranges, large areas of gently sloping uplands, meandering rivers with broad floodplains, and extensive, flat lowlands dotted with numerous lakes. Discontinuous permafrost underlies most of the terrain but is often absent from south facing slopes and major floodplains. Black spruce forest is the dominant vegetation type below tree line and is closely associated with the presence of permafrost. Sites with warmer soils sustain white spruce and deciduous tree and shrub species. Above tree line, subalpine shrubs, tundra sedge meadows, and heaths predominate. The major river systems draining interior Alaska are the Yukon River and its largest tributary, the Tanana River.

Other refuges and federal lands included in this ecosystem are: the Tetlin, Yukon Flats, Kanuti, and Innoko refuges; Denali National Park and Preserve; Yukon-Charley Rivers National Preserve; the Steese National Conservation Area; and the White Mountains National Recreation Area.

There have been numerous attempts to classify ecosystems and ecoregions in Alaska (Gallant et al. 1995, Nowacki and Brock 1995). These classification systems are similar and vary mainly in small scale boundary differences and terminology. To aid Alaskan users and facilitate interagency work, Nowacki et al. (2001) attempted to unify ecoregion boundaries. The resulting map delineates 32 ecoregions in Alaska. Of these, the Yukon River Lowlands Ecoregion predominates on the Koyukuk and Northern Unit Innoko, and covers the northern half of the Nowitna (Figure 3-4). This ecosystem is characterized by floodplains lined by deep deposits of undifferentiated sediments, and a continental climate with cool, moist summers and cold, dry winters. Permafrost, when present in older floodplains and adjacent lowlands, produces poor drainage, a prevalence of wet, organic rich soils, and a dense concentration of lakes and ponds. Lowlands underlain by permafrost are dominated by black spruce and birch-ericaceous shrub and sedge tussock bogs. Permafrost is absent in younger floodplains and well drained soils. The vegetation along the major rivers is dominated by white spruce and cottonwood, while floodplains and river bars support tall stands of alders and willows. Wet sedge meadows are common around sloughs, oxbow lakes, and the numerous ponds formed by permafrost thaw.

Foothills and mountainous areas along the peripheries of the Refuge are classified in four other ecoregions (Figure 3-4): the Kobuk Ridges and Valleys Ecoregion, forming the northern boundary of the Koyukuk; the Ray Mountains Ecoregion, found along the southeastern edge of the Koyukuk; the Kuskokwim Mountains Ecoregion, covering the southern portion of the Nowitna and the southeast edge of the Northern Unit Innoko; and the Nulato Hills Ecoregion which lies along the western boundary of the Koyukuk.

All of those mountain ranges are typified by low, rolling hills and mountains, with a generally continental climate that is cooler than the lowlands. Thin to moderately thick permafrost underlies most of these areas, although is it discontinuous in the Ray Mountains Ecoregion. Vegetation patterns are strongly influenced by elevation, with shrub-birch and lichen tundra on the highest mountains and ridges. Further down slope willow, birch, and alder shrub lands occur and give way to black spruce and white-birch woodlands at progressively lower elevations. Black spruce forests dominate on north facing slopes and in moist valleys, while white spruce and deciduous forests are found on south facing slopes and in floodplains.

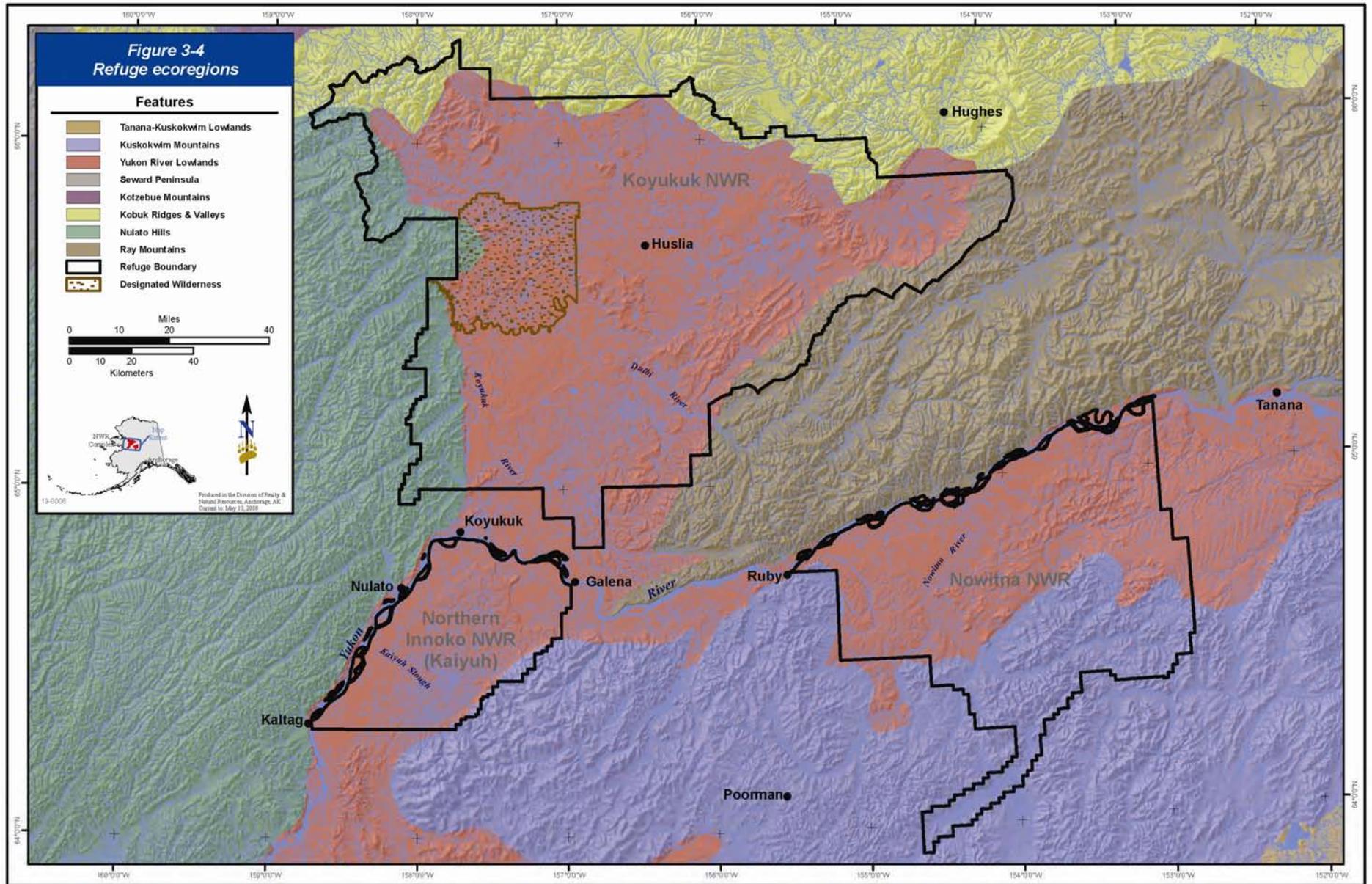


Figure 3-4. Refuge ecoregions

3.2 Physical Environment

3.2.1 Climate

The Refuge has a continental subarctic climate characterized by low annual precipitation, low humidity, low cloudiness, and large diurnal and annual temperature ranges. The summer sun provides almost continuous radiation and heats valleys, which are protected from coastal winds and clouds by surrounding hills. On June 21, the area gets nearly 22 hours of daylight. Between mid-May and late-July, there are 72 consecutive days in which the sun remains continuously above the civil twilight limit. During the summer months (June–August), temperatures are generally mild, with a mixture of warm sunny days and cooler rainy days. The average summer daily high temperature at Galena (1942–2007) is 66 degrees Fahrenheit (18.9 degrees Celsius) with highs above 80 degrees Fahrenheit occurring in most years (see Table 3-5). Summer daily low temperatures average 58 degrees Fahrenheit (12.8 degrees Celsius), and frosts may occur in any month. Galena experiences an average 140 frost-free days, and the growing season generally ranges from 90–130 days.

Galena receives an average of 13.3 inches (33.8 cm) of measurable precipitation. Most occurs as rainfall during July–September (45 percent). The fall season is fairly short, with snowfall beginning in late September or early October. Ice is present in the lakes and many sloughs from early October to late May. Freeze-up of the Yukon River generally occurs in late October or early November. Winter snowfall (November–March; average of 66 inches or 167.6 cm) accounts for nearly 30 percent of annual precipitation. Maximum snowpack at Galena averages 26 inches (66 cm) and occurs in March. Eleven snow markers were installed on the Refuge from 2004 to 2006, providing both an east-west and north-south gradient of snow depth across the refuge units. Snow depths are observed aerially at the start of each month from December through May. From February through April, snow depths range from two to three feet (61-91.5 cm), with lesser snowpack in other winter months.

During the short days of winter, temperatures are primarily influenced by weather patterns rather than solar radiance. On December 21, the sun stays above the horizon for less than four hours. Cold spells [usually 20–40 degrees below zero Fahrenheit (28.9–40 degrees below zero Celsius) but sometimes as cold as 60–70 below zero degrees Fahrenheit (51.1–56.7 degrees below zero Celsius)], caused by high pressure systems with clear skies and no wind, are moderated by intervening milder weather [20 degrees below zero to 20 degrees above zero Fahrenheit (28.9–6.7 degrees below zero Celsius)], with clouds, snow, and light to moderate winds and under a low pressure system. Local valleys become cold sinks, and temperatures are among the coldest on the continent.

April and May are transitional months as daylight and temperatures increase, and snow and ice melt. Most waterfowl arrive in late April to early May as ground cover and open water emerge. Breakup of the Yukon River ice occurs in mid-May, with green up of trees and shrubs in late May.

Table 3-5. Climate data for Galena, Alaska 1942–2007. (Data taken from the National Climate Data Center, NOAA).

Average:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Max. Temperature (°F)	-2	5	17	33	54	67	69	62	51	30	11	0	33
Max. Temperature (°C)	-18.9	-15	-8.3	0.6	12.2	19.4	20.5	16.7	10.5	-1.1	-11.7	-17.8	0.6
Median Temperature (°F)	-10	-4	5	23	45	58	60	55	44	24	4	-7	25
Median Temperature (°C)	-23.3	-20	-15	-5	7.2	14.4	15.5	12.8	6.7	-4.4	-15.5	-21.6	-3.9
Min. Temperature (°F)	-18	-13	-6	13	35	48	52	47	36	18	-2	-15	16
Min. Temperature (°C)	-27.8	-25	-21.1	-10.5	1.7	8.9	11.1	8.3	2.2	-7.8	-18.9	-26.1	-8.9
Total Precipitation (in.)	0.69	0.76	0.66	0.49	0.61	1.27	1.92	2.47	1.58	0.98	0.81	0.89	13.14
Total Precipitation (cm)	1.8	1.9	1.7	1.2	1.5	3.2	4.9	6.3	4	2.5	2.1	2.3	33.4
Total Snowfall (in.)	9.35	10.04	8.50	5.08	0.42	0	0	0	0.63	8.52	11.29	12.46	66.29
Total Snowfall (cm)	23.7	25.5	21.6	12.9	1.1	0	0	0	1.6	21.6	28.7	31.6	168.4
Max. Snow Depth (in.)	20	24	26	21	4	0	0	0	0	5	11	17	26
Max. Snow Depth (cm)	50.8	61	66	53.3	10.2	0	0	0	0	12.7	27.9	43.2	66

3.2.2 Landforms

3.2.2.1 Koyukuk and Northern Unit Innoko

The topography of the Koyukuk and Northern Unit Innoko is dominated by the Koyukuk Flats. This extensive lowland, covering about 4,000 square miles, lies along the Koyukuk River from the Indian River Upland near Hughes to where the Yukon River narrows between the Kaiyuh Mountains and the Nulato Hills below Kaltag. Nearly all the Koyukuk River portion is included in Koyukuk, while the Yukon River portion forms the Kaiyuh Flats.

On the Koyukuk, the Koyukuk Flats encompasses the broad Koyukuk River floodplain, adjacent sand dune sheets, and broad silt terraces. Elevations in the flats are about 300 feet (91.4 m) where the Koyukuk enters the Refuge near Huggins Island and only 100 feet (30.5 m) above sea level where the Koyukuk River leaves the Refuge near its confluence with the Yukon River. The floodplain is 5 to 20 miles (8.1–32.4 km) wide, with meander belts in younger units along the rivers and thaw lakes in older units. Broad, rolling silt plains—mantled in part by dunes and in part pocked by thaw lakes—stand 100 to 200 feet (30.5–61 m) above the central plains and merge imperceptibly with the surrounding uplands. Several low bedrock hills rise from the center of the lowlands. Smaller rivers and streams meander across the lowland and have numerous side sloughs.

Northeast of the Koyukuk Flats is an area of low, gently rounded ridges with summits of 1,500 to 2,000 feet (457–609.6 m) interspersed with irregular lowlands and broad, flat divides. This area is known as the Indian River Uplands. Ridges forming the eastern boundary of the Koyukuk are generally parallel and trend northeastward, with a few peaks rising to over 3,000 feet (914.4 m). The streams and small rivers that drain these uplands have extremely irregular courses. Numerous thaw lakes are present in the lowlands, valleys, and broad passes.

North of the Koyukuk Flats lies the Pah River section of the Western Alaska province. Here a diversified topography includes compact groups of hills and low mountains (including the Purcell Mountains and Zane Hills) 20 to 40 miles (32.4–64.8 km) long with elevations up to 4,000 feet (1219.2 m), surrounded by rolling plateaus 500 to 1,500 feet (152.4–457 m) high and broad lowland flats 5–10 miles (8.1–16.2 km) across. The hills were glaciated, as shown by crested divides and flared valleys in highest parts north of the Koyukuk. In lower areas, the down slope movement of rock and soil has nearly obliterated glacial effects. The northern and western parts of the Pah River section drain to the Selawik and Kobuk rivers, while the southern and eastern parts drain via the Huslia and Hogatza rivers to the Koyukuk River. Numerous thaw lakes and sluggishly meandering streams lie in the lowland flats.

To the west of the Koyukuk Flats (west of the Yukon and Koyukuk rivers) are the Nulato Hills. The topography here is dominated by northeast trending ridges 1,000 to 2,000 feet (304.8–609.6 m) high with rounded summits and gentle slopes. Three highland areas of steeper ridges rise to near 4,000 feet (1219.2 m). Streams on the east side flow to the Yukon River either directly or via the Koyukuk River. Major streams are markedly parallel, flowing northeast along fault zones.

The majority of the Northern Unit Innoko consists of the Yukon River portion of the Koyukuk Flats. To the south and east are the Kaiyuh Mountains, a range of northeast-trending ridges with rounded to flat summits 1,500 to 2,000 feet (457–609.6 m) high and broad gentle slopes. Higher peaks occur infrequently. The Kaiyuh Mountains are the western extension of the Kuskokwim Mountains.

3.2.2.2 Nowitna

The northern part of the Nowitna includes part of the Nowitna Lowland. Wetlands predominate in this area, with numerous lakes and marshlands along the northern boundary. Elevations of less than 200 feet (61 m) can be found along the Yukon River on the Refuge's northern boundary. The southern part of the Refuge is characterized by foothills on the northern edge of the Kuskokwim Mountains. The foothills in the southeast corner of the Refuge rise to over 2,300 feet (701.4 m). The northern lowlands and southern foothills are bisected from the center of the Refuge to the eastern boundary by a band of vegetated sand dunes and bedrock hills.

Almost all of the Refuge is in the Nowitna River watershed. The Nowitna River runs the entire length of the Refuge from south to north before emptying into the Yukon, and forms a wide meandering floodplain varying in width from one to six miles (1.6–9.7 km). The river corridor narrows in the Nowitna Canyon portion, as the river flows through hills in the south central portion of the Refuge. The Big Mud River and Grand Creek flow through the Kuskokwim Mountain foothills on the east side of the Refuge and join before flowing into the Nowitna River. The Little Mud River drains the northern edge of the foothills, the central wetlands, and the vegetated dune areas.

3.2.3 Geology

The Koyukuk, Northern Unit Innoko, and Nowitna lie within the vast floodplains of the Yukon and Koyukuk rivers, part of the plains and plateau region of interior Alaska (Mark Anthony and Tunley 1976). The broad river valleys are edged by small mountain ranges of low relief, and there are no steep, rugged mountains or glaciers. The region is an extension of the central plateau system found in British Columbia, the Yukon Territory, and the Western United States. It extends westward to the Bering Sea. The Yukon-Koyukuk basin is volcanic in origin, with perimeters formed of metamorphosed continental rock. The Brooks Range to the north, the Ruby Uplift (including the Kaiyuh Mountains, the Kokrines Hills, and the Hodzana Highlands) on the east, and the base of the Seward Peninsula to the west delineate the basin. Farther south, the perimeter of the basin is unknown, probably buried under the Yukon-Kuskokwim delta.

In terms of plate tectonics, the Yukon-Koyukuk Basin is believed to be a drifted piece of oceanic crust that collided with the continental crust of the southern Brooks Range and the Ruby Uplift. Upon collision, the oceanic crust overrode the continental material. Thus, the continental Brooks Range and Ruby Uplift borderlands were the leading edge of a subduction zone, while the oceanic crust was thrust up, over, and through the borderlands. Further thrusting occurred inside the formation, bringing volcanic rocks over ocean crust. The result is a basin rim of overlapping stacks: fine grained volcanic rock over dark colored igneous rock over metamorphic rocks. Troughs formed on the north, and northeast fringes of the basin were filled with conglomerate material.

Very little bedrock is exposed in the Refuge; most is covered by wind and water deposited silt, sand, and gravel, much of which is glacial in origin. The most recent Ice Age (Wisconsinian) had three glacial periods, interspersed with warmer interglacial periods. The last glacial period peaked about 20,000 years ago and ended about 10,000 years ago. During this time, when great masses of ice covered much of North America, very little glacial ice was found in the Yukon-Koyukuk region. Rivers in the area follow varying courses. A large Pleistocene lake formed over the Nowitna Lowland, and beach gravels from the lake edge can still be found in the Ruby and Long Creek areas. This lake deposited deep layers of silt (up to 1,400 feet) over much of the Nowitna. Silt eroded by rivers and streams in the eastern portion of the Nowitna formed the geologically unique Boney Creek Dissected Benchlands. The silt layer tapers off along the bedrock ridges of the uplands.

Glacial silts, sand, and till, deposited by wind and water, also cover much of the underlying bedrock on the Koyukuk. Glacial drift present in the upper valleys of Billy Hawk and Huslia rivers is older than 100,000 years old and probably came from glaciers in the Purcell Mountains and the Zane Hills. Local glaciation probably did not extend beyond the Huslia River. At one point, wind-blown glacial flour (loess) covered much of the Refuge but was re-worked by streams and rivers in many areas. Two loess terraces are present; the higher (and oldest) is 100–200 feet above rivers, and the lower (younger) terrace is only 30–80 feet above rivers. Between these terraces, and on the Koyukuk River floodplain, are broad areas of wind-blown sand. The resulting sand dunes are mainly stabilized, or partially stabilized, by vegetation. The Nogahabara sand dunes are an active portion of this extensive dune system.

The volcanic bedrock of the Kaiyuh Flats (Northern Unit Innoko) is primarily overlain by micaceous silts (Patton and Moll-Stalcup 2000). The youngest deposits lie in the Yukon River floodplain. Older floodplain silt deposits (some dating from the Pleistocene) are found in the southern, northwestern, and eastern portions of the refuge. The oldest silt deposits (also

Pleistocene) form a central, higher terrace rising 33 to 330 feet above the floodplain that is dotted by many small thermokarst lakes. There is little exposure of the volcanic bedrock on the Refuge, with the exception of the outcrop that forms Pilot Mountain. This same material forms Koyukuk Mountain, just north of the Refuge. The Kaiyuh Flats are at the edge of the Yukon-Koyukuk basin, which is bounded by the Kaiyuh Hills (a portion of the Ruby Uplift) on the southeast border of the Refuge. Running along the base of the Kaiyuh Hills is the Kaltag fault line, which crosses the southern portion of the Refuge from northeast to southwest. The fault line is visible from the air in forested areas along the base of the hills. West of Bonanza Creek, the fault follows a more westerly course away from the mountains and across the flats. This fault line extends eastward into the northern Yukon Territory, Canada (Lane 1992). There has been limited seismic activity related to the fault, including a magnitude 6.0 earthquake near Ruby in February 2000 (City of Galena 2007).

The Nowitna contains a variety of bedrock including limestone, sandstone, lignitic coal, conglomerates, granite, quartzite, schist, slate phyllite, greenstone, and a variety of volcanic rocks. Silt covers most of the Refuge, apparently deposited in a large Pleistocene lake lying within the Nowitna Lowland. In the center of the lowland, the rivers are deeply entrenched in broad silt plains with a silt layer up to 1,400 feet thick. Silt is also found tapering down from the upland bedrock ridges. The Boney Creek Dissected Benchlands are composed of silt that has been deeply eroded to form the Benchlands. South of the Yukon River and eastward from the Klatsuta River are older terrace deposits. Alluvium covers the Yukon, Nowitna, and Little Mud River floodplain sections of the Refuge. Other material in the Refuge is colluvium and scattered areas with loess.

3.2.4 Soils and Permafrost

Soil units mapped at a scale of 1:500,000 are described in the Exploratory Soil Survey of Alaska (Rieger et al. 1979). These soil units, called associations, are collections of individual soils grouped by landscape position and texture. Soil associations and locations are shown in Figures 3-5a, 3-5b, and 3-5c.

Soil associations found on the Refuge are fairly uniform, with poorly drained silt loams dominating. These soils are continually wet and are generally underlain by continuous permafrost except near large water bodies, where permafrost is discontinuous. Combined with peat, these soils are found on over 80 percent of the Refuge, including much of the lowlands areas of the Koyukuk, Northern Unit Innoko, and Nowitna. These soils vary from sandy and clayey in some areas to very gravelly on slopes and in valleys at higher elevations.

Permafrost is defined as ground that is continuously frozen through at least two successive cold seasons and the intervening summer. Permafrost is found throughout the area except along major drainages and is usually shallow (from 10 to 25 inches). The western interior region of Alaska is primarily discontinuous permafrost (50–90 percent coverage), containing medium amounts of ground ice with a thick overburden layer, while some areas are underlain by continuous permafrost, with medium amounts of ground ice and thick overburden. In interior Alaska, temperatures of the upper layers of the permafrost are in the range of 28 to 31 degrees Fahrenheit.

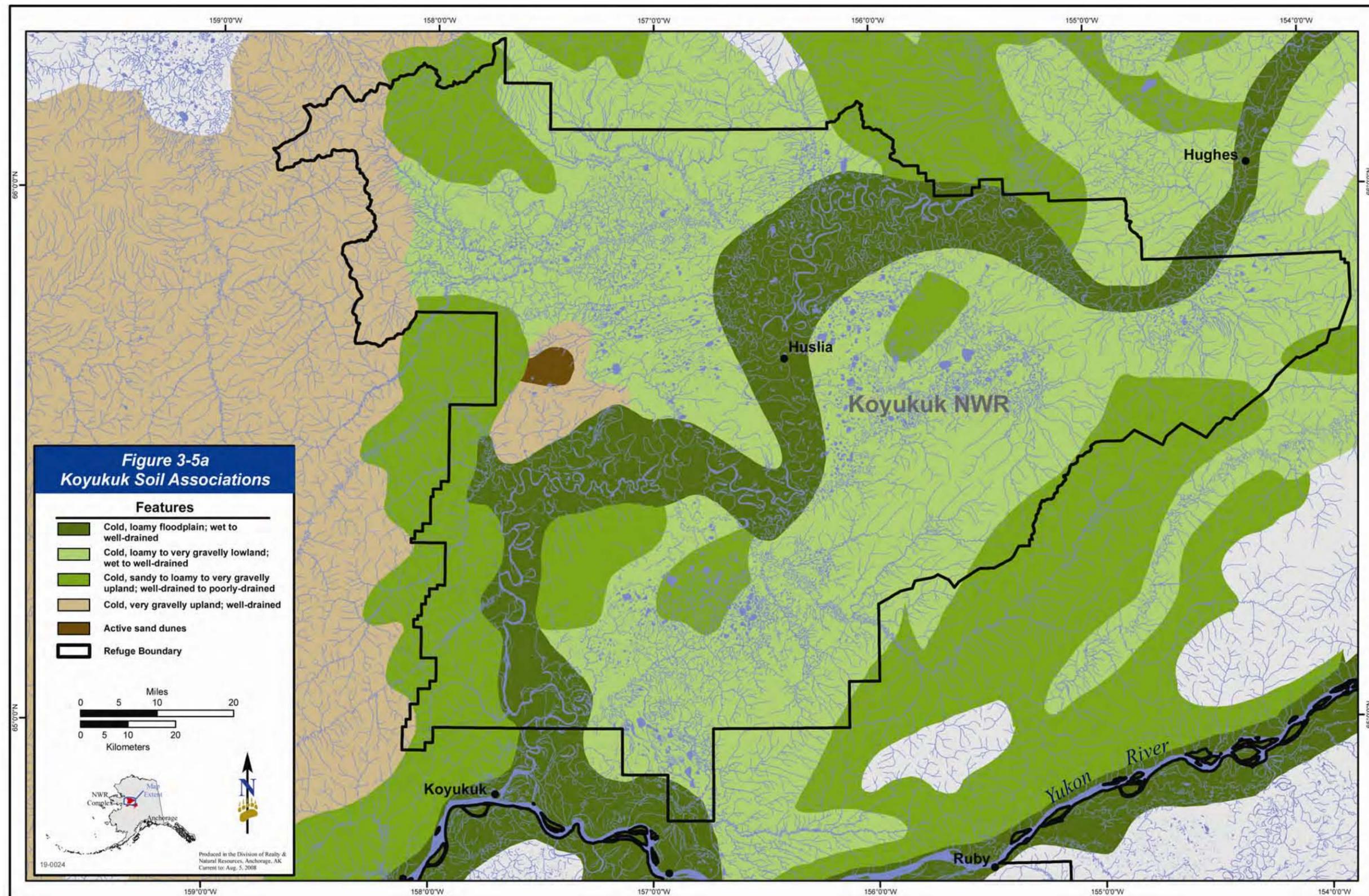


Figure 3-5a. Koyukuk soil associations

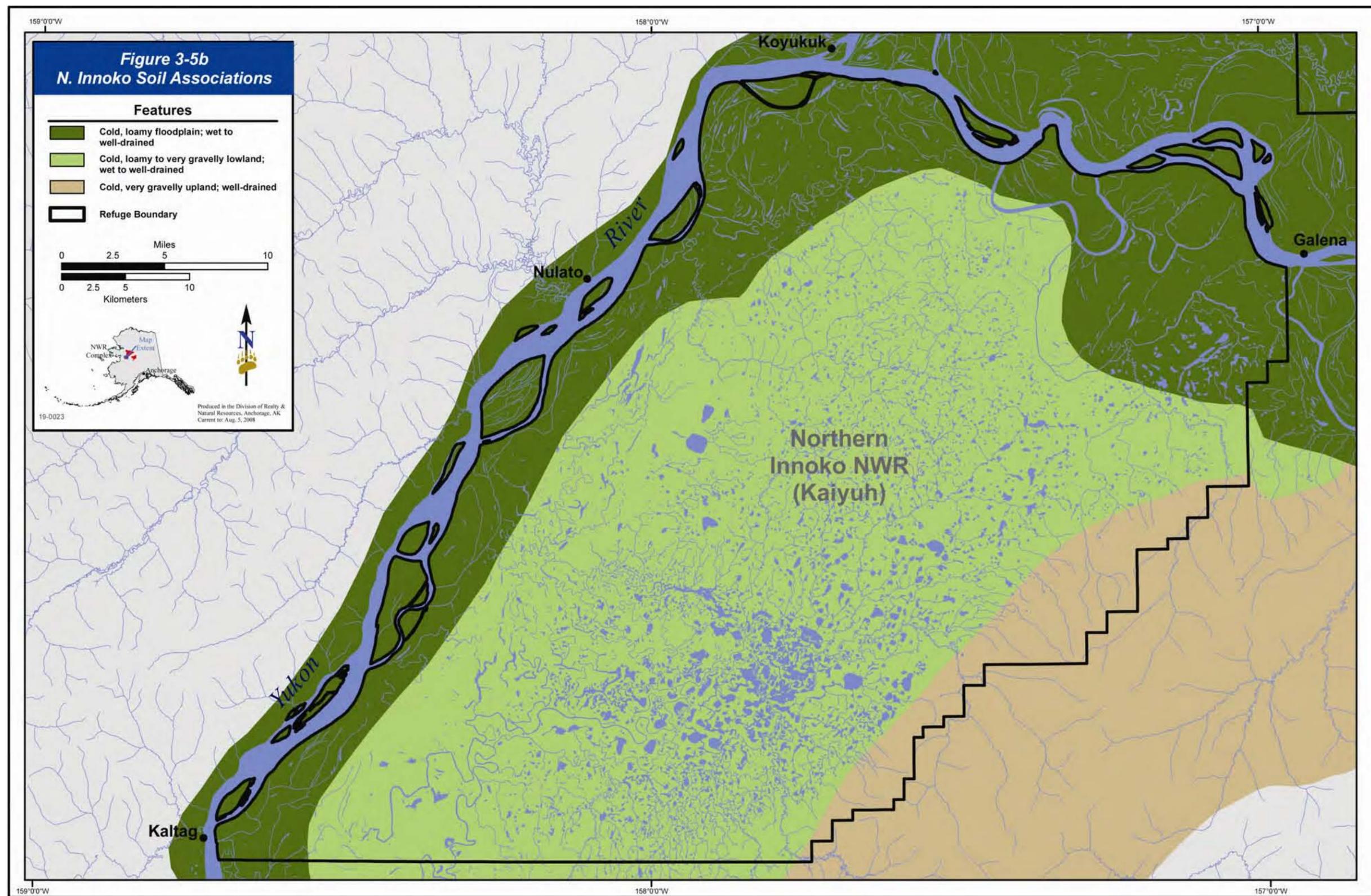


Figure 3-5b. Northern Unit Innoko soil associations

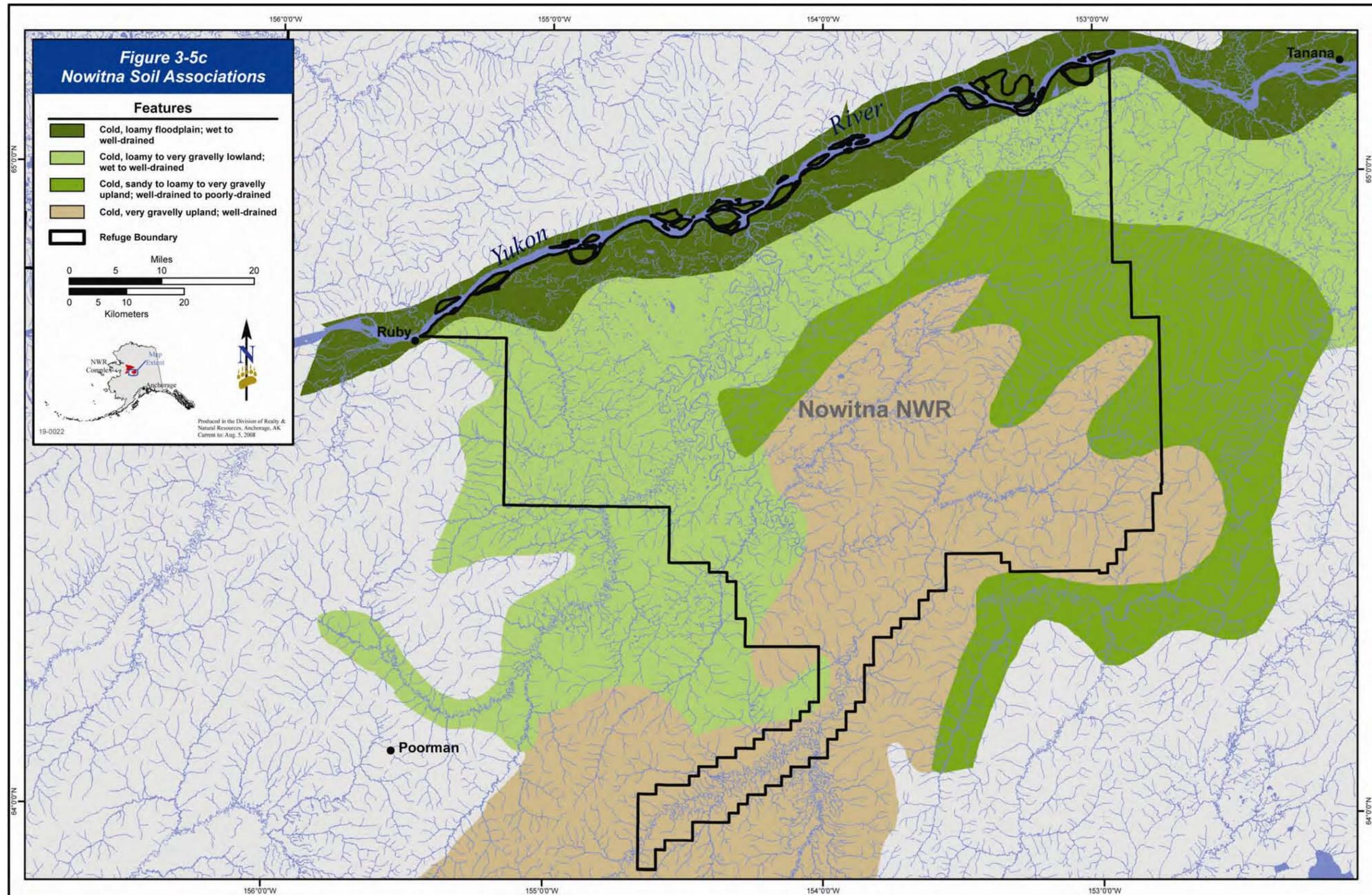


Figure 3-5c. Nowitna soil associations

3.2.5 Minerals

3.2.5.1 Nowitna

Indications of mineral presence in the region are shown in Figure 3-6. Except for one underground effort at Gold Hill, all deposits were placer-mined. Most were first explored in the early 1900s and have been mined intermittently for about 75 years. Metal produced was gold, plus some tin. Latest known major exploration in the region was by Anaconda for hard rock deposits in the Long-Poorman area.

Mining claim records show that most placer mines have had recent activity. There are no mining claims on the Refuge. Four claims, staked on the Refuge in 1979, on California Creek in Section 17, T. 13 S., R. 26 E., were abandoned in 1986 and voided by the Bureau of Land Management in 1987. U.S. Bureau of Mines records credit the property with past production (amount unspecified). There are also claims further up California Creek that are not on the Refuge.

In the Long-Poorman area, placer mines are located on nearly all the tributaries of the Sulatna River, which drains towards the Nowitna Lowland. Although gold was found in nearly all of the streams in the area, production was short-lived. The placer mines were commonly irregular and discontinuous, with pay streaks spotty and disseminated. Many of the gold deposits were believed to be of beach origin (Mertie and Harrington 1924).

Although spotty, the widespread nature of the gold indicates that moderate deposits do exist. The main problem with prospecting in the Nowitna region seems to be that areas where large deposits are expected are buried by silt. “No doubt there are large buried placer deposits in the broad depressions that are now filled with deep alluvial deposits—one can see such extending up the larger valleys well towards their heads. But since the present streams generally do not follow exactly in the courses of the original streams, any prospecting results are bound to be erratic and prospecting is not justified.” (Eakin 1918).

Another indication of mineral resources is the Refuge’s location at the intersection of three regional belts of tin-tantalum-niobium mineralization (Warner 1985). The Kokrines-Hodzana belt trends southwest from the Sithylemenkat Lake area to the Tozimoran Creek area, and across the north part of the Refuge to the Long-Poorman area. The Yukon-Tanana belt extends west from Circle through the Tofty tin district to upper Cosna River east of the Refuge. South of the Refuge, the Kuskokwim belt is located southwest from near Mystery Mountain. The belts are established from evidence of favorable country rock (biotite granite) and from compounds of tin, tantalum, and niobium found mostly in gold placer concentrates.

Coal beds exposed in the Refuge at the Palisades are approximately 20 feet thick, and are inter-bedded with lowland silt believed to be no older than late Pliocene (1–10 million years ago). Consequently, the coal is probably very immature. Thin or poor quality coal is known from limited exposures along the Yukon River and in prospect shafts. The existence of a Tertiary basin, which might contain better, older, and deeper coal, is doubtful.

An active geothermal basin may underlie the north-central portion of the Refuge; however, there are no known geothermal resources on the Refuge.

3.2.5.2 Koyukuk and Northern Unit Innoko

Though some tentative estimates of mineral potential in the region can be made, there is a lack of extensive geologic mapping, sampling, and drilling that an accurate assessment requires.

Until more exploration is undertaken, discussion of mineral resources will be based on the limited information that is available.

Sites of known or indicated mineralization, and locations of favorable terranes (fault-bounded tracts of rock with geologic history different from that on the opposite side) and placer mines in the vicinity of Koyukuk and Northern Unit Innoko are identified in Figure 3-6.

The majority of the mineralization found in the vicinity of the Refuge appears to be related to contact zones around bodies of granitic rock along the Koyukuk's northern boundary. Placer gold has been produced at various times at sites on Utopia Creek, Indian River, and Bear Creek (on the Hogatza River). From 1957 to 1975, the Bear Creek placer mine was worked by a dredge with cumulative production exceeding 200,000 ounces of gold. The dredge operated again from 1981 through 1984. The Utopia Creek operation produced significant amounts of gold from 1930 through 1962. Indian River operation produced a total of 5,000 ounces from 1911 to 1965.

Hard rock mining has not occurred in the region but could occur in the future, as placer deposits can be traced to conditions favorable for mineralization (Miller and Ferrians 1968).

Inside the Refuge, indications of mineral presence include previous mining claims, two prospects (identified from the Bureau of Mines Mineral Industry Locator System records), and lead-copper-silver mineralization in the Sun Mountain area (Miller and Ferrians 1968).

Seventy-seven lode claims located southwest of Bear Mountain and two other lode claims located in the southeast Zane Hills have been identified in Bureau of Land Management mining records. These are all no longer listed as valid claims. The two prospects noted in Bureau of Mines records are west of Sun Mountain and in the Zane Hills south of Caribou Mountain. Copper has been reported at both prospects.

A coal bearing unit (mapped by Patton 1966) appears along the west edge of Koyukuk south of the Kateel River. The coal layer is bituminous and at most is six inches thick. The rock unit containing these coal deposits is called the Kaltag Formation. It is about 5,000 feet thick on the Refuge and consists primarily of shale, siltstone, and sandstone, and is north-trending. Coal thicknesses increase southward in the formation where exposures along the west bank of the Yukon River are as much as 39 inches thick with inclusions of eight-foot thick pockets (Chapman 1963). These exposures were mined from 1898 through 1902 for use by steamships on the Yukon River. The largest output was probably 2,000 tons from the Williams Mine about 40 miles downriver from Kaltag. This area of coal, from where it appears along the Yukon River up to the Kateel River, is known as the Nulato field. Chapman (1963) describes the coal layer as thin, irregular, laterally discontinuous, highly fractured, and steeply dipping and probably suitable only for shallow small-scale local use.

3.2.6 Oil and Gas Occurrences and Potential

Both Koyukuk and Northern Unit Innoko are within the Yukon-Koyukuk geologic province, a broad wedge-shaped depression of Cretaceous and Tertiary volcanic and sedimentary rocks that stretches across west-central and southwestern Alaska from the Brooks Range to the Yukon River delta. The province was classed as a possible petroleum province (Miller et al. 1959). However, subsequent studies indicate that the sedimentary rock types present in the province are generally unfavorable for deposits of oil and gas, having been involved in severe compression and dislocation (Patton 1973).

The earliest sedimentary rocks, probably marine shelf deposits, now form metamorphic borderland buttresses. Subsequent marine Cretaceous sediments, possibly 15,000 to 25,000 feet deep in places, appear to be poured-in volcanics and contain easily alterable tuffs. Little chance for sand development exists with these sediments. Some submarine fans, which can be favorable for oil and gas accumulation, may exist in these sedimentary rocks. However, the entire lower and mid-Cretaceous section is metamorphosed and highly deformed, making the potential for petroleum very low. Late Cretaceous sediments, though only gently deformed, are limited in extent and are in near-surface positions, which also indicates low potential.

Aeromagnetic profiles across the Koyukuk Flats indicate the presence of highly magnetic rocks at shallow depths. Surface mapping around the margin of the flats suggest that Quaternary alluvial deposits are probably underlain by andesitic volcanic rocks of Early Cretaceous age (Patton 1973). The flats, except along the Kaltag Fault, do not appear to contain any substantial thickness of Cenozoic sedimentary strata, which indicates that oil and gas accumulations are probably absent. One exploratory test hole, Nulato No.1, located west-southwest of Nulato, was drilled to a depth of 12,000 feet entirely in Cretaceous sedimentary rocks.

Inside the Nowitna, possibilities are limited to the speculative presence of Tertiary sediments. West of the Refuge, the Galena Basin Cretaceous sediments may have some potential.

Evidence for a Tertiary basin consists of Tertiary sediments at the Palisades and a gravity low along the north side of the Refuge. The low is delineated as a trough, about 10 or 20 miles wide, from Big Creek to Blind River and flanks the gravity high marking the southeast edge of the rim of the Yukon-Koyukuk Province (Barnes 1976). The low may have developed by down-dropping on the south side of the Kaltag Fault and may thus be as old as early or middle Tertiary (Patton and Hoare 1968). However, at this time, no identifiable oil and gas basin exists in this area or elsewhere within the refuge boundaries. Consequently, the oil and gas potential is probably low on the Nowitna.

3.2.7 Water Resources

One of the five specific ANILCA purposes of the Refuge is to ensure the conservation of water resources, specifically, “to ensure . . . water quality and necessary water quantity within the refuge[s] for the conservation of fish and wildlife populations and habitats in their natural diversity.” The abundant and mostly pristine freshwater resources within the Refuge support plentiful populations of fish, wildlife, and vegetation.

Water is one of the main ecological drivers on the Refuge. The Refuge encompasses more than 1,800,000 acres of wetlands and waters, including over 50,000 lakes and thousands of miles of rivers and streams (Table 3-6). Though precipitation across the Refuge is only 12 to 14 inches per year, permafrost hinders infiltration of water into the ground, thus creating lakes and wetlands. River flows are influenced by winter freezing, spring snowmelt and breakup, late summer rain storms, and springs. The timing, frequency, duration, and magnitude of low and high flow events on the streams and rivers affect both in-channel and floodplain habitats through disturbance and recharge of lakes and wetlands. These events also drive the use of the landscape by wildlife.

In 1994, the Alaska Region of the Service identified and evaluated threats to water resources in the 16 National Wildlife Refuges in Alaska. This effort was intended to help set priorities for hydrologic investigations that would support instream water-rights filings. Most of the streams on the Refuge were not judged to be threatened; however, past mining, mineral

exploration, and village trash and sewage were identified as potential threats. A subsequent ‘threats analysis’ in 2007 yielded similar results.

Table 3-6. Acres of wetland vegetation classes on the Northern Unit Innoko, Koyukuk, and Nowitna.

Vegetation Class	Refuge			Total
	N. Unit Innoko	Koyukuk	Nowitna	Acres
Clear Water	38,118	161,709	29,521	229,348
Dwarf Shrub	80,768	45,568		126,336
Emergent	6,260	47,745		54,005
Lichen	3,845			3,845
Low Shrub	103,680	644,666	91,635	839,981
Low Shrub - Tussock Tundra		295,095	18,434	313,529
Moss	5,355			5,355
Turbid Water	9,620	53,202	17,525	80,347
Tussock Tundra		34,786		34,786
Wet Graminoid	22,215	36,048		58,263
Wet Sedge		93,062		93,062
Total Acres	269,861	1,411,881	157,115	1,838,857

3.2.7.1 Water Quantity

To date, there have been no refuge-wide water studies. Stream flow has been measured only on the Yukon and Koyukuk rivers outside the refuge boundaries, and not since 1982. No other stream flow or water quality studies or stations are known for the refuge.

The Service plans to conduct a comprehensive investigation of water quantity to support instream-flow water rights filings for the Refuge. Reconnaissance and selection of gauging sites was conducted in 1998. Installation of flow gauge equipment is scheduled to begin within the next 10 years, with data collection planned for the subsequent 6 years.

3.2.7.2 Water Quality

The U.S. Fish and Wildlife Service, Division of Ecological Services, Fairbanks Field Office, conducted a contaminant study of water, sediments, and fish on the Koyukuk and Nowitna between 1986 and 1988 (Snyder-Conn et al. 1992). On the Nowitna, metal and metalloid contaminants were studied on the Sulatna and Sulukna rivers, Cross Lake, and one pond next to the Sulukna (Mueller et al. 1996). These studies essentially found no significant contamination in water, sediment, or fish tissues.

The Service plans to conduct a baseline water quality study in conjunction with the water quantity study. Water quality sampling will be done at selected sites on the Refuge. Sampling is planned to begin within 10 years and continue for 6 years.

3.2.8 Fire Disturbance Regime

Wildfires (fire) in the (black spruce-dominated) boreal forest tend to be large and frequent due to the dry continental climate, the flammable nature of fuels, and the continuity of fuels, which commonly extends from the ground layer to the tree canopy layer. The feathermoss-dominated understory forms a large, horizontally continuous, and well-aerated fuelbed when dry. Most fires in the boreal forest are either intense ground fires or crown fires of sufficient intensity to consume or kill both the overstory and understory vegetation. However, these fires do not burn with consistent intensity or severity and often leave a patchwork of unburned to moderately-burned areas that create a mosaic of different aged vegetation and an irregular fire edge. Wildfires often smolder deep in the duff and can hold over through long periods of high relative humidity and moderate rainfall.

The leaf litter and shading found under deciduous and mixed forests combines to create moist cool conditions and a compact litter layer that until recently has been less combustible than those found in conifer forests. The effects of climate change appear to have altered this factor somewhat. Surface fuels in the hardwood and mixed forests typically do not form a continuous ladder from the ground to the tree crowns, so surface fires are common. Deciduous forests have, in the past, provided a natural fuel break where fire will typically smolder in the understory and spread slowly, but that appears to be also changing as a result of climate change.

Shrub habitats and sedge tussock-tundra are characterized by light flashy fuels whose moisture content responds quickly to small changes in relative humidity. These fires tend to burn quickly and intensely, skipping over and around standing water lying between tussocks and pockets of wet sphagnum moss. The presence of wind contributes to high rates of spread and short- to medium-range spotting. With a little moisture, these fires go out quickly; they do not hold over for long. Moderate intensity wildfires may consume the above ground portion of shrubs and forbs but seldom kill the below ground portion. In drier conditions, fires in the shrub and tussock-tundra habitats may have high rates of spread and intensity, which can easily carry fire into adjacent conifer forests.

3.2.8.1 Fire Occurrence and Frequency

Evidence of fire can be found throughout most of the Refuge. Historically, fire has strongly influenced the distribution and diversity of interior Alaska plant and animal communities. Most fires are lightning caused. There is no evidence of anthropogenic fire on the Refuge.

The fire return interval is 275 years for the Koyukuk and 192 years for the Nowitna, based on the past 50 years of fire records. Such a short timeframe can only yield an approximation of the Refuge's fire return interval. The estimated mean fire interval for other interior Alaska black and white spruce forest locations ranges from 25–130 years for black spruce to 50–240 years for white spruce (Murphy and Whitten 2006).

Climate change is predicted to result in substantial increases in landscape flammability. During the next 20–30 years, interior Alaska will 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).

3.2.8.2 Fire Size

Wildland fires on the Refuge range in size from less than one acre to as large as 200,000 acres. Fires in the black and white spruce forest types tend to be 125,000 acres or larger. Fire size is determined by a variety of factors.

- The later in the season a fire starts, the less time it has to spread.
- Weather not only affects initial spread but also eventual fire growth.
- Fires can hold over during long periods of moist weather and become active again after a drying period.
- Wind can cause a fire to quickly grow.
- Fuel continuity determines whether a wildland fire can and will continue to grow.
- Wetlands and rocky areas tend to form barriers to spread that can only be breached by spotting.
- Hardwood stands, wet areas, and old burn scars can serve as barriers because the reduced fuel load in these areas usually limits fire behavior and slows fire spread.

Consequently, some fires may burn only a few hundred square feet, while others burn throughout the summer, affecting thousands or hundreds of thousands of acres.

3.2.8.3 Fire Season

The fire season on the Refuge can begin as early as Memorial Day and end as late as the first week of September. Most of the fire activity occurs during July when fuels have matured and are at their lowest live fuel moisture levels.

3.2.8.4 Impacted Villages Around the Refuge

Seven villages have the potential to be affected by fire on or adjacent to the Refuge. The village of Huslia is located within the Koyukuk. The villages of Galena, Hughes, Kaltag, Koyukuk, Nulato, and Ruby are located outside of the refuge boundaries.

3.3 Biological Environment

3.3.1 Vegetation

Riparian vegetation is dominated by willow (*Salix spp.*), cottonwood (*Populus balsamifera ssp. balsamifera*), and white spruce (*Picea glauca*). As rivers and creeks move through the floodplain, outside banks and vegetation are eroded into the river, and inside banks are built up through the deposition of silt, sand, and gravel. Recent inside-bank soil deposits along rivers and creeks are well drained and are usually free of permafrost. These factors are conducive to the establishment of varying age groups of willow moving inland away from the river channel. On extremely winding rivers such as the Yukon, large oxbows are common. Within this area, concentric bands of willow or cottonwood of different ages often become established. Grass lakes are sometimes intermingled with these bands. Common riparian vegetation includes willow and alder (*Alnus viridis ssp. crispa* and *A. incana ssp. tenuifolia*) thickets along gravel bars at the water's edge, stands of cottonwood trees higher on the bank, and bands of white spruce varying in width on the higher banks. Stands of paper birch (*Betula papyrifera ssp. humilis*) and quaking aspen (*Populus tremuloides*) often mix with the white spruce forest along the river corridors.

Treeless bogs are common in the center of the Koyukuk and in scattered locations on the Nowitna and Northern Unit Innoko. Bog vegetation consists of dwarf birch (*Betula nana ssp.*

Exilis), shrub birch (*Betula glandulosa*), bog blueberry (*Vaccinium uliginosum*), Labrador tea (*Ledum palustre*), leatherleaf (*Chamaedaphne calyculata*), myrtle (*Myrica gale*), bog rosemary (*Andromeda polifolia*), bog cranberry (*Oxycoccus microcarpus*), cottongrass (*Eriophorum spp.*), sundew (*Drosera anglica, ssp. rotundifolia*), sedges (*Carex spp.*), feather mosses, and sphagnum moss (*Sphagnum spp.*). Often intermixed with the bogs are ridges vegetated with willow, alders, resin birch (*Betula glandulosa*), black spruce, and tamarack (*Larix laricina var. alaskensis*).

Wetland vegetation is quite site-specific and varied. Refuge wetlands include upland basins, ice-formed lakes on the flats, river flooded lowlands, oxbows, and bog lakes. Spring runoff, rain, and river flooding recharge the lakes. Favorable water temperatures in the shallow lakes create ideal conditions for the growth of aquatic plants such as duckweed (*Lemna sp.*), horsetail (*Equisetum spp.*), water milfoil (*Myriophyllum sp.*), mare's tail (*Hippuris vulgaris*), and smartweed (*Polygonum spp.*). One or more of 12 species of pondweed (*Potamogeton spp.*) occur in almost all lakes. Indicators of bog lakes include water lily (*Nuphar polysepalum*), pygmy water lily (*Nymphaea tetragona*), water hemlock (*Cicuta douglasii and C. mackenziana*), water parsnip (*Sium suave*), buckbean (*Menyanthes trifoliata*), and bladderwort (*Urtricularia macrorhiza*). Shorelines of bog lakes vary in character but nearly always contain buckbean, wild calla (*Calla palustris*), various sedges, and burreed (*Sparganium hyperboreum*). Several species of graminoids, including sedge, bluejoint grass (*Calamagrostis canadensis*), and foxtail (*Hordeum spp.*), are found on the exposed shorelines. A variety of forbs grow on recently exposed soils along river shorelines. Cattail (*Typha latifolia*) is an invasive species on the Refuge.

Shallow, seasonally flooded basins or grass lakes are common along the Koyukuk, Yukon, and Nowitna rivers. Grass lakes are usually wetlands during spring breakup and flooding, and in summer become dry meadows, many of which show the beginnings of shrub and forest succession. The drier portions of grass lakes are vegetated primarily by bluejoint grass and occasionally polar grass (*Arctagrostis latifolia var. arundinacea*). *Carex aquatilis*, *C. rostrata*, *C. capitata*, and other sedges and marsh cinquefoil (*Potentilla palustris*) dominate in the wetter portions.

There are about 14,000 lakes and ponds on the Nowitna, where wetland acreage is approximately 30,000 acres. The Koyukuk and Northern Unit Innoko have an estimated 15,000 water bodies, comprising approximately 280,000 acres of lakes and ponds and 5,500 miles of rivers and streams.

Forests cover 88 percent of the Nowitna and 41 percent of the Koyukuk and Northern Unit Innoko. Black spruce (*Picea mariana*) is the dominant tree species followed by white spruce, paper birch (*Betula papyrifera ssp. humilis*), quaking aspen (*Populus tremuloides*), and balsam poplar. While there are pure stands dominated by a single tree species, stands typically mix and grade into one another, depending on underlying soil type.

The open conifer forests have 25–60 percent tree cover and are found on moderately to poorly drained soils. This forest type is composed primarily of black spruce but often includes tamarack and willows. Open conifer forests are frequently found on north facing slopes and poorly drained lowlands that are usually underlain by permafrost. Ground cover species include bog blueberry, Labrador tea, sedges, and mosses. In many areas, a thick blanket of lichen species entirely covers the ground, forming an open conifer-lichen association. This forest type dominates the Nowitna with 42 percent coverage and 7 percent coverage of the Koyukuk and Northern Unit Innoko.

The closed-conifer forests occur on moist to well-drained sites that can be found in the lowlands all the way up to mountain slopes and are particularly well developed on alluvial sites along the major rivers. Closed forests typically have 60–100 percent cover. The dominant tree species is white spruce, which may grow 80–100 feet tall, forming the largest stature forest found on the Refuge. Understory species include northern toadflax (*Geocaulon lividum*), highbush cranberry (*Viburnum edule*), azalea (*Rhododendron lapponicum*), prickly rose (*Rosa acicularis*), sweetvetch (*Hedysarum alpinum*), and various species of feathermoss. This forest type comprises about two percent of the Refuge.

Deciduous forests occur on well to imperfectly drained sites—mainly on hills where strips of paper birch forest line hillside streams, and aspen is present on south facing sandy hillsides. Paper birch, aspen, and cottonwood dominate the overstory. The deciduous forest reaches its greatest extent on the Nowitna, where it covers 30 percent of the total surface area—but only 3 percent of the Koyukuk and Northern Unit Innoko.

Mixed forests have 25–100 percent cover of deciduous broadleaf trees mixed with conifer trees. Mixed forests are distributed mainly along the major water courses, especially on islands in the Yukon and Koyukuk rivers, and on relatively dry, south facing hillsides where drainage is good and permafrost is absent. This forest type consists of moderately tall (50 to 80 feet) paper birch, quaking aspen, and cottonwood, mixed with white spruce. Common understory species found in mixed forest include highbush cranberry, currant (*Ribes triste*), bunchberry (*Cornus canadensis*), and prickly rose. This forest type comprises six percent of the Koyukuk and Northern Unit Innoko and four percent of the Nowitna.

Conifer woodlands, sometimes called muskeg, have 10 to 25 percent tree cover and are found on moderately to poorly drained soils. These woodlands contain short sparse tree growth (mainly black spruce and some tamarack). The ground cover resembles treeless bog and is dominated by shrub species such as Labrador tea, bog rosemary, bog blueberry, highbush cranberry, bog cranberry, and crowberry (*Empetrum nigrum*). Various graminoid and moss species are common, including cottongrass, sedges, and mosses (especially *Sphagnum* moss). This forest type makes up 26 percent of the Koyukuk and Northern Unit Innoko and 10 percent of the Nowitna.

The Refuge contains several **non-forest shrub, herbaceous, and graminoid (grass-sedge)** vegetation community types. The dwarf shrub-graminoid tussock peatland community contains slow-growing dwarf shrubs less than 1.5 feet tall and frequently occurs on poorly drained organic soils. Mosses and lichens cover the surface. Dominant shrub species include Labrador tea, leatherleaf, bog blueberry, lowbush cranberry, dwarf birch (*Betula nana* ssp. *exilis*), cottongrass, sedges, cloudberry (*Rubus chamaemorus*), *Sphagnum* moss, feathermosses (*Dicranum* spp), and various lichens (*Cladina* spp. and *Cetraria* spp). This is a dominant vegetation type on the Koyukuk and Northern Unit Innoko (27 percent) but a minor type on the Nowitna (2 percent).

The alluvial/lowland tall shrub community is dominated by deciduous shrubs ranging from 1.5 to 16 feet in height. The tall shrub communities are found primarily on floodplains and are dominated by willows (*Salix alaxensis*, *Salix planifolia pulchra*, *Salix arbusculoides*, and *Salix bebbiana*), and in some areas alder. The main understory species include lowbush cranberry, Twinflower (*Linnaea borealis*), bluejoint grass, and horsetail (*Equisetum* spp.). This vegetation type makes up four percent of the Nowitna and three percent of the Koyukuk and Northern Unit Innoko.

The graminoid tussock-shrub community has a plant composition similar to the previous community but is dominated by cottongrass (*Eriophorum spp.*) tussocks and lesser amounts of dwarf shrub and herbaceous cover. This type is transitional to arctic and alpine tundra in some areas. It is most common on the Koyukuk and Northern Unit Innoko, where it makes up 14 percent of the cover.

The prostrate dwarf shrub tundra community is characterized by relatively bare alpine vegetation dominated by low-growing matted dwarf shrubs. This community is rich in lichens. Dominant species include dryas (*Dryas octopetala*), willow (*Salix phlebophylla*), bog blueberry, lowbush cranberry, bearberry (*Arctostaphylos alpine*), and lichens (*Sphaerophorus globosus*, *Cetraria nivalis*, *C. cucullata*, *Alectoria ochroleuca*, *Thamnomia subuliformis*, and *Stereocaulon spp.*). This type comprises one percent of the Koyukuk and Northern Unit Innoko and less than one percent of the Nowitna.

The **herbaceous vegetation** type is dominated by herbaceous plants (grasses, sedges, and flowering plants). The main subclasses of this vegetation type include graminoid-dominated bogs, meadows, and marshes. The graminoid-dominated bogs have a moss-dominated surface underlain by peat that is often saturated with water. Typical graminoids in this subclass include cottongrass (*Eriophorum russeolum*), sedges (*Carex limosa*), and (*Carex chordorrhiza*). The graminoid meadow is relatively dry and dominated by bluejoint grass. It is often associated with old river meanders. The graminoid marsh primarily occurs at the margins of lakes and ponds. The most important graminoids in this subclass are sedges (*Carex aquatilis*) and (*Carex rostrata*). This class occurs along the margins of most wetlands on the Refuge. Approximately two percent of the Refuge is covered by this vegetation type.

Other minor vegetative types are found on the Refuge. There is upland vegetation that surrounds some of the wetland floodplain basins. On the Koyukuk, small mountain ranges occur on the east, west, and north boundaries of the Refuge. The Kaiyuh Hills form the southern boundary of the Northern Unit Innoko. Hills occur along all four sides of the Nowitna. Mountaintops on the Refuge typically are scarcely vegetated rock scree (loose rock) that often extends down a mountain in fingers of unstable rock. Below the scree, communities of prostrate dwarf shrub tundra, alpine meadows, and dwarf shrub tussock tundra predominate. These communities grade into subalpine broadleaf shrub communities and a treeline composed of stunted white spruce. Alpine habitats are particularly rich in lichen species such as *Cetraria nivalis*, *C. cucullata*, *Alectoria ochroleuca*, *Thamnomia subuliformis*, *Stereocaulon spp.*, *Cladina spp.*, and *Cladonia spp.* Subalpine broadleaf shrub communities are dominated by alder and willow (*Salix planifolia* ssp. *pulchra*). Estimated cover of these alpine and subalpine habitats is three percent on the Koyukuk and Northern Unit Innoko and one percent on the Nowitna.

Land cover mapping was done by Ducks Unlimited (1998a and 1998b) based on a modified Alaska Vegetation Classification (Viereck et al. 1992) during three different time periods. The northwest section of the Northern Unit Innoko was completed in 1999; the Nowitna was completed in 2000; and the Koyukuk was completed in 2001. The classification of the Northern Unit Innoko contains 35 different vegetative classes; the Nowitna contains 32 vegetative classes; and the Koyukuk contains 33 vegetative classes. There are 12 main vegetative classes that cover the bulk of the Refuge. They are described in following text and summarized in Table 3-7, Table 3-8, and Table 3-9.

Open Needleleaf forests have 25 to 60 percent tree crown canopy cover. This class can be found on a range of sites - from well drained timberline to poorly drained soils. It is composed

of primarily black and white spruce, some tamarack, and willows. Ground cover species include bog blueberry, Labrador tea, sedges, lichens, and feather mosses.

Needleleaf Woodland forests have from 10 to 25 percent tree canopy cover. This class is often referred to as muskeg and is found on a range of sites from near the latitudinal and elevational extent of the treeline to cold, wet, and poorly drained soils. Forests are composed of primarily black and white spruce and scattered paper birch and willows. Ground cover species include alder, cloudberry, dwarf birch, bog blueberry, Labrador tea, highbush cranberry, crowberry, cottongrass, sedges, horsetail, feather and sphagnum mosses, and lichens.

Closed Mixed Needleleaf/Deciduous forests are populated by both conifer and deciduous tree species, but neither species has a clear dominance. Both conifer and deciduous species contribute 25 to 75 percent of the total canopy cover. Tree cover totals at least 10 percent. This forest type is found on a variety of sites including well- to moderately-drained areas, floodplains, slopes, bases of south facing slopes, and relatively warm dry sites. Common tree species include white spruce, paper birch, quaking aspen, and cottonwood. Understory species include alders, willows, prickly rose, highbush cranberry, northern red current (*Ribes triste*), spiraea (*Spiraea Beauverdiana*), highbush cranberry, bog blueberry, Labrador tea, bluejoint grass, bunchberry, twinflower, bluebell (*Mertensia paniculata* var. *paniculata*), horsetail, fireweed (*Epilobium* spp.), and feathermosses.

Closed Deciduous forests are dominated by paper birch and have at least a 60 percent tree cover. This forest type is commonly found on upland sites that are moderately to well-drained. Common tall shrubs include alder, prickly rose, and highbush cranberry. Dwarf shrubs may include only highbush cranberry and twinflower. The herb layer usually is dominated by bluejoint grass. Bluebell and horsetail may also be common. Mosses and lichens are rare.

Open Mixed Needleleaf/Deciduous forests are comprised of paper birch and either white or black spruce. Total tree cover is 25–60 percent. These forests are found on relatively wet and poorly drained wetland sites. Alder and willow are the dominant tall shrubs. Understory species include dwarf birch, spiraea, bog blueberry, highbush cranberry, Labrador tea, and bluejoint grass. Feathermosses dominate the ground layer. Lichens are very common.

Woodland Needleleaf – Lichen forests are similar to Needleleaf Woodland forests except they are in a late seral stage of development.

Open Needleleaf – Lichen forests are similar to Open Needleleaf forests except they are in a late seral stage of development.

Closed Mixed Deciduous forests are similar to Closed Mixed Needleleaf/Deciduous forests except they are in a late seral stage of development while the latter is in an early to mid-seral stage of development.

Wet Graminoid communities include the treeless bogs, which are the predominant vegetation type in the center of the Koyukuk and in scattered locations of the Nowitna and Northern Unit Innoko. Bog vegetation on the Refuge consists of various species of cottongrass, dwarf birch, shrub birch, bog blueberry, Labrador tea, leatherleaf, myrtle, sedges, and mosses, especially *Sphagnum*. Minor species include bog rosemary, bog cranberry, and sundew.

Low Shrub communities are dominated by shrubs eight inches to five feet in height. These communities have at least 25 percent cover by shrubs at least eight inches tall; trees provide less than 10 percent cover and tall shrubs provide less than 25 percent cover. Alder, willow,

and shrub birch are the dominant shrubs. Myrtle, cinquefoil, and ericaceous shrubs (members of the heath family such as blueberry) may dominate some communities. Some ericaceous shrubs transcend the boundary between dwarf shrub and low scrub. In general, bog blueberry and Labrador tea are considered to be low shrubs. Crowberry, high bush cranberry, bearberry, alpine azalea, and diapensia (*Diapensia lapponica ssp. obovata*) are considered to be dwarf shrubs.

Table 3-7. Acreage summary of land cover classes on the Koyukuk.

Land Cover Class	Federal Acres	Private Acres	Percent of Refuge
Open Needleleaf	817,352	146,565	18.2
Needleleaf Woodland	727,606	90,307	16.2
Closed Mixed Needleleaf/Deciduous	77,323	29,919	1.7
Closed Deciduous	103,585	44,010	2.3
Open Mixed Needleleaf/Deciduous	170,839	42,310	3.8
Woodland Needleleaf – Lichen	145,515	15,275	3.2
Open Needleleaf – Lichen	122,397	23,397	2.7
Closed Mixed Deciduous	55,718	16,609	1.2
Wet Graminoid	28,808	7,241	0.6
Low Shrub	559,103	85,563	12.4
Tall Shrub	166,544	32,442	3.7
Low Shrub Tussock – Tundra	270,579	24,516	6.0

Table 3-8. Acreage summary of land cover classes on the Northern Unit Innoko.

Land Cover Class	Federal Acres	Private Acres	Percent of Refuge
Open Needleleaf	37,062	48,210	5.6
Needleleaf Woodland	35,662	29,319	4.8
Closed Mixed Needleleaf/Deciduous	13,615	34,401	1.8
Closed Deciduous	4,107	11,615	0.6
Open Mixed Needleleaf/Deciduous	16,828	34,203	2.3
Woodland Needleleaf – Lichen	8,470	5,569	1.1
Open Needleleaf – Lichen	88,668	59,509	12.8
Closed Mixed Deciduous	0	0	0
Wet Graminoid	9,919	12,296	1.3
Low Shrub	53,346	50,334	7.1
Tall Shrub	5,894	8,952	0.8
Low Shrub Tussock – Tundra	25	15	<0.1

Table 3-9. Acreage summary of land cover classes on the Nowitna.

Land Cover Class	Federal Acres	Private Acres	Percent of Refuge
Open Needleleaf	972,863	98,413	47.0
Needleleaf Woodland	170,783	16,745	8.3
Closed Mixed Needleleaf/Deciduous	220,436	48,481	10.7
Closed Deciduous	101,780	15,582	4.9
Open Mixed Needleleaf/Deciduous	49,181	5,780	2.4
Woodland Needleleaf – Lichen	28,887	1,636	1.4
Open Needleleaf – Lichen	0	0	0
Closed Mixed Deciduous	13,405	2,123	0.7
Wet Graminoid	10,913	2,627	0.5
Low Shrub	81,564	10,072	4.0
Tall Shrub	9,364	2,372	0.5
Low Shrub Tussock – Tundra	16,971	1,463	0.8

Tall Shrub communities have at least 25 percent cover of shrubs five feet or more in height. Trees contribute less than 10 percent cover and are often absent. Low and dwarf shrubs may be present or absent. Tall shrub communities are found primarily in floodplains or along streambanks. They are dominated by willows, and in some areas, alder. Major understory species include bog blueberry, twinflower, bluejoint grass, and horsetail.

Low Shrub Tussock-Tundra communities are characterized by an open canopy of low shrubs. They have at least 25 percent shrub cover and are dominated by tussock-forming sedges, usually cottongrass but sometimes by Bigelow sedge (*Carex bigelowii*). This community occurs on poorly drained organic soils underlain by permafrost. Trees are absent or very scarce. Mosses and dwarf shrubs form a mat surrounding the tussocks. Common shrubs include dwarf and shrub birch, Labrador tea, highbush cranberry, bog blueberry, and cloudberry. Herbs other than the tussock-formers are generally scarce.

Figure 3-7, Figure 3-8, and Figure 3-9 depict the cover type classification completed for the Refuge by Ducks Unlimited (1998a and 1998b).

3.3.1.1 Non-Native Invasive Plants

Invasive non-native plant species pose a significant risk to ecological stability and integrity. Opportunistic investigation of invasive plant species on the Refuge during other operations has revealed a very limited occurrence. Lambsquarter (*Chenopodium album*) was observed in two places on the upper Nowitna River in 2006. Foxtail barley (*Hordeum jubatum*) was observed on the Nowitna Refuge at the mouth of Junekaket Slough in 2007. Several non-native plants have been observed in Galena, including lambsquarter, common chickweed (*Stellaria media*), pineapple-weed (*Matricaria matricariodes*), common plantain (*Plantago major*), dandelion (*Taraxacum officinale*), red clover (*Trifolium repens*), timothy (*Phleum pratense*), foxtail barley, cattails (*Typha latifolia*), and white sweet clover (*Melilotus alba*). Of these, white sweet clover is considered the most invasive, and removal efforts are ongoing. Plans are underway to develop a monitoring strategy to identify non-native plants in other villages within the region.

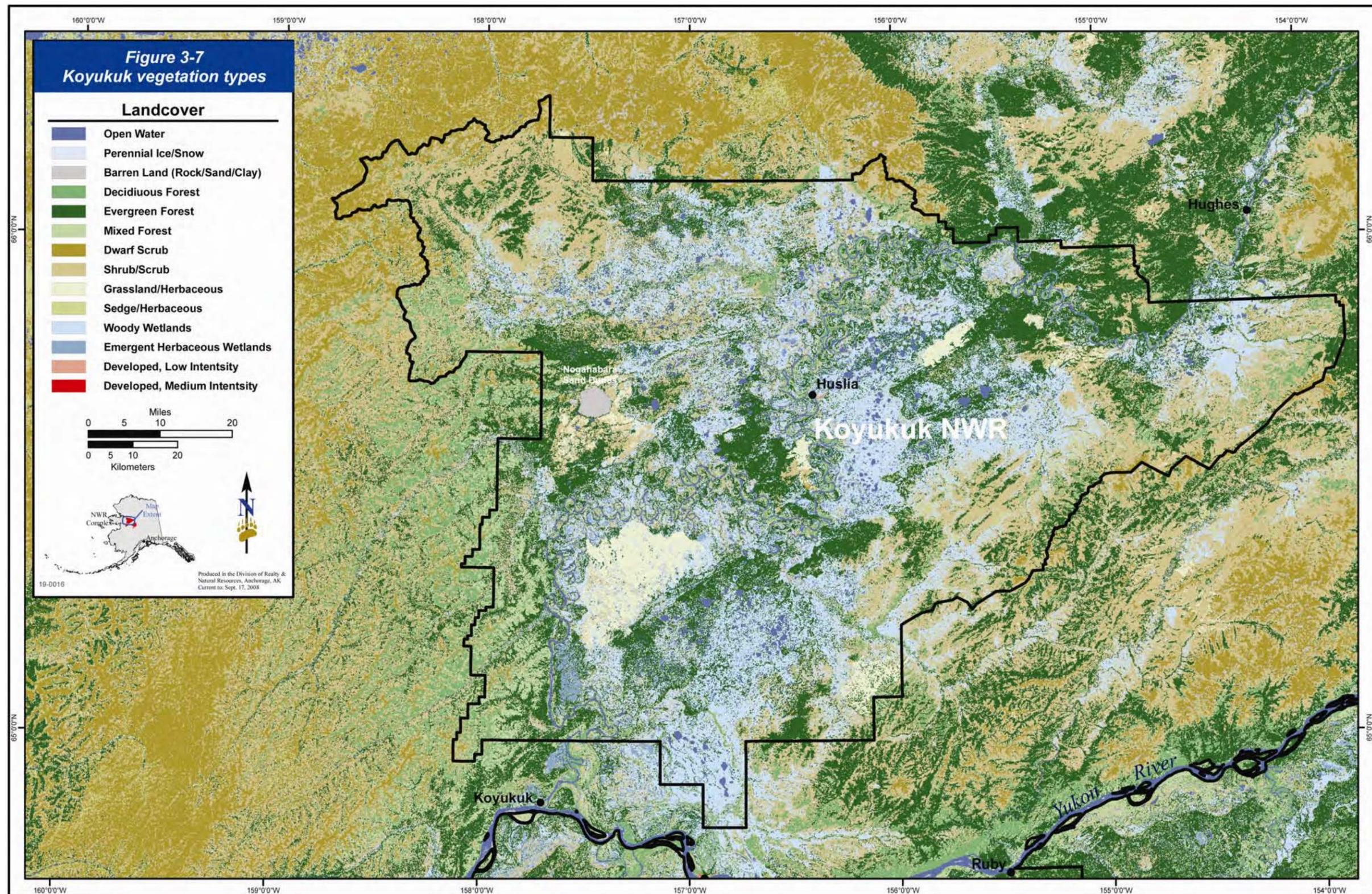


Figure 3-7. Koyukuk vegetation types

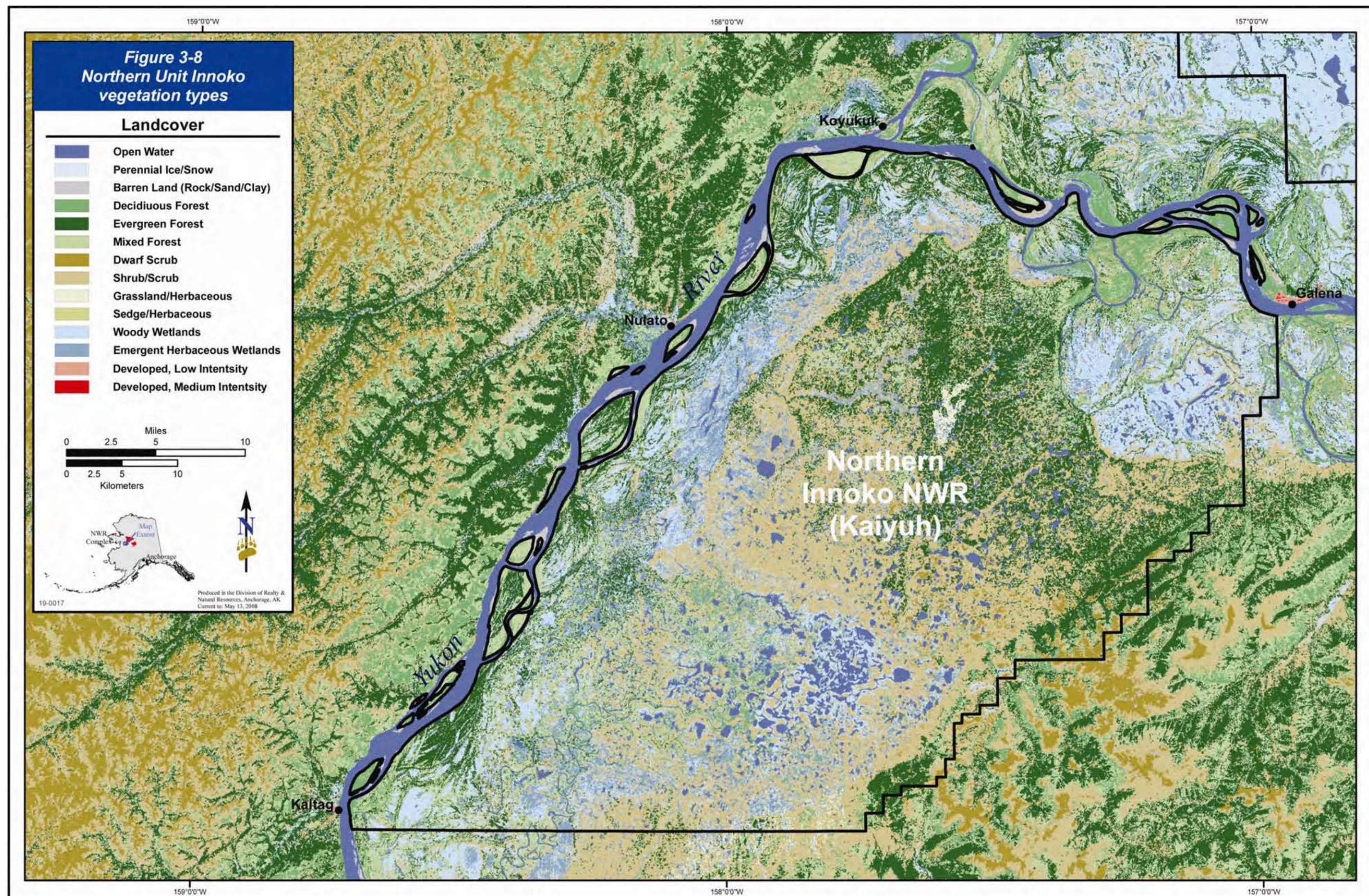


Figure 3-8. Northern Unit Innoko vegetation types

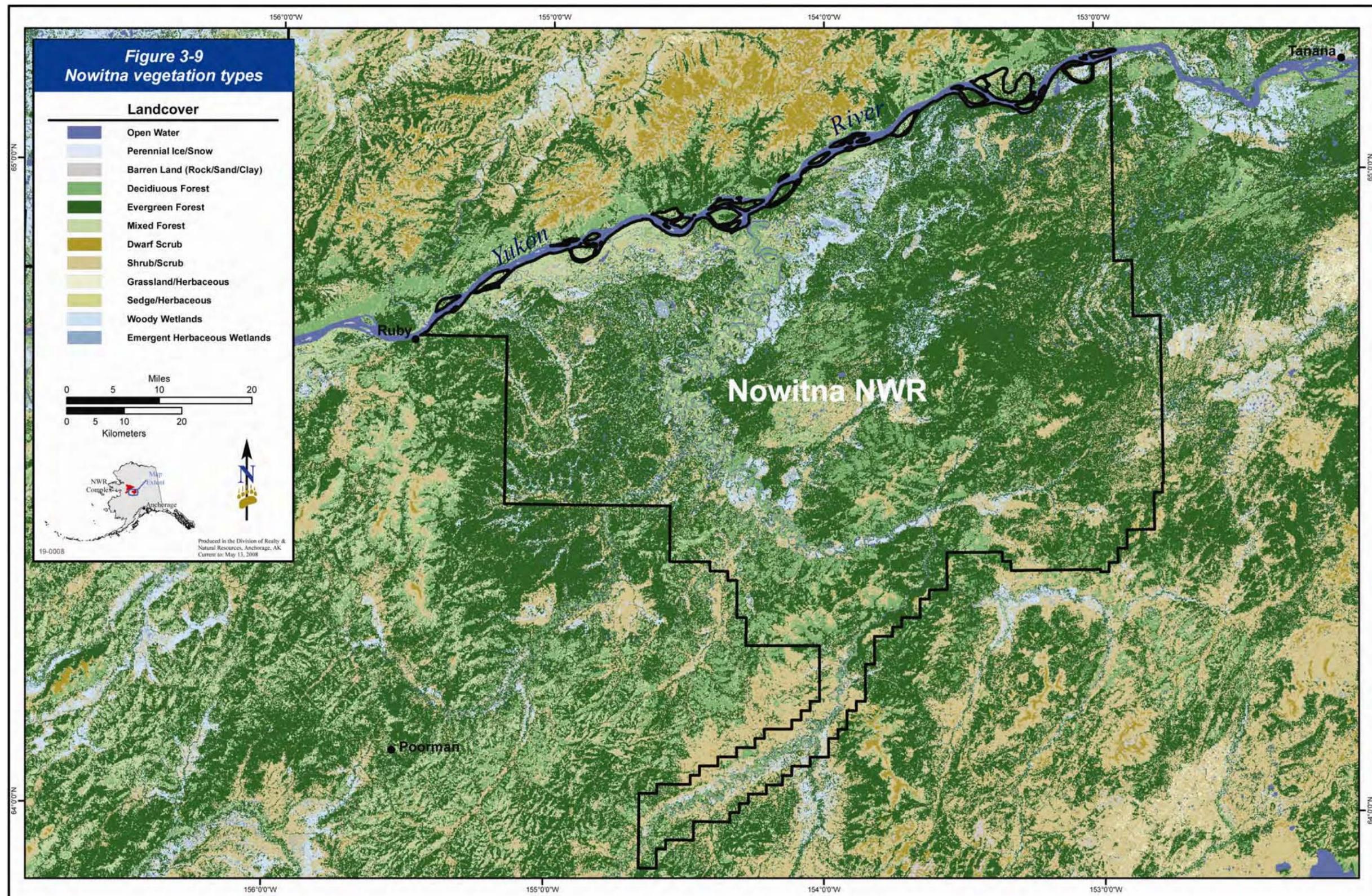


Figure 3-9. Nowitna vegetation types

3.3.2 Fish and Wildlife

3.3.2.1 Fish

The Refuge contains an extensive assemblage of fish communities and their habitats. These waters provide spawning, rearing, feeding, overwintering, or migratory habitats for 21 reported species of fish (see Table 3-10) (Adams and McLain 2007, USFWS 1991, USFWS 1993). Most species are classified in the Salmonidae family with individual species representing eight other families. The two life history strategies used by these species are represented by the anadromous behaviors of salmon and whitefish and the purely freshwater dependence of Arctic grayling and northern pike.

Despite the importance of several species to subsistence, commercial, and sport fisheries and the value of all species to the aquatic production, natural diversity, and food webs of the Refuge, little is understood about the life history, distribution, behaviors, and harvest of fish on the Refuge. Most of the available information is related to salmon, and their basic life history is understood in the larger context of the Yukon River system. However, comprehensive information about adult salmon stock abundance, population structure, timing, distribution, and critical habitats on the Refuge is lacking. Additionally, information about the characteristics of juvenile salmon populations on the Refuge or factors affecting them is absent.

Whitefish are an important Refuge resource. Little information is available about these species. Whitefish provide subsistence users with another food source during seasons when salmon are not available. Emerging commercial fisheries have the potential to harvest large numbers. These fish act as an important prey base for wildlife and other fish species.

Sheefish are targeted in sport fisheries. Similar to salmon, the migratory habits of this species makes refuge stocks susceptible to harvest impacts outside of the Refuge. However, unlike salmon, few fundamental population characteristics or critical habitats have been identified.

While some information exists for other harvested species in the region, such as northern pike and Arctic grayling, little is known about these species within the Refuge. Also, information about species that are not used directly by humans, but may be important for predator-prey relationships and other ecological aspects (e.g., blackfish, lake chub, and trout perch) is nonexistent. Additionally, although salmon harvests in some villages are documented annually by the Service (Gerken and Holder 2005, Gerken 2006, Gerken 2008) and ADF&G (Busher and Hamazaki 2005), with non-salmon harvests occasionally described (Andersen 2007, Andersen et al. 2004, Marcotte and Haynes 1985), detailed harvest information for all species is lacking. Descriptions of the more commonly known species follow.

Northern pike are a common species on the Refuge and typically inhabit the lower portions of the larger rivers and most lakes of suitable depth (USFWS 1991, USFWS 1993). Fish begin spawning during the spring of their third year, and fry emerge one to three weeks after spawning (Cheney 1971). Soon after emergence, they become active predators of suitable-sized fish and invertebrates. Northern pike have been captured on the Koyukuk in the Gisasa River, the mouth of the Kateel River (Alt 1978), the Hogatza River, Clear Creek (Mueller et al. 1996), the South Fork of the Huslia River (Wiswar 1994a), the North Fork of the Huslia River, and in Billy Hawk Creek (Wiswar 1994a, Wiswar 1994b). Within the Nowitna, this species has been captured in the Sulatna, Sulukna, and main stem Nowitna rivers (Wiswar 1994a). Northern pike were also captured in Camp and Eddy Creeks on the Northern Unit

Innoko (Mueller et al. 1996). Based on a 1994–1996 radio telemetry study, northern pike tagged in the Kaiyuh Flats overwintered in three areas: the North Lakes area with most fish relocated in Duck Lake; the South Lakes area with most fish relocated in Little Brush Island Lake; and in the Khotol River near Manslaughter Slough (Taube and Lubinski 1996). These fish exhibited high fidelity to overwintering sites, unlike spawning and summering areas where fish were greatly dispersed. Adult northern pike in the Kaiyuh Flats were not reliant on movements to the Yukon River for their seasonal needs.

Broad whitefish are highly migratory, and some stocks in the Yukon River basin are considered to be anadromous (Brown et al. 2007). They enter Refuge waters from the main stem of the Yukon River to feed in the lower river systems and river-connected lakes soon after breakup (Alt 1985). Spawning occurs in the fall. Although broad whitefish have been captured on the Koyukuk in the Gisasa River, at the mouth of the Kateel River (Alt 1978), in Billy Hawk Creek (Wiswar 1994a, Wiswar 1994b), in the North Fork main stem (Wiswar 1994b), and the South Fork of the Huslia River, no spawning areas have been identified on the Koyukuk or the Northern Unit Innoko (USFWS 1993). Within the Nowitna, this species has been captured in the Nowitna River (Alt 1978, Wiswar 1994a). This species is an important forage fish for aquatic and terrestrial predators.

As with broad whitefish, **humpback whitefish** are highly migratory, and some stocks are considered to be anadromous (Brown et al. 2007). The timing of arrival in refuge waters is similar to broad whitefish, with both species using overlapping habitats for feeding. This species also spawns in the fall. Humpback whitefish have been captured on the Koyukuk in the Gisasa River, at the mouth of Kateel River (Alt 1978), and in the North Fork of the Huslia River (Wiswar 1994b), but spawning has not been documented on the Koyukuk and Northern Unit Innoko (USFWS 1993). Humpback whitefish are common in the Nowitna River (Alt 1978, USFWS 1991) and have been identified as spawning in the lower reaches of the river (Alt 1985). Humpback whitefish are also an important forage species.

Like the previous whitefish species, **least cisco** are highly migratory, and some stocks are thought to be anadromous (Brown et al. 2007). Their run timing and habitat use appear to be similar to broad and humpback whitefish (Alt 1983), with spawning occurring in the fall. Documented presence includes at the mouths of the Gisasa and the Kateel rivers on the Koyukuk and at the mouth of the Nowitna River (Alt 1978). Least cisco also provide forage for aquatic and terrestrial predators.

Sheefish or inconnu are also highly migratory with several stocks considered to be anadromous (Brown et al. 2007). Their distribution across the Refuge is limited to the larger river systems and the main channel of the Yukon River (USFWS 1991, USFWS 1993). Sheefish overwinter in the Lower Yukon River and migrate into the larger rivers after breakup to forage in tributaries (Alt 1985). In general, sheefish are thought to be non-consecutive year spawners, with females spawning every other year or less, frequently beginning at 8–12 years of age (Brown 2000). Males begin spawning at age 6–8. Spawning occurs in late September to mid-October with fry appearing in early spring. Fish within the Koyukuk spawn in the Koyukuk River near the village of Hughes (Alt 1978) and in the Alatna River (Brown 2008). Fish found on the Nowitna spawn upstream of the refuge boundary in the Sulukna River (Alt 1985). Sheefish have also been captured at the mouth of the Kateel River (Alt 1978) and in the main stem of the Huslia River on the Koyukuk (Wiswar 1994a). Important sheefish prey include whitefish, northern pike, longnose suckers, lamprey, and

salmon parr (juvenile fish preparing to leave their freshwater home) and smolts (juvenile fish that become adapted to saltwater and begin their ocean stay) (Alt 1983).

Table 3-10. Fish of the Koyukuk, Northern Unit Innoko, and Nowitna

Common Name	Scientific name (in taxonomic order)
	PETROMYZONTIDAE
Arctic lamprey	<i>Lampetra camtschatica</i>
	CYPRINIDAE
Lake chub	<i>Couesius plumbeus</i>
	CATASTOMIDAE
Longnose sucker	<i>Catostomus catostomus</i>
	ESOCIDAE
Northern pike	<i>Esox lucius</i>
	UMBRIDAE
Alaska blackfish	<i>Dallia pectoralis</i>
	SALMONIDAE
Bering cisco	<i>Coregonus lauretta</i>
Broad whitefish	<i>Coregonus nasus</i>
Humpback whitefish	<i>Coregonus pidschian</i>
Least cisco	<i>Coregonus sardinella</i>
Round whitefish	<i>Prosopium cylindraceum</i>
Sheefish (inconnu)	<i>Stenodus leucichthys</i>
Arctic grayling	<i>Thymallus arcticus</i>
Pink salmon*	<i>Oncorhynchus gorbuscha</i>
Chum salmon	<i>Oncorhynchus keta</i>
Coho salmon	<i>Oncorhynchus kisutch</i>
Sockeye salmon	<i>Oncorhynchus nerka</i>
Chinook salmon	<i>Oncorhynchus tshawytscha</i>
Dolly Varden char	<i>Salvelinus malma</i>
	PERCOPSIDAE
Trout perch	<i>Percopsis orniscomaycus</i>
	GADIDAE
Burbot	<i>Lota lota</i>
	COTTIDAE
Slimy sculpin	<i>Cottus cognatus</i>

* species reported from Koyukuk Refuge only

Arctic grayling are resident fish that congregate at the mouth of clear water tributaries in the large river systems prior to spawning in mid-May to early June (USFWS 1991, USFWS 1993). Arctic grayling begin spawning at age three, with fry emerging within a month of

spawning (Alt 1983). Soon after emergence, the fry seek slower velocity water. The documented distribution of Arctic grayling on the Refuge includes the Gisasa River, the mouth of the Kateel River (Alt 1978), the Honhosa River (Wiswar 1994b), and Clear Creek (Mueller et al. 1996) on the Koyukuk, as well as the main stem Nowitna River above the confluence with the Big Mud River (Alt 1985). Insects of the orders Diptera and Hemiptera constitute the major food of grayling.

Chum salmon on the Refuge are part of the Yukon River run and include two distinct groups (USFWS 1991, USFWS 1993). Summer chum salmon are more abundant, arrive in late June to mid-July, and spawn through August. Spawning areas on the Koyukuk include the Koyukuk, Dakli, Gisasa, Indian, and Kateel rivers; the North Fork of the Huslia River; and Billy Hawk Creek (Barton 1984). Within the Nowitna River, adult summer chum salmon have been captured in the Sulatna River (Mueller et al. 1996). An area near the Nowitna River confluence with the Big Mud River has been identified as a spawning area (Alt 1985). Fall chum salmon typically pass the Nowitna during August on their way to their primary spawning areas in the middle and upper Yukon River basin. However, adult fall chum salmon have been captured in the Sulukna River, but a spawning area has not been identified (Alt 1985). Eggs develop through the fall and winter, with fry emerging in early spring. Soon after emergence, the fry begin migration to salt water and return in three to six years (Salo 1991), although four-year-old chum salmon account for most of the annual return (Buklis and Barton 1984).

Coho salmon on the Refuge are also part of the Yukon River run. These fish enter the area in mid-September and spawn throughout late fall (USFWS 1991, USFWS 1993). Within the Refuge, adult Coho salmon have only been captured in the main stem of the Nowitna River (Wiswar 1994a), with a spawning area suspected near the mouth of Our Creek (Alt 1985). Eggs develop throughout the fall and winter, with fry appearing the following spring. Coho salmon parr typically remain in fresh water one to three summers and smolt the following spring (Sandercock 1991). These fish generally rear for one year in the ocean before returning to freshwater to spawn. Four-year-old fish comprise most of the annual return.

As with chum and Coho salmon, **Chinook salmon** on the Refuge are part of the Yukon River run (USFWS 1991, USFWS 1993). Returning adults arrive in refuge waters in June and July, and typically complete spawning by early September. Documented spawning areas on the Koyukuk include the Koyukuk, Dakli, Gisasa, Indian, and Kateel rivers (Barton 1984), as well as areas on the Hogatza River upstream of the refuge boundary (Eiler et al. 2004, Eiler et al. 2006a, Eiler et al. 2006b). Spawning areas have also been identified in the Nowitna River (Eiler et al. 2004, Eiler et al. 2006a, and Eiler et al. 2006b). Eggs develop throughout the fall and winter, with fry appearing early the next spring. Chinook salmon parr typically rear for one year in freshwater and smolt during the spring of their second year (Healey 1991). Once the smolt enter the ocean, they generally rear and mature for three to six years before returning to freshwater to spawn. Five-year-old fish account for most of the annual return.

3.3.2.2 Amphibians

Of the eight species of amphibians known to occur in Alaska (MacDonald 2003), only the wood frog inhabits the Refuge. In the summer of 2001, a pilot study began monitoring wood frogs for malformations at three sites near Galena. The goal was to collect a minimum of 50 froglets, young metamorphosed frogs, before their first hibernation, and examine them for deformities. This project has since been incorporated into the Refuge's Inventory and Monitoring Plan (I&MP).

3.3.2.3 Birds

The numerous rivers and creeks of the Refuge provide riparian, wetland, and upland habitats that support abundant bird life. Nearly 150 bird species have been recorded on the Refuge, and 104 are thought to breed on the Refuge (see appendix H). Of these 104 species, 22 species are hardy enough to overwinter. Grouse, owls, woodpeckers, chickadees, gray jays, ravens, and redpolls are year-round residents of the Refuge.

The Refuge was established in part to protect the vast wetland complex in the Northern Unit Innoko and the floodplain of the Koyukuk and lower Nowitna rivers. These wetlands are important to waterfowl during many of their life stages. Wetland habitats also support a diversity of breeding land and water birds, including several species of conservation concern.

Three Breeding Bird Survey routes and three Off-Road Point Counts are conducted annually on or adjacent to the Refuge as part of the I&MP. Basic inventory work is still being conducted to update species lists. Species found in subalpine and alpine portions of the Refuge are probably underrepresented on these bird lists.

Several thousand White-fronted **geese** and several hundred Canada geese nest and molt on the Refuge each summer. Annual (aerial) molting and (river-float trip) production surveys are conducted on portions of the Refuge. Extensive research on the nesting ecology and migratory patterns of interior nesting White-fronted geese have been conducted on the Refuge (Spindler and Hans 2005). White-fronted geese have been captured and banded on the Refuge for survival rate analysis, but banding efforts ceased in 2001 in favor of banding on the main unit of the Innoko Refuge—where more geese can be captured in a cost effective manner. Recent analyses of survival data have revealed that interior Alaska White-fronted geese have a lower survival rate than other mid-continent White-fronted populations (Schmutz 2008).

Canada geese are less abundant than White-fronted geese but also breed and molt on the Refuge. Both species of geese are important subsistence harvest species, particularly during the spring season.

The Koyukuk contains habitat for both **Trumpeter and Tundra swans**, and a recent research project indicates 50 percent of the nesting swans on the Koyukuk are Tundra swans (*Cygnus columbianus columbianus*), 20 percent of nesting swans on the Northern Unit Innoko are Tundra swans, and nesting swans on the Nowitna are 100 percent Trumpeter swans (*Cygnus buccinator*) (Bryant et al. 2007). Tundra swans may be hunted statewide during spring and fall seasons, but Trumpeter swans are fully protected and remain closed to subsistence hunting. The two species are very similar in appearance and are difficult to identify on the wing.

Annual trend surveys of swans are conducted on the Refuge as part of the I&M Plan. Every five years, a refuge-wide census is flown as part of the statewide Trumpeter Swan Census. Both the census and trend surveys continue to show a steadily increasing swan population.

Duck abundance on the Refuge is currently monitored using the aerial duck breeding pair survey conducted by the Service's Division of Migratory Birds in Juneau. The following population estimates apply to the entire Koyukuk stratum—the Koyukuk refuge is only a part of this stratum. A comparison of the breeding pair estimates for the Koyukuk stratum to estimates of adults summering on the Refuge (based on 1990–1993 brood survey extrapolations) suggested that depending on the year, the Koyukuk represented

approximately 36–65 percent of the ducks estimated for the entire Koyukuk stratum. The May 2006 estimated breeding duck population in the Koyukuk stratum was 191,068 ducks. Using the percentages given previously, the calculated mean estimated 2006 population for the Koyukuk was 68,785–124,194 ducks. These figures are up slightly from those seen in the past six years and are above the mid-1990s/nineties (July) post-breeding estimate of 62,000–117,000 (Saperstein 1997).

The Nowitna comprises less than 10 percent of the aerial duck breeding pair survey of the Tanana-Kuskokwim stratum conducted by the Service's Division of Migratory Birds. Duck production surveys were conducted on the refuge from 1983 through 1992, and summarized in *A summary of ten years of duck production surveys, Nowitna National Wildlife Refuge, Alaska, 1983–1992* (Saperstein 1996). Saperstein found highly variable numbers of ducks and production of offspring in the early 1990s, with estimates of adult ducks ranging from 5,000 to 167,000.

In addition to the annual banding project at Willow Lake on the Koyukuk, ducks have also been banded on the Northern Unit Innoko as part of a statewide avian influenza monitoring project. Northern Pintails are the target species with a desired quota of 200 birds for each banding site. Ducks have been banded annually on the Koyukuk since 1989, and since 2006 on the Northern Unit Innoko. Results from these projects are reported in the I&M Plan (appendix C).

A number of **marsh and water birds** are commonly observed on the Refuge, including Common, Pacific, and Red-throated loons; Red-necked and Horned grebes; and Sandhill cranes. Yellow-billed loons are occasionally observed. Past duck production surveys indicate that Red-necked grebes, Common loons, and Sandhill cranes are the most common marsh and water bird species.

The following **shorebird species** are commonly observed on the Refuge: Lesser and Greater yellowlegs, Arctic tern, Glaucous gulls, Bonaparte's gulls, Mew gulls, Herring gulls, Long-tailed jaeger, Semipalmated plover, Common snipe, Spotted sandpiper, Least sandpiper, Pectoral sandpiper, Solitary sandpiper, Northern phalarope, Hudsonian godwit, and Whimbrel.

Gallinaceous birds (heavy-bodied, ground-feeding domestic or game birds) such as Ruffed and Spruce grouse are common in wooded habitats, while tundra and shrub habitats support Willow ptarmigan. Sharp-tailed grouse have also been infrequently observed.

The Refuge supports a diversity of **raptor species**, including Rough-legged hawks, Merlin, Sharp-shinned hawks, Northern harriers, Red-tailed hawks, Goshawks, Osprey, Great horned owls, Great Grey owls, Boreal owls, Northern Hawk owls, American Peregrine falcons, and Bald and Golden eagles. Raptors are generally sensitive to disturbance and serve as important indicator species.

Peregrine falcon surveys have been conducted periodically on the Yukon River between Ruby and Kaltag and on the Koyukuk River above the village of Koyukuk. The Service's Endangered Species Office conducted the survey (as part of a larger survey of the Yukon River) between 1979 and 1991. Refuge staff conducted partial surveys in 1992–1994. In 2000, a thorough Peregrine survey between Ruby and Tabernacle was conducted by the Endangered Species Office. Beginning in 2001, surveys have been conducted annually by refuge staff on the Yukon River from just above Ruby to Galena. The presence of adults and nesting information is documented on each survey.

The rattling calls of Belted **kingfisher** can be heard along many creeks and rivers on the Refuge. Less common, but still occasionally seen and heard, are the year-round **woodpecker species**: Black-backed, Three-toed, Downy, and Hairy; and the migratory Northern flicker. Diverse wetland and terrestrial habitats on the Refuge support close to 50 species of **passerines** (perching birds characterized by having four toes, three directed forward and one backward). The most common riparian **songbirds** are the Northern waterthrush, Alder flycatcher, Swainson's thrush, Yellow warbler, Blackpoll warbler, and Fox sparrow. Several species that breed on the Refuge are considered priority species for conservation in the northwest interior forest region. These included the Olive-sided flycatcher, Gray-cheeked thrush, Blackpoll warbler, and Rusty blackbird (Boreal Partners in Flight Working Group 2006). Year-round resident songbirds include Black-capped and Boreal chickadee, Gray jay, Common raven, Common and Hoary redpoll, Pine grosbeak, and White-winged crossbill.

3.3.2.4 Mammals

The Refuge has 36 species of mammals either known or suspected to occur on the Refuge (see appendix HI). This includes the musk ox, normally a species found along the Bering Sea and Arctic Ocean coasts. Musk ox is commonly seen along the continental divide in the northwest corner of Koyukuk. Three have been shot along the Kateel and Yukon rivers in the past five years. Moose occur in high densities on portions of Koyukuk. The Galena Mountain caribou herd commonly uses the Koyukuk. Periodically, large numbers of the Western Arctic caribou herd use the Refuge during winter. Both black and brown bears are found on the Refuge. Many furbearers are common to abundant.

The Refuge contains an abundance of **moose** and large areas of excellent moose habitat. The Koyukuk River floodplain is excellent year-round habitat and contains high densities of moose (3–10 moose per square mile) from the mouth of the river all the way to the mouth of the Hogatza River. Kaiyuh Flats has a much lower density of moose (less than 1.0 per square mile), and the floodplain of the Nowitna has a moderate density of moose (1–3 moose per square mile), while the rest of the Refuge is considered low density. The Koyukuk and Northern Unit Innoko supports 8,000–10,000 moose, and the Nowitna has between 2,000 and 4,000 moose. Harvest of moose from the Refuge is extremely important to both locals and non-locals. Several hundred hunters access the Refuge during September for the fall hunt. A hunter check station is manned annually on the Koyukuk River by the Alaska Department of Fish and Game, and the Service administers a check station at the mouth of the Nowitna River each fall.

Moose surveys are a big portion of the refuge inventory and monitoring program. Trend count surveys are conducted annually over 1,260 square miles of the Refuge. Some of these trend count areas have been surveyed annually since the early 1980s. In addition to these trend surveys, periodic population estimates are also conducted using the Geo-Spatial Population Estimator technique. Twinning surveys are conducted annually in the spring. A radio telemetry research project is currently investigating calf performance on different winter ranges on the Refuge and across the State.

Two **caribou** herds normally occur on the Koyukuk: the Galena Mountain herd (GMH) and the Western Arctic herd (WAH). The GMH is a small resident herd of approximately 150 animals that winter north of Galena and calve east of the Refuge in the western Kokrines Hills. The WAH is currently estimated at about 500,000 caribou. Portions of the WAH winter on northern and western sections of the refuge; but in the winters of 1989–1990, 1990–1991, 1992–1993, and 1998–1999, the WAH wintered southeast of the Koyukuk River from the mouth of

the Koyukuk River, northeast to the village of Hughes. The Galena Mountain herd currently contains radio-collared individuals. Monthly radio-tracking flights of these animals are a part of the inventory and monitoring program of the Refuge.

Both **black and grizzly bear** inhabit the Refuge. Black bear are abundant in the lowland forests. Estimates of bear numbers on the Refuge are not available primarily due the expense involved in censusing the species. Previous research on moose indicated that black bear were the most important predator of moose calves on the Koyukuk (Osborne et al. 1991). Black bear hunting pressure is low, but some traditional hunting activity occurs in the late fall when hunters inspect known den sites for black bear. Bear meat is considered an important local traditional food. Information from village residents and incidental observations suggest that black bear may be declining in abundance while grizzly bear may be increasing. Sow grizzlies with cubs have been observed on the Koyukuk in recent years by staff. Grizzlies are common in the hills surrounding the Refuge and use the salmon spawning rivers as feeding areas in the fall. Grizzly and black bear are often observed during moose twinning surveys hunting and killing moose calves.

Besides black and brown bear, the Refuge supports a wide variety of other carnivores (see appendix H for a complete list). Unlike many refuges and parks outside of Alaska, natural predator-prey relationships are intact within the Refuge. **Wolf** density on the Refuge is periodically estimated using the Sample Unit Population Estimator technique (Becker et al. 1998). Annually, all incidental observations of wolves are recorded. During the spring, efforts are made to track and count all of the packs on the Refuge. These techniques are incorporated into the I&MP. Wolves are important as an integral part of the natural ecosystem. They compete with humans for moose (an important subsistence food source) and are a valued furbearer. There is considerable local public interest regarding the number and location of wolf packs. Because of the high numbers of moose on Koyukuk, there are also high densities of wolves there. The wolf density for the Koyukuk was calculated at 13 wolves per 1,000 square kilometers (386.1 square miles) in spring of 2000, and the density of wolves on the Nowitna was 5 wolves per 1000 square kilometers in the spring of 2004 (Scotton and Bryant 2004).

The abundance and distribution of **lynx** populations are affected primarily by natural cycles of their primary food source—the snowshoe hare (see the following section on snowshoe hare). Based on harvest data and comments from area trappers, Stout (2004) identified peaks in the lynx population cycle in 1990–1991 and 2000–2001. If trapping records accurately portray the population cycles, the population was at its lowest point during the winter of 1995–1996 (Stout 2004). The time between population highs in Game Management Unit 21 (see Figure 1-3) appears to correspond with the typical 10-year cycle of snowshoe hare and lynx. This is in contrast to eastern interior Alaska, where snowshoe hare and lynx numbers appear to have increased during the winters of 1990–1991 and 1991–1992, then again during the winters of 1997–1998 and 1998–1999, earlier than expected (Gardner 2001).

A study on the Nowitna found that lynx were more abundant in an area that had burned 25 to 27 years previous than in a mature (greater than 100-year-old) needleleaf forest or in an area that had burned 6–8 years previously. The study also found that lynx favored ridges for travel. The moderate-aged, burned-over areas and ridges also corresponded to areas with the greatest amount of brush cover, a preferred habitat for snowshoe hares (Johnson et al. 1995).

Wolverine are found throughout all of the Refuge. Incidental winter observations indicate that wolverine may be more locally abundant in the hilly regions of the Refuge than in other

areas. Wolverine tracks are a common sight during wolf surveys, and several suspected den sites have been incidentally observed.

Marten are found throughout the Refuge where suitable habitat exists. Incidental winter observations indicate that tracks are abundant in both open and closed needleleaf forest areas. A radio-telemetry study conducted on the Nowitna looked at marten use of areas impacted by wildfire. The severity of the fires was not recorded. The study revealed that marten were much more abundant in a 6 to 8 year old burn than in a 25-27 year old burn, but less abundant in mature (greater than 100-year-old) needleleaf forests (Johnson et al. 1995). Marten are an important trapping species in the region; however, their importance has probably diminished substantially compared to the early 1980s when a large number of households participated in trapping and derived significant portions of their household incomes from trapping.

River otter and mink are common throughout the Refuge. These species are not specifically targeted by many trappers, but they are incidentally taken in low numbers. Population level information is lacking, but both species appear to be abundant and healthy based on tracks and inspection of carcasses from trapped animals.

Red fox appear to be common and widely distributed throughout most of the Refuge. Based on track observations, their numbers can fluctuate dramatically annually. **Coyotes** are present on the Koyukuk and are probably occasionally present on the other two refuges. Two have been observed from the air, and one was trapped near Galena during the 2007–2008 trapping season. Given the abundance of wolves on the Refuge, it is unlikely that a large coyote population will become established any time soon.

The smallest carnivore on the Refuge, and the smallest member of the carnivore order, is the **least weasel**. The least weasel preys primarily on lemmings and voles but has been known to take small hare as well (Fagerstone 1987); therefore, cover and abundant prey are the primary driving factors behind the abundance and distribution of least weasels on the Refuge.

Beaver are abundant on the Refuge and are important ecological landscapers and furbearers. They are trapped by local residents for food and fur. They can be a significant component in the diet of wolves, particularly during snow-free periods (Peterson 1977). Beaver play a large role in shaping the hydrologic features and wetland habitats of the Refuge. Their activities increase habitat diversity by changing flow patterns and creating impoundments where lake habitats develop. Beaver also influence the structure and composition of terrestrial vegetation by foraging on shrubs and felling trees. Beaver dams can restrict fish movement during periods of low flow. This has generated concern about the disruption of normal fish movements (Andersen and Fleener 2001). Though dams may restrict fish movement at times, beaver ponds provide stable rearing habitat for juvenile fish (Snodgrass and Meffe 1999, Brown and Fleener 2001). In the Black River drainage of interior Alaska, Brown and Fleener (2001) found that juvenile northern pike, humpback whitefish, least cisco, and broad whitefish were found only in habitats created by beaver dams, while adults were found in both these and flowing water habitats. They also found that relative fish abundance was greater in lake habitats, and seasonal high flows provided opportunities for fish to move over beaver dams. Older, more stable beaver ponds were found to provide high quality breeding habitat for wood frogs (Stevens et al. 2006).

Beaver populations on the Refuge are monitored with trend area fall cache surveys as outlined in the I&MP. Densities have generally increased since the early 1990s on the Refuge. The Northern Unit Innoko contains the highest concentrations—one township contained at least 145 active caches during the fall of 2005. Beaver are still trapped for their furs, and the meat

is frequently used for human food, dog food, and trapping bait. Overall harvests are probably substantially lower than 20 years ago.

Muskrat is another furbearer that is important to some trappers. Muskrats were reportedly much more abundant in the region in the 1950s through the 1970s than they are now. Muskrats were commonly shot in the spring for their furs and for food. A few hunters and trappers still pursue them in the springtime, but abundance of muskrats is generally low based on aerial pushup observations. Reasons for the low numbers of muskrat on the Refuge are unknown and have not been investigated.

While 15 species of **voles, lemmings, and mice** are known or suspected to occur (appendix H), little is known about the distribution and abundance of small mammal species that occur on the Refuge. Lehmkuhl (2001) studied yellow-cheeked voles on the Koyukuk and estimated densities of yellow-cheeked voles ranging from 13 per hectare (2.5 acres) to as high as 143 per hectare. Small and medium-size mammals such as voles and snowshoe hares are the prey base for a wide variety of avian and mammalian predators. Krebs (2001) found that, in terms of biomass, snowshoe hares, squirrels, mice, and voles comprised a much greater percentage of herbivore biomass than moose in the Kluane ecosystem of the Yukon Territory. A similar relationship probably exists on large portions of the Refuge. Foraging, seed caching, and fertilization through fecal deposition by these herbivores shapes their habitat. The effects of their dietary habits on the ecosystem are poorly understood.

Yellow-cheek voles form colonies in burned areas in the boreal forest but are not commonly seen in high densities in undisturbed habitat. In terms of biomass, black spruce habitat supported more yellow-cheeked voles (approximately 4.5 pounds per acre) than upland spruce-birch forest (Rexstad 2003). This estimate of biomass per unit area is roughly equivalent to biomass estimates of moose in the Tanana River floodplain (Flora 2002), again emphasizing the importance of small mammals as a prey base and the role of fire in creating habitat and species diversity.

Snowshoe hare are an integral part of the boreal ecosystem. Hare populations are cyclical across boreal North America over a period of 8–11 years (Keith 1963, Krebs et al. 1986, Keith 1990), with 5- to 25-fold increases (Hodges 2000). Hares are an important food item for a wide variety of terrestrial and avian predators (Keith 1990, Hodges 2000), and hare densities can greatly influence production and recruitment of a variety of species; the best known of these is the lynx (Keith 1963, Brand and Keith 1979). Hare densities are also positively correlated with other species such as spruce grouse, Willow ptarmigan, and arctic ground squirrel (Boutin et al. 1995). Great-horned owl and northern goshawk production and densities are also strongly influenced by hare density (McInville and Keith 1974, Keith et al. 1977, Boutin et al. 1995, McIntyre 1995). Other species, such as wolves, red fox, marten, and red-tailed hawks, may be less dependent on hares but likely use the increases during cyclic highs (Wolff 1980, Todd et al. 1981, Carbyn 1987).

In North America, the order of insectivores is represented by two families, only one of which is found in Alaska. **Shrews** are the smallest mammals in the world. They are characterized by having long pointed snouts, short velvet-like fur, minute black bead-like eyes, and short but regular type legs (Banfield 1974). Projects on the Koyukuk and Nowitna have confirmed the presence of five species of shrews on the Refuge—common shrew, dusky shrew, tundra shrew, pigmy shrew, and tiny shrew (appendix H).

3.3.2.5 Threatened, Endangered, and Sensitive Wildlife

At this time, there are no federally listed Threatened, Endangered, or Sensitive plants or animals on the Refuge. The American race of the peregrine falcon was delisted (removed from the endangered species list) in 1999 but remains a (federal) Species of Concern (U.S. Fish and Wildlife Service 2002). Arctic peregrine falcons, which migrate through the Refuge, were delisted from threatened status in 1994.

The State has also identified species and subspecies of fish and wildlife native to Alaska that have entered a long-term decline in abundance or are vulnerable to a significant decline (Alaska Department of Fish and Game 2006). Vulnerability to decline includes low numbers, restricted distribution, dependence on limited habitat resources, or sensitivity to environmental disturbance. On the Refuge, identified (State) Species of Special Concern include Peregrine falcon, Olive-sided flycatcher, Gray-cheeked thrush, Townsend's warbler, and Blackpoll warbler.

The Olive-sided flycatcher occurs in mature spruce forests associated with habitat edges in burns and riparian areas. The Gray-cheeked thrush is found in a variety of habitats: willow and alder thickets in lowland, upland, and subalpine areas; upland and riparian deciduous forests; needleleaf forests; and needleleaf-deciduous woodlands. Townsend's warblers select mature needleleaf forests for nesting; white spruce appears to be an important component to site selection. Blackpoll warblers select for a variety of habitats but are commonly associated with tall shrubs in riparian areas, needleleaf forests, deciduous forests, and woodlands.

3.3.3 Concerns Regarding Fish, Wildlife, and their Habitats

3.3.3.1 Increased Fishing Pressure

The potential for increased fishing pressure on existing fisheries may affect population size and structure of several species found on the Refuge. In recent years, the Nowitna River and Kaiyuh Flats have become popular destinations for guided anglers who target northern pike. Although these anglers target trophy fish with little harvest, the combination of subsistence harvest, sport harvest, and post-capture mortality in the sport fishery could affect the status of the population. The combination of subsistence and commercial harvest has the potential to affect salmon stocks and whitefish populations as discussed in section 4.2.2.2 of the draft plan and environmental assessment. Also see sections 2.1.1 (Objectives 1, 2, 3, and 4) and 2.1.7 (Objectives 2, 3, 5, and 6) in this document for a discussion of fish goals and objectives.

3.3.3.2 Off-refuge Harvest of Refuge Whitefish and Salmon Stocks

Main channel Yukon River mixed stock commercial and subsistence fishing may have an effect on the population size and structure of salmon and whitefish that spawn on the Refuge. Because there are no available means to rapidly identify particular stocks of these species, Refuge stocks could be disproportionately harvested. Disproportionate harvest could be especially detrimental to small stocks that pass through the Refuge during a short time frame of intense fishing activity. The by-catch of salmon in Bering Sea and Gulf of Alaska ground fish fisheries may also affect refuge salmon stocks.

3.3.3.3 Development of Inholdings and Lands Adjacent to the Refuge

Private lands within and outside the Refuge have the potential to be developed for residential, mineral, sport fishing, and remote tourism access. These developments may lead to fragmented habitats, degraded water quality, reduced in-stream flows, altered water tables,

increased pressure on fishery resources, and increased conflicts with local users. Coordinated planning efforts among agencies and private landowners will help decrease inconsistencies.

3.3.3.4 *Alteration of Wild Salmon Stocks Caused by Enhancement*

During recent times, several stocks of salmon in the Yukon River have become depressed to where management actions have reduced fishing opportunities by restricting fishing periods, areas, or gear. With insufficient numbers of fish for harvest and escapement, enhancement could, at some future date, become a consideration for rebuilding the stocks. Enhancement could develop large populations of particular stocks that could be heavily exploited. Such exploitation of enhanced stocks could lead to pressure on more vulnerable smaller stocks. However, rigorous policies and guidelines of the Alaska Department of Fish and Game help mitigate concerns about the potential for inadequate escapement, loss of genetic diversity, or an unsustainable harvest. If carefully planned and implemented under both State and Service protocols, enhancement could supplement wild salmon production and safely increase salmon harvests (see section 2.1.1 objective 2).

3.3.3.5 *Past and Current Off-refuge Mining Activities*

Placer and hard rock mining activities can introduce excessive amounts of sediment and other contaminants to streams, causing degraded fish habitat. Historic placer mining activities undoubtedly caused increased levels of turbidity and sediment transport in some streams, but there are insufficient data available to determine the impact that mining practices may have had or will have on refuge fish populations and their habitats. However, current mining technology and State and federal regulations have substantially reduced potential pollution. Water quality monitoring of refuge streams will identify upstream disturbances that may affect refuge fishery resources.

Mining activities may have introduced contaminants to streams, causing degradation in water quality and fish habitat. Placer mining activity on tributaries of the Hogatza River have the potential to cause increased levels of turbidity and sediment transport. Another major concern is leaching of heavy metals and chemicals such as cyanide into the water.

3.3.3.6 *Climate Change*

Although predicting the effects that climate change will have on refuge fishery resources is difficult, this phenomena will undoubtedly require new approaches to research and management. Not only will new approaches be needed to understand the biological responses by fish to climate change, but there will also be a need to understand changes in use and access patterns by all user groups. Future approaches must also consider modifications to transportation methods and corridors that may threaten resources formerly not considered at risk. Research and management approaches must keep pace with the effects of emerging technologies and their effects on fishery resources on the Refuge.

Long-term changes in weather patterns have become issues of interest and concern both among scientists and residents of northern latitude communities where changes have been most pronounced. Variations in weather patterns can significantly affect wildlife and plant communities, as well as human residents who depend upon their environment for food and travel. Overall, the climate in Alaska has warmed by about four degrees Fahrenheit since the mid-1950s, including a seven-degree Fahrenheit increase during the winter in interior Alaska (Parson et al. 2001). Climate models project that the greatest warming will continue to occur in the Arctic region (Parson et al. 2001). A warming climate will have numerous effects on

habitat, hydrology, and species occurrence that could fundamentally change the boreal forest as we know it (Hinzman et al. 2005).

The Refuge has worked with researchers at the University of Alaska Fairbanks (UAF) to examine historic local weather patterns using data collected at area villages for the U.S. Weather Bureau. Data includes daily temperature extremes and precipitation that has been documented for more than 80 years in some villages. Galena weather records date back to 1942. Analysis of these records indicates a change in weather over the past 65 years. Climate change observations corroborate perceptions of many local elders. Following are some of the changes that are evident from weather data and local observation.

- The cold season (October–March) has shown the greatest warming. Extreme cold events have decreased in frequency, duration, and severity.
- Total winter snowfall shows an increase, although moisture contribution does not, suggesting that the snow is drier and less compact. Snow comes later in the winter (January–March).
- Temperatures above freezing are more common in March and April. In some years, this results in an early thaw. However, late spring frosts continue, and the start of the growing season (consecutive frost-free days) has not changed.
- River breakup is less dramatic, with thinner ice and less frequent flooding.
- Summer temperatures have remained fairly stable, with a slight cooling trend in daily lows.
- Total annual precipitation has remained fairly stable. Most of it occurs during the warm season (June–September) as rain. June and September precipitation has increased, while July and August precipitation has decreased.
- Warm rainy weather typical of late August extends later into September in some years.
- Despite an increase in the frequency of fall temperatures above freezing (September–October), the first fall frost is coming earlier and the Galena growing season is getting shorter.
- More October precipitation occurs as rain instead of snow. Freeze-up is occurring later, and conditions are less predictable, causing concerns about ice thickness and travel safety.

Climate change research predicts that the boreal region will experience a decline in wetlands, an increased fire frequency and intensity, shifts in the distribution and composition of plant communities, changes in plant phenology, 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. These changes in habitat and wildlife due to climate warming will, in turn, affect the local people who rely on natural resources for food, livelihood, and cultural identity.

Changes in wetlands are of particular concern due to their extent on the Refuge, contribution to biodiversity, and importance to numerous fish and wildlife species. Interior 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 (Ford and Bedford 1987). Climate warming has already caused noticeable widespread melting of permafrost in the boreal region (Osterkamp and Romanovsky 1999, Jorgenson et al. 2001) and increased evapotranspiration, resulting in shallower, more nutrient-rich wetlands (Rouse et al. 1997, Klein et al. 2005, Smith

et al. 2005). These conditions also contribute to an increase in floating mat vegetation, which results in loss of surface water. Over the long term, this insulates the soil and can lead to permafrost re-development. The long-term effects of climate change on lake system dynamics are unclear.

Research and monitoring efforts help us understand the extent of climate-related changes on the Refuge. Since changes also occur on a much broader scale than the Refuge, it is most appropriate to participate in larger, landscape-level efforts to monitor climate change and its effects on wildlife and habitats. Though there may be little the Refuge can do to mitigate these changes, awareness of long-term climate change effects can lead to changes in management strategies. Ongoing communication with resource users regarding environmental changes and discussion of potential management approaches is vital in developing strategies to deal with the effects of climate change on the Refuge.

3.3.3.7 Invasive Species

Although few non-native plant species have been identified within the Refuge, there is concern that the diversity of invasive species and number of sites may expand. Lambsquarter and barley foxtail were discovered recently on the Nowitna. These species readily invade open, disturbed sites such as sand and gravel bars along rivers. Recent burns can provide similar habitat. Individual plants can be removed by mechanical means (pulling or cutting), but several attempts may be needed for eradication. The spread of invasives is accelerated when seeds are moved by wind and water. Finding all occurrences of invasive species on the Refuge may be physically impossible.

3.3.3.8 Forest Defoliators

Invasive, non-native insects (e.g., larch sawfly and eastern larch beetle) have already negatively affected tamarack in the region (Rozell 2007), particularly in the Nowitna River corridor. Spruce budworm (*Choristoneura spp.*) and various leaf miners are of concern because of their ability to rapidly alter plant community composition. Insect induced changes in plant communities, potentially accelerated by climate changes, could significantly affect wildlife communities on the Refuge. Native leaf blotch miners (*Phyllocnistis populiella* and *P. ontario*) affect conifers, aspen, cottonwood, paper birch, and alder. Willow leaf miners (*Micrurapteryx salicifoliella*) attack all of the willow species found on the Refuge except feltleaf willow (*Salix alaxensis*). Repeated heavy insect attacks on the same tree or shrub generally cause reduced growth, and branch dieback and may cause mortality (Holsten et al. 2001).

The spruce beetle (*Dendroctonus rufipennis*) is a bark beetle that attacks white spruce and can cause extensive tree mortality (Holsten et al. 2001). Bark beetles bore through the outer bark then feed and breed in the phloem. If the phloem is girdled, the tree will die. Small populations of beetles are usually present in spruce forests and are kept in check by parasites and predators of the insect. However, epidemics may be caused when an abundance of breeding material is present, often accompanied by an extremely dry summer. Beetles attack and breed in fresh wind thrown trees, felled trees, injured trees, and large diameter logging slash. Proper treatment of logging slash to minimize potential for spruce beetle outbreaks is a condition of the Refuge Special Use Logging Permits.

3.3.3.9 Moose

Moose are a critically important local subsistence species and are widely sought after by sport hunters. Concern was expressed during public scoping for revision of this Plan about

competition with non-local hunters and predators. See section 1.9.1 in chapter 1 for additional discussion of this issue.

3.3.3.10 Predator Control

Moderate densities of moose on the Refuge, coupled with local interest in predator control, may contribute to increased pressure on the Refuge to consider a predator control program in the future. For additional information about predator management on Alaska National Wildlife Refuges, see appendix E.

3.4 Human Environment

3.4.1 Area History

3.4.1.1 Prehistory

The archaeology of interior Alaska is not well known. This section contains a broad overview. Most research has focused on the earliest inhabitants. By about 9000 BC, the unglaciated areas of central Alaska, including the refuge region, was occupied by people belonging to several archaeological traditions, including the Northwest microblade complex, Nenana Complex, Denali Complex, Chindadn, and Sluiceway. These traditions were closely related to the East Siberian groups of the same period. Many authorities consider most of these traditions to be variations of a single Paleo-Arctic tradition (Clark 1981, Clark 2001, Dumond 2001, Holmes 2001).

People from this era used a blade and microblade technology, presumably in conjunction with an extensive kit of bone, antler, and wooden tools. A preferred material for blades and microblades was obsidian. The primary source of obsidian for interior Alaska was the Batza Tena site in the northeast corner of the Koyukuk (Clark and Clark, 1993). Obsidian from Batza Tena has been found in archaeological sites throughout Alaska and portions of northern Canada.

As the glaciers retreated, lines of communication were opened to the south and east. The previously easy routes to the west were blocked by the encroaching Arctic Ocean and Bering Sea. There are indications of contact and perhaps an amalgamation of the Siberian-related cultures and the Paleo-Indian cultures during this period that had been developing south of the continental ice sheets. The Mesa site on the North Slope and the Spein Mountain site in southwest Alaska have been interpreted as a manifestation of the big-game hunting Paleo-Indian tradition, with roots in the Great Plains.

The Northern Archaic tradition began about 6,000 years ago with clear ancestral lines in the Paleo-Arctic tradition. This tradition is defined by the presence of side notched points in tool assemblages. In addition, Northern Archaic people used leaf-shaped spear points; large bifaces; a variety of end scrapers, choppers and hide scrapers; and notched stone net sinkers. Net sinkers signal a significant shift in subsistence from land based hunting to a mixed hunting and fishing economy that incorporated the rich fish resources available in lakes and rivers. The presence or absence of microblades in Northern Archaic sites remains a debated point of northern archaeology. Microblades are rare at most sites dating after this time, but they never totally disappear from the record.

The Northern Archaic tradition lasted until about 2,000 years ago and is generally assumed to be ancestral to the more recent cultures of the area. This later prehistoric period, up until European contact, is characterized by small, tapered-stem projectile points, ground-stone hide and wood working tools, bone implements, and limited use of copper. Sites from this period

are larger than those of the earlier Northern Archaic and Paleo-Arctic peoples and contain semi-subterranean houses and cache pits. There is, however, substantial diversity in the sites of the later period. The advent of sites that can be described as clearly being in the “Athabaskan tradition” is highly variable in time. Much work remains to be done to clarify and explain what have been described as somewhat ambiguous data (Clark 1981).

3.4.1.2 Ethnography

The majority of the Koyukuk and Northern Unit Innoko lie within the territory of the Koyukon Athabaskan Indians. The Northern Unit Innoko falls into the Lower Yukon subdivision; while the Koyukuk falls into the Koyukuk River subdivision. The northwestern portion of the Koyukuk River has been described as being within the territory traditionally inhabited by Eskimos, however, that area was sparsely populated, and the Eskimo population will not be discussed here. The Nowitna lies within the territory of the Upper Yukon subdivision. The Koyukon Athabaskan depended heavily on the anadromous fish resources of the Yukon and Koyukuk rivers and their major tributaries, along with moose, caribou, and a variety of other fish, small game, and—to a lesser extent—plant resources for their food source. They frequently occupied large semi-permanent villages and fish camps during the summers and dispersed from these into the tributary drainages for hunting and trapping in the fall and winter.

At the time of European contact, it was estimated that the Lower Yukon Koyukon group numbered about 425 individuals, while the Koyukuk River Koyukon numbered over 289 people, and the Upper Yukon Koyukon were at about 300 people. Koyukon and Upper Yukon groups were generally divided into small bands of less than 50 members that were based on a core of several matrilineal extended families and included some unrelated individuals. Band territories were fairly well defined and quite large, reaching as much as 50 to 75 miles across. In the Lower Yukon area, there was no clan development, and band areas were exploited by groups based on semi-sedentary villages. Communal property (most large game hunting areas, fowling areas, and berry picking areas) was present within most band territories, but other sites were seen as private or family property e.g., beaver houses and ponds, other trapping areas, fishing sites, and bear dens (Clark 1981).

There was no distinct developed political organization among the Koyukon, although individual leaders were recognized in some cases (most commonly, they were economically successful and often the owners of the best fishing, hunting, and trapping areas). The elders of a group might be called upon to decide on important matters, but this was not a structured process. The Koyukuk River Koyukon maintained friendly relations with the Upper Yukon group. However, the Koyukuk River and Upper Yukon Koyukon regarded the Lower Yukon Koyukon as hostile (Simeone 1982).

3.4.1.3 History

European presence in the Middle Yukon region began with Andrei Glazunov’s exploration up the Unalakleet river and overland to the Yukon settlement of Ttutago in 1837 (deLaguna 2000). Declining sea otter populations had prompted the Russian-American company to seek new sources of fur on Alaska’s Arctic coast and in the interior. In 1838, Petr Vasil’evich Malakhov of the Russian-American Company followed a similar route to Glazunov’s. He found a suitable location for a trading post near the mouth of the Nulato River. Despite tremendous impacts of smallpox in Nulato, a post was established the following year. For the first several years, operation of the post was intermittent due to lack of food and periodic burning of the company’s buildings by local Natives.

European trade goods had become available some years earlier through Yupik and Inupiaq Eskimo middlemen trading from the Lower Yukon, Norton Sound, and the northwest coast (De Laguna 2000). In 1842, Lieutenant Lavrentii A. Zagoskin of the Russian Navy was sent to investigate the unknown trade routes by which much fur from the Nulato region was bypassing the post and reaching Kotzebue and thence Siberia. In 1843, Zagoskin led an exploration up the Koyukuk River as far as the Kateel River, where he discovered a well-established trade network between the Koyukuk Indians and Malemiut Eskimos of Kotzebue Sound (De Laguna 2000). Zagoskin also led an expedition up the Yukon River to near the mouth of the Nowitna River. The party encountered a number of camps and settlements along the Yukon River, as well as native traders from the upper Innoko River.

The establishment of the Hudson's Bay Company Post at Fort Yukon by Alexander Hunter Murray in 1847 provided competition for the Russians and reduced the importance of the Lower Yukon Koyukon as trade middlemen for the upriver Koyukon. The post was continuously operated until 1869 (Turck and Turck 1992). There was an important Native trading site and settlement called Nowikakat at the mouth of the Nowitna River, which was visited by the explorers Whymper and Dall from the Scientific Corps of the Western Union Telegraph Expedition in 1867 (De Laguna 2000). At the time, Nowikakat was a substantial village of some 150 residents who were living in skin and commercial woven fabric tents. The natives were equipped with English flintlocks, as opposed to percussion rifles which were obtained from the Russians (Simeone 1982). The first trading post in the immediate vicinity of the Nowitna was established in 1869 by Gregory Hakorcins (later changed to Kokrines), a Russian or Creole trader, at Fourteen Mile. Hakorcins subsequently moved his post to the site on the Yukon River currently known as the Kokrines. This move resulted in the move of the entire village Nowikakat (Hart 1981).

Unrest between Native trade groups and the Russians, including periodic raids and attacks, was somewhat common in the region and culminated in the Nulato Massacre of 1851. This attack was one of a series of strikes made by the Koyukuk River people against the Lower Yukon Koyukon, likely the result of trade rivalry. It resulted in the death of over 50 people living in and around the trading post. Despite these difficulties, the Nulato post continued to serve as a profitable trading station until the Alaska Purchase in 1867.

The upper Koyukuk River area remained virtually unexplored by non-Natives until 1885 when Lieutenant Henry T. Allen was sent by the U.S. Army to investigate reports of a drop in prices paid for furs and to count the Native people. Gold prospectors followed Allen and by the late 1880s had begun what has been a long history of mining in the area (mainly upriver of the Koyukuk). The first ascent of the Koyukuk River by steamboat occurred in 1897. The same year, a U.S. Post Office was established at Nulato. The first wood-powered paddle-wheeler had begun regular service on the Yukon River in 1869. The cutting of cordwood for the steamboats provided some income to Natives living along the river. Gold was discovered near Ruby in 1907, beginning another substantial influx of outsiders to the area. Mining interests in the Ruby region were generally confined to the area west of the Nowitna (Hart 1981).

The construction of a military telegraph line and posts along the north side of the Yukon River brought more Americans into the area at the turn of the twentieth century. The posts were located about 40 miles apart, resulting in a semi permanent Euro-American presence throughout the area. However, the line was virtually abandoned by about 1915 (Simeone 1982). Roadhouses became established to accommodate dog teams hauling mail and other winter travelers and remained for some time scattered along the Yukon at approximately 30-

mile intervals (Hart 1981). Wireless radio transmitters were installed at telegraph stations along the river in 1922, operated by the U.S. Army Signal Corps (Hart 1981).

Interest in gold mining had generally subsided by the 1920s, and numerous miners left the region upon being called up to fight in World War I (Hart 1981). Many of the remaining residents turned to trapping for income. A boom in fur prices in the 1920s and 1930s filled the river valleys with trappers, both Native and white. Many of the Natives had begun to settle in communities that offered a store, school, and church. Missionaries had begun work in the region near the turn of the century. Several mission schools were well established by World War I. Changes in technology continued to affect life in the Koyukon Region, with airplanes and gas engines replacing the dog team and paddled boats.

A long steady process of change for the Koyukon people was well underway by World War I. The shift from a semi-nomadic, subsistence oriented lifestyle to a community centered, sedentary lifestyle became more complete by 1956, by which time all of the Koyukon villages had a school (Turck and Turck 1992). Requirements for year-round school attendance had significant impacts on the culture and lifestyle. Prior to 1976, most communities did not have secondary schools, and older students were sent to boarding schools. Community infrastructures developed to accommodate increasing populations and changes in technology. Airports; roads; housing developments; clinics; and water, sewer, and electrical systems gradually became available in each village. The passage of the 1971 Alaska Native Claims Settlement Act (ANSCA) also had substantial impacts on the organization of tribes and their relationship to the land. Despite all these changes, the harvest of fish, game, and other resources remained vital components of the Koyukon economy and culture. When the Alaska National Interest Lands Conservation Act (ANILCA) became law in 1980, it contained language specifically supporting continued traditional and customary use on federal lands. Contemporary life in the Koyukon region today is a unique blend of modern culture along with subsistence practices and other lifestyle elements which differ surprisingly little from the days of first European contact.

A summary table of historic events is found in appendix I.

3.4.1.4 Archaeological and Historic Sites

The Koyukuk has 269 recorded historic and cultural sites. Of these, 128 are listed on the Alaska Heritage Resources Survey (AHRs), and most of these are archaeological sites. The non-AHRs sites include place names, historic sites, cabins, and other reported but unverified sites. The best known archaeological sites on the Koyukuk include Hahanudan Lake, the Batza Tena obsidian source on the Little Indian River, and the Nogahabara sand dunes. The sites at Hahanudan Lake represent an apparent intrusion of Ipiutak Eskimo peoples into an area presently occupied by Athabascans (Clark 1977). Artifacts from these sites are similar to those recovered from the Ipiutak site at Point Hope. Sites around Little Indian River span a time period of up to 12,000 years and a wide diversity of cultures ranging from Paleo-Indian materials (fluted points) up through sites from the immediate pre-contact period (Clark and Clark 1993). This area accounts for over 75 of the AHRs sites listed for the Koyukuk. One site on the Nogahabara sand dunes is a Pleistocene age site where over 260 biface and uniface tools, microblades, and preforms were recovered (Odess and Rasic 2007). Within the assemblage are microblade cores, lanceolate bifaces, and notched projectile points—tool types previously thought to be characteristic of unrelated cultural traditions and archaeological complexes. Most artifacts were obsidian from Batza Tena and showed transport wear that demonstrates a high level of material conservation.

During later prehistoric periods, the question of the dynamics between coastally adapted (Norton, Ipiutak) people moving inland and their interactions, if any, with Athabascans is of great archaeological interest. If more recent sites are found, they would provide information on the development and adaptations of Koyukon Athabaskan culture. The history of the Koyukuk River area is incomplete. Historic remains are an invaluable record of the early exploration and use of this area of the refuge.

The Northern Unit Innoko has about 175 recorded native place names but no recorded archaeological or historic sites, and nothing listed on the AHRS.

The Nowitna has 10 recorded sites, including two on the AHRS. Among these is Nowikakat, a settlement and trade center situated at the mouth of the Nowitna River. No extensive work has been done at this site. The present extent of the remains of the village is unknown. Two other reported camp locations (Minkhotlyatno River Camp at the mouth of Big Creek, and Tsoonakeek'at on Junakaket Slough) may also contain archaeological remains.

It is unlikely that these small and geographically restricted samples represent the true extent of the archaeological resources of the Refuge. It is probable that there are a substantial number of sites that have yet to be discovered. Since the area was unglaciated during the late Pleistocene, it is entirely possible that other very early sites may be located within the Refuge. Due to the meandering nature of the streams of the area, many such sites may already have been destroyed or covered by natural causes. There is a high likelihood of finding recent sites on present stream banks, but older sites probably only remain on higher ground.

3.4.2 Population and Settlement Patterns

3.4.2.1 Overview¹

The Refuge lies within the Yukon-Koyukuk Census Area (Figure 3-10), which covers over one-quarter of Alaska's landmass but is home to less than 5,900 people (Table 3-11). Three other national wildlife refuges are also located wholly or partially within the Census Area. Most of the Refuge, and most of the communities affected by refuge management, lie within the Koyukuk-Middle Yukon Census Sub-area. Galena is the largest community in the sub-area, with 675 residents.

Table 3-11. Population trends in the Yukon-Koyukuk Census Area in Alaska 1990–2020.

Yukon-Koyukuk Census Area – Alaska						
	Census		Estimate	Projections		
	1990	2000	2006	2010	2015	2020
Population	8,478	6,551	5,844	5,899	5,766	5,595

About 70 percent of the Yukon-Koyukuk Census Area population is Alaska Native. Forty-six percent of area residents are female, and the median age is 32. Males have a median age of 33. Roughly 74 percent of the adult population has at least a high school education, and 14 percent have completed a bachelor's or higher degree.

¹Except where otherwise noted, this section is adapted from: Windisch-Cole, B. 2001: The Yukon-Koyukuk Census Area: A profile of rural Interior Alaska. *Alaska Economic Trends*, 21(2).

The Institute of Social and Economic Research (ISER) at the University of Alaska prepared a set of population projections for Alaska in the late 1980s (Goldsmith 1986) based on four different economic scenarios. The population in the Yukon-Koyukuk region was projected to grow between zero and 31 percent from 1986–2010. After a short period of growth, however, the populations of most communities in the region stabilized or began to decline. In 2000, there were just over 2,200 residents in the region—about 100 *fewer* than in 1980 (Table 3-12). Most of the reduced population is attributable to declines in Galena, which now has nearly 200 fewer residents than in 1990. Huslia is the only village to have had a substantial population increase since 1980 (Table 3-12). Current population projections suggest a continued but less dramatic decline for the Yukon-Koyukuk Census Area (Palin et al. 2007) (see Table 3-12).

Table 3-12. Population trends in the Koyukuk, Northern Unit Innoko, and Nowitna area communities.

COMMUNITY	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000
Galena	0	0	0	0	0	67	44	176	261	302	765	833	675
Hughes	0	0	0	0	45	0	32	49	69	85	73	54	78
Huslia	0	0	0	0	0	0	0	65	168	159	188	207	293
Kaltag	45	29	0	141	89	137	140	121	165	206	247	240	230
Koyukuk	150	174	0	121	124	143	106	79	128	124	98	126	101
Nulato	168	118	281	230	258	204	113	176	283	308	350	359	336
Ruby	0	0	0	0	128	132	138	132	179	145	197	170	188
Tanana	0	203	186	398	213	185	170	228	349	120	388	345	308
TOTAL	363	524	467	890	857	868	743	1,026	1,602	1,449	2,306	2,334	2,209

3.4.2.2 Principle Refuge-Affected Communities²

Residents of eight local villages rely most heavily on the Refuge for subsistence resources. These communities are Galena, Hughes, Huslia, Kaltag, Koyukuk, Nulato, Ruby, and Tanana (see Figure 3-10 for locations). Galena is important as a regional service hub and population center and as the site of the refuge headquarters. Within the broader region, these eight communities are most likely to affect, and be affected by, refuge management.

All of the villages are accessible by air or water only. No roads connect these villages with any other community or to Alaska’s road system. All the villages are located on the bank of a major river: six are on the Yukon River, and two are on the Koyukuk River. Rivers are essential to local transportation—boats provide warm season transportation between villages and access to subsistence resources, and river barges deliver cargo during summer months. Snowmobile trails are established on the rivers for winter travel. Automobiles, snowmobiles, ATVs, and boats are used for local transportation within the village. State-owned, lighted gravel airstrips provide year-round access. Galena has the only paved airstrip. Supplies, services, and travel out of the region generally route through Fairbanks, the urban center of interior Alaska.

²Except where otherwise noted, this section is adapted from the Alaska Community Database Online, provided by the Alaska Department of Commerce, Community, and Economic Development and accessed online at: www.commerce.state.ak.us/dca/commdb/CF_BLOCK.htm

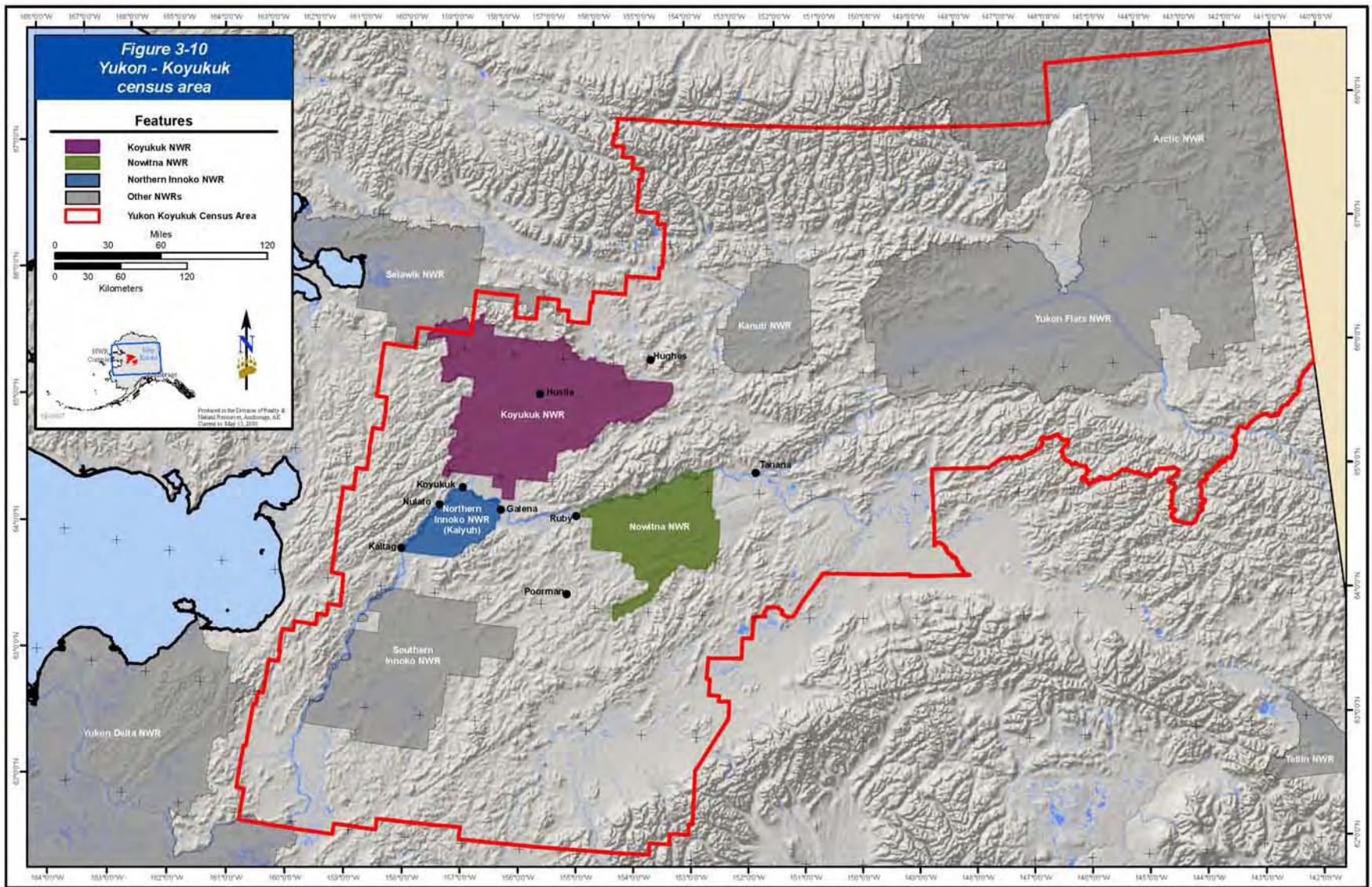


Figure 3-10. Yukon-Koyukuk Census Area

Galena

Galena is located on the north bank of the Yukon River 270 air miles west of Fairbanks. It lies just north of the northeastern portion of the Northern Unit Innoko and is less than 10 miles south of the Koyukuk. Galena was established in 1918 near a fish camp called “Henry’s Point” as a supply point for nearby lead ore mines. In 1920, Natives living 14 miles upriver at Loudon began moving to Galena to sell wood to steamboats and to work hauling freight for the mines. A school was established in the mid-1920s, and a post office opened in 1932. Military presence at Galena began in 1941 with the construction of a runway and hangar adjacent to the civilian airport. In 1945, the community suffered a major flood. During the 1950s, military facilities at Galena and the nearby Campion Air Force Station were constructed in support of the 5072nd Air Base Group, headquartered at Elmendorf Air Force Base, Anchorage. The Air Force presence in Galena provided improvements to the airport and the local infrastructure and economic growth for the area. Due to another severe flood in 1971, a new community site (New Town) was developed alongside Alexander Lake, about 1.5 miles east of the original townsite. City offices, the health clinic, schools, a store, and more than 150 homes were eventually constructed in “New Town,” and a city government was formed. The Galena Air Force Base was placed in a caretaker status in 1993, following the end of the Cold War. It was decommissioned in 2008. Some of the base facilities are being used by the Galena School District as a boarding school. Galena serves as the transportation, government, and commercial center for the western interior. Federal, State, city, school, and village government jobs dominate, but there are other jobs associated with air transportation and retail businesses.

Hughes

The community of Hughes, situated on the east bank of the Koyukuk River, is surrounded by the Indian Mountains to the east, the Hatdolitna Mountains to the north, and Hughes Mountain directly west of the town. Hughes is about 210 miles northwest of Fairbanks, 65 miles northeast of Huslia, and 12 miles north of the Koyukuk. Hughes is the smallest of the communities near the Refuge with a population of 78 in 2000. There are strong social ties between the residents of Hughes and Allakaket and Huslia.

Traditionally, the Hughes area was used as a trade center between the Athabascan and Inupiaq Eskimo. In 1884, Roy Hughes prospected an area two miles upstream from the village, but according to the U.S. Geological Survey, the community was named in 1910 after New York Governor Charles Hughes. It served as a riverboat landing and supply port for the Indian River gold fields until 1915 when the local mining industry declined. The Hughes Post Office was established in 1942. An airstrip was built in the 1950s, a school in 1956, and a clinic in 1968. The city was incorporated in 1973. Local roads were built in 1974. A community-wide electric system was developed in 1981. In September 1994, flood waters destroyed and swept away nearly all of the community buildings, homes, and winter food caches. Residents rebuilt homes and facilities following the flood. River transportation is very important to Hughes, although barge service is not reliable due to shallow water. Most fuel and heavy freight is brought in by air.

Huslia

Huslia is the only community located within refuge boundaries (Koyukuk). It is situated on the east bank of the Koyukuk River in the Koyukuk Lowland. The lands surrounding Huslia are generally low with numerous lakes, streams, and rivers. Roundabout Mountain is 12 miles southwest of Huslia on the opposite side of the Koyukuk River. The Huslia River flows east

across the northern portion of the Koyukuk to its confluence with the Koyukuk River midway between the old townsite of Cutoff and Huslia. Because of its location, subsistence activities of Huslia residents are centered on the Koyukuk.

The village of Huslia traces its roots to the Cutoff Trading Post, which was established in the 1920s about 4 miles north (16 river miles) of Huslia. In 1949, the community moved to the present site because the Cutoff location flooded frequently, the ground was swampy, and the drinking water was of poor quality. Huslia (originally spelled Huslee) was named after a local stream. The area had been used as a burial site since 1886, but by the time of the move, most of the old cemetery had been destroyed by bank erosion. In 1950, the first school was established, followed in 1952 by a post office, airport, and limited road construction. At that time, families began to live year round at Huslia. In 1960, a health clinic was constructed, and in 1963, hand-pumped water wells were installed. The city government was incorporated in 1969. Running water and indoor plumbing arrived in 1974. A new airstrip was constructed during the summer of 2000, and new homes have been built along the old airstrip. A new clinic and water plant were constructed during 2005–2007. Cargo arrives by barge several times a year. Huslia is accessible by air year round.

Kaltag

Kaltag is located on the west bank of the Yukon River at the base of the Nulato Hills, directly across the river from the Northern Unit Innoko. Some residents of Kaltag have historic ties to the Kaiyuh Flats and continue to use the southwest corner of the Northern Unit Innoko. The village is 335 miles west of Fairbanks, 33 miles southwest of Nulato, and 75 miles west of Galena. The community has undergone numerous changes during its 150-year history. It was located on an old portage trail, which led east through the mountains to Unalakleet. It served primarily as a cemetery for surrounding villages until about 1900, when disease and starvation dramatically affected the Native population. Survivors from nearby areas moved to Kaltag to regroup. During the next 30 years, mining and steamship activity caused a mini-boom in the area. A series of schools and post offices opened, closed, and re-opened again during this period. Modern facilities, including an airport and clinic, were constructed in the 1960s. The city government was incorporated in 1969. A lighted airstrip, regular barge service, and the 90-mile Old Man Trail to Unalakleet provide relatively good access into and out of the community.

Koyukuk

The village of Koyukuk is located at the confluence of the Yukon and Koyukuk rivers, directly across from Koyukuk Island and the Kaiyuh Flats, and about 10 miles south of the Koyukuk. Koyukuk is 290 miles west of Fairbanks and 30 miles west of Galena. In 1867, Koyukuk became the site of a telegraph station when the military telegraph line was established on north side of the Yukon River. A trading post opened around 1880, just before the gold rush of 1884–1885. The post office was first operated in 1898. The first school was constructed in 1939. After the school was built, families began to live in Koyukuk year round. The city was incorporated in 1973. The community has experienced severe flooding from both the Yukon and Koyukuk rivers, most recently in 2006. Significant erosion of the riverbank since the 1960s has also caused loss of structures, including homes, a Bureau of Indian Affairs (BIA) school, a church, a store, and two community halls. The community is considering relocation to a higher site within a few miles of the current location. Koyukuk has a small local road system, summer barge service, and a State-owned, lighted gravel airstrip. The airstrip was rebuilt in 2005–2006 to raise it above the floodplain.

Nulato

Located next to the Nulato Hills, Nulato lies on the west bank of the Yukon River across from the Kaiyuh Flats. Nulato is located 310 air miles west of Fairbanks and 35 miles west of Galena. The first trading post in the region was established at Nulato by the Russians in 1839. Nulato was a center of missionary activity. Many area Natives moved to the village after a Roman Catholic mission and school, Our Lady of Snows Mission, was completed in 1887. A post office was opened in 1897. Nulato incorporated as a city in 1963. During the 1970s, a clinic, water supply, new school, and telephone and television services were developed. In 1981, housing development began above the floodplain at a new townsite located on a hill north two miles from the old townsite. Nulato has a small local road system, summer barge service, and an airstrip.

Ruby

Ruby is located on the south bank of the Yukon River in the Kilbuck-Kuskokwim Mountains, just downstream from the confluence of the Melozitna and Yukon rivers. It is about 230 air miles west of Fairbanks and 50 air miles east of Galena. Ruby lies adjacent to the western edge of the Nowitna. The 35-mile State-maintained road south to Long Creek Mine comes within eight miles of the Nowitna.

Ruby developed as a supply point for gold prospectors following a gold strike at Ruby Creek in 1907. The village was named for the red stones, thought to be rubies, found in the same creek. At the time, there was a telegraph station across the river at Melozi. In 1911, a second gold strike 30 miles south at Long Creek attracted hundreds more prospectors to the area. At one time, over 1,000 miners lived in Ruby and around the nearby creeks. Placerville, Poorman, Sulatna Crossing, Kokrines, and Long Creek were some of the area's boom settlements.

A post office was established in 1912. Ruby incorporated as a city in 1913. Initially, the city was governed by miner's meetings, then later by Pioneer Igloo Number 5 Lodge. After the gold rush, the population declined rapidly. By 1939, there were only 139 residents. During World War II, the mining operations were shut down, and most of the residents left. After the war, the remaining residents of nearby Kokrines relocated to Ruby, and the population began to increase. Gold mining continues in the area on a very small scale. In 1998, Barry Clay discovered the largest gold nugget ever found in Alaska. It weighed over 294 troy ounces and was found in the Long-Poorman area. Ruby incorporated as a second class city in 1973. A clinic, water source, and schools were constructed in the 1970s. During the 1980s, telephones and television services were provided. Construction of a new water source, water treatment plant, and washeteria was completed during the past decade. Ruby is accessible by a lighted gravel airstrip, and barges make several deliveries each summer. Riverboats, trucks, snowmobiles, and ATVs are used for local transportation.

Tanana

Tanana is located on the north bank of the Yukon River a few miles west of its confluence with the Tanana River. The village is located about 130 miles west of Fairbanks and about 25 miles east of the Nowitna. Tanana was a traditional trading settlement for Koyukon and Tanana Athabascans before European contact. In 1880, Harper's Station, an Alaska Commercial Company Trading Post, was established 13 miles downriver from the present townsite. In 1881, Church of England missionaries from Canada built a mission eight miles downriver. Between 1887 and 1900, an elaborate school and hospital complex, the St. James Mission, was constructed. It became an important source of services and social change along both rivers.

In 1899, Fort Gibbon was founded at Tanana to maintain the telegraph line between Fairbanks and Nome. A post office was also established, and several other trading posts developed around the turn of the century. Fort Gibbon was abandoned in 1923. The St. James Hospital was transferred to the BIA administration in the 1920s. During World War II, an air base was established near Tanana as a refueling stop for the lend-lease aircraft program. New hospital facilities were built in 1949; and during the 1950s, hospital administration was transferred to the U.S. Public Health Service. The City of Tanana was incorporated in 1961. The hospital complex was a major employer during this period but was closed in 1982. Also in 1982, Tanana incorporated as a first class city to assume control of the local school system. The hospital facilities were remodeled for use as a health clinic, counseling center, tribal office, and Regional Elders Residence. Tanana is accessible only by air and river transportation. The city maintains 32 miles of local roads and a dock on the Yukon River.

3.4.2.3 Social Infrastructure

Social infrastructure includes local government, housing, education, health services, local transportation, water and sewage systems, solid waste disposal, police and fire protection, and communication systems.

Galena and Tanana are first class cities. The other villages are incorporated second class cities. All eight villages have mayor-council governments. Traditional tribal governments are active in all of the villages.

All of the communities are eligible for land entitlements under the Alaska Native Claims Settlement Act. The Native residents of area communities are shareholders in Doyon, Limited (the regional Native corporation), members of the non-profit Tanana Chiefs Conference, and shareholders in local village corporations organized under ANCSA. The regional and local corporations have land holdings and are often involved in local business concerns. Table 3-13 lists the communities and their respective village corporations.

Table 3-13. ANCSA village corporations in the vicinity of the Refuge.

Community	ANCSA Village Corporation
Galena	Gana-A'Yoo, Limited
Hughes	K'oyitl'ots'ina, Limited
Huslia	K'oyitl'ots'ina, Limited
Kaltag	Gana-A'Yoo, Limited
Koyukuk	Gana-A'Yoo, Limited
Nulato	Gana-A'Yoo, Limited
Ruby	Dineega Corporation
Tanana	Tozitna, Limited

The communities all have a similar infrastructure. Law enforcement is provided by city police departments in the villages of Galena and Tanana; village public safety officers in Huslia, Nulato, and Ruby; and the Alaska State Troopers in all villages.

Elementary and secondary schools are available in all of the villages. The Tanana Chiefs Conference offers the Headstart program for preschoolers in Huslia, Kaltag, Nulato, Ruby,

and Tanana. Galena's Headstart program is run by Galena City Schools. The Galena School District also operates the Galena Interior Learning Academy, a high-school level boarding school, as well as the IDEA home-school support program.

Health facilities are provided in the villages by the Indian Health Services, which is under the U.S. Department of Health and Human Services. Clinics are staffed by health aides trained by the U.S. Public Health Service (PHS). Galena has medical and mental health facilities at the city-owned Edgar Nollner Health Center, which also provides services to outlying villages. In addition, PHS physicians and other health caregivers visit the villages regularly.

Communication facilities are relatively good in the area. Post offices, satellite communications (telephone and television), and electricity are available in all of the communities. The region is served by a public radio station (KIYU) located in Galena.

Housing consists of both wood frame and log homes. Most homes date from the 1960s with recent construction becoming more common. Public lodging is available in Galena, Huslia, Ruby, and Tanana. Community water and sewage systems are available to most residents. Many residents haul water from a public water source (drilled wells). Some of the Galena residents are served by a centralized water system.

3.4.3 Subsistence Way of Life

In 1980, the U.S. Congress passed the Alaska National Interest Lands Conservation Act (ANILCA), which established the Refuge, along with other conservation system units. One of the purposes of the Act, and of the Refuge, is to provide the continued opportunity for rural residents to stay engaged in a subsistence way of life (ANILCA sec. 101(c)). Subsistence is regarded as a way of life rather than merely a recreational activity. The meanings of subsistence are based on a culture that has been shaped over the years by family traditions, religion, relationships with particular animals and places, and a preference for natural foods.

Several communities rely on the resources of the Refuge for subsistence purposes: Hughes, Huslia, Koyukuk, Nulato, Kaltag, Galena, Ruby, and Tanana are all either adjacent or within the Refuge. The primary subsistence-use areas within the Refuge are the rivers and river corridors of the Yukon, Koyukuk, Huslia, and Nowitna rivers, as well as the Kaiyuh Flats and Dulbi Slough.

A wide variety of subsistence activities occur year round on the Refuge, while other activities are seasonal and depend upon the resource and its location. Waterfowl hunting, a common subsistence activity, occurs in late spring and fall. Fishing for northern pike, by jigging through the ice, typically occurs in the early spring. As spring turns to summer, salmon fishing begins, starting with Chinook and summer chum, and then progressing to Coho salmon and fall chum in late summer and fall. Sheefish and other whitefish species are also caught during the summer. Berry picking and the gathering of other plants occurs during the late summer. Moose hunting and firewood gathering are primarily fall activities. Throughout the fall and early winter, blackfish, burbot, and whitefish are harvested. As lakes and rivers begin to freeze in early winter, nets are sometimes set under the ice for whitefish and northern pike. Other animals hunted during the fall and winter months are Spruce and Ruffed grouse, ptarmigan, snowshoe hare, muskrat, beaver, and black and grizzly bear. Trapping begins after the lakes and ponds have frozen, usually during early November. Marten, beaver, lynx, and fox are the primary furbearers trapped. Other species include: muskrat, mink, otter, wolf, and wolverine. Early spring is also a traditional time to harvest moose and caribou, provided populations are stable.

Following is a description of subsistence activities in the villages surrounding the Refuge.

Galena

Galena's central location allows residents to use the Refuge. Large mammal hunting in Galena focuses mainly on moose, although bear and caribou are taken, when available. The Yukon and Koyukuk rivers and their tributaries are used for traveling to moose and black bear hunting areas. The Alaska Department of Fish and Game (Brown et al. 2004) reported 110 moose were harvested (on average) each year from 1997–2003 by Galena residents. During the same time period, an average of 17 caribou and 11 black bear were harvested each year (Brown et al. 2004).

Galena residents harvest fish primarily from the Yukon River. A smaller percentage of fish are caught in tributaries, sloughs, and lakes off the Yukon River. Set nets, drift nets, and fish wheels are utilized for harvesting salmon. From 1994–1998, an average of 1,992 Chinook, 2,792 summer chum, 3,814 fall chum, and 636 Coho salmon were harvested each year. From 1999–2003, an average of 1,943 Chinook, 712 summer chum, 955 fall chum, and 402 Coho salmon were harvested each year (Busher et al. 2008). From 1999–2003, an average of 1,943 Chinook, 712 summer chum, 955 fall chum, and 402 Coho salmon were harvested each year (Busher et al. 2008).

Trapping is still a common activity that supports the subsistence lifestyle of residents. Residents use the Koyukuk, Northern Unit Innoko, and main Innoko refuges for furbearer trapping.

Hughes

There are strong social ties between the residents of Hughes and Allakaket and Huslia. The stretch of river that lies between the villages is the focus of many subsistence activities. Moose are a primary source of protein in Hughes, although they were generally not hunted before the 1930s. Residents of Hughes hunt moose along the Koyukuk River, from the mouth of the Kanuti River to below Hog River Landing, and up the Little Indian River. Most of the hunting is concentrated in the Huggins Island–Matthews Slough area on the Koyukuk. The river corridor that is used for moose hunting is also used for black bear, waterfowl, and some small game hunting. Black bear are hunted primarily in the early fall, though a few are taken in the spring.

Hughes residents also participate in bird and waterfowl hunting. In 1998, residents harvested a total of 130 ducks and 128 geese, nearly 7.3 birds per capita, the highest in the region (Webb 1999). Most of the small game hunting takes place in the area surrounding the community. Common species taken include snowshoe hare, grouse, and ptarmigan.

Caribou have historically been an important food source. More recently, when the Western Arctic caribou herd comes into the Hughes-Huslia area, residents will hunt them.

Fish comprise the largest volume of food harvested in Hughes. Summer run chum salmon make up a major portion of this harvest. Much of the fishing is done using set nets at fish camps along the Koyukuk River from Discovery Creek to Florence Island. The lower part of this harvest area is within the Koyukuk. Most of the fishing occurs downstream from the community where the salmon are more abundant and in better condition. Non-salmon fish, including blackfish, burbot, grayling, northern pike, sheefish, sucker, and whitefish are also harvested. Whitefish species—such as broad, humpback, and cisco—are harvested mainly with a set or seine net in the Koyukuk River. In 2002, an estimated 12,541 pounds of non-

salmon fish (burbot, grayling, pike, sheefish, sucker, and whitefish) were harvested by Hughes residents (Andersen et al. 2004).

Trapping areas, used by the residents of Hughes, include the general area from the Hatdolitna Hills west to the Hogatza River and from the Klikhtentotzna Creek area south to the Takhakhдона Hills. The southern portion of the Hughes trapping area is within the Koyukuk.

Plant gathering is an activity which fulfills a wide range of needs in the community. Most buildings, including houses, smokehouses, and storage buildings, are built from local timber. Wood is the normal heat source. Firewood is generally gathered close to town, along the Koyukuk River between Hughes and Allakaket, or in a nearby burn area. Smaller poles are used for wall tents and fish drying racks.

Huslia

Huslia is located within the Koyukuk. Due to Huslia's location, subsistence activities (2004 census indicated 269 individuals) are focused on the Koyukuk. Residents often utilize resources in a large proportion of the Refuge.

Large mammal hunting focuses on moose, caribou, and black bear. Residents mainly hunt for large mammals along the Koyukuk, Huslia, and Dulbi River corridors. Caribou are taken when available. On average, 77 moose, 120 caribou, and 26 black bear were harvested annually from 1996 to 2003 by Huslia residents (Brown et al 2004).

Waterfowl and small game are also important food sources. In 1998, 535 ducks and geese were harvested in the surrounding area (Webb 1999). Small game hunting has concentrated on hares, beaver, muskrat, ptarmigan, and grouse.

Trapping is a major activity that supports the subsistence lifestyle of the residents, providing furbearers for clothing, crafts, and sale, as well as food. The first part of the trapping season focuses on marten, fox, and lynx. In February and March, trapping emphasis shifts to beaver. They are harvested for their meat and their pelts. The area used for trapping by residents extends over much of the Koyukuk. People use the area up the Dakli River north to the Continental Divide, Cutoff Slough and the mouth of the Hogatza River, the Holitnakakatina Creek and Natlaratlin River areas to the south, from the Nayuka and upper Dulbi rivers to Three Day Slough, and along the Huslia River to the Nulato Hills to the west.

The harvest of fish occurs primarily in the Koyukuk River, from Cutoff Slough to the mouth of the Dulbi River. Nets are set for sheefish and whitefish in May, as soon as the ice melts. In 2002, the total community harvest of these species was 873 sheefish and 4,650 whitefish. A total of 33,635 pounds of non-salmon fish (blackfish, burbot, lake trout, grayling, pike, sheefish, sucker, and whitefish) were caught in 2002 (Andersen et al. 2004). Summer chum salmon are the most heavily harvested of the fish species. Fall chum salmon, pike, and Chinook salmon are also important harvest species.

Kaltag

Some of the residents have historic ties to the Northern Unit Innoko and continue to use the southwest corner of the Refuge and the area south of Kaltag from Kaiyuh Slough along the Yukon and Khotol rivers. Most of the resource use by residents occurs off of the Refuge.

As in the other communities in the region, Kaltag residents depend on moose, waterfowl, small game, and fish for protein. Caribou are also taken in the Nulato Hills when available. Berries are harvested for food. Wood is gathered for fuel and building materials.

On average, 41 moose were harvested annually by residents from 1996–2003. Most moose hunting takes place along the Yukon River and its smaller tributaries. A considerable portion of protein harvested by residents comes from salmon. During the 1994–1998 salmon fishing seasons, an annual average of 1,489 Chinook, 820 summer chum, 793 fall chum, and 220 Coho salmon were harvested. During the 1999–2003 fishing seasons, an annual average of 1,581 Chinook, 413 summer chum, 520 fall chum and 330 Coho were caught (Busher et al. 2008).

Koyukuk

As with other communities in the region, the residents depend on the resources of the Refuge for their living. They use portions of both Koyukuk and Northern Unit Innoko. Use of the Koyukuk centers on the Koyukuk River, from the Three Day Slough area south to the Yukon River, including parts of the Natlaratlen River to the east, and the Gisasa, Honhosa, and Kateel rivers to the west. The northwest portion of the Northern Unit Innoko is used, primarily the Squirrel Creek drainage north to the Yukon River.

Similar to other communities in the area, residents depend mainly on moose and salmon for the majority of their protein; and bear, caribou, small game, waterfowl, other fish, and plants are also harvested when available. Residents of Koyukuk harvested an annual average of 14 moose from 2001–2007 (ADF&G 2008). During the 1997 spring and fall waterfowl hunting season, residents of Koyukuk harvested 202 ducks and 209 geese (Webb 1999).

Nulato

Residents use the Kaiyuh Flats, refuge lands along the Yukon River and up the Koyukuk River, as far as the Three Day Slough area, and the Nikolai Slough northwest of Galena.

The Kaiyuh Flats, which is productive for beaver and mink, is a popular trapping area. Trapping occurs in late winter, usually February through April. Residents are similar to the other communities in the region and depend on moose, bear, waterfowl, small game, and fish for protein. Caribou are also hunted in the Nulato Hills when available.

Brown et al. (2004) estimated residents, on average, annually harvested 58 moose from 1996 to 2003. During the same time period, an average of four caribou and three black bear were harvested (Brown et al. 2004). In addition to sheefish, whitefish, and pike, salmon is the main fish protein source. From 1994–1998, an average of 2,090 Chinook, 1,168 summer chum, 1,122 fall chum, and 136 Coho salmon were harvested each year (Busher et al. 2008). From 1999–2003, an average of 1,863 Chinook, 596 summer chum, 766 fall chum, and 299 Coho salmon were harvested each year (Busher et al. 2008)

Waterfowl hunting occurs during late spring and fall on the lakes and sloughs of the Northern Unit Innoko. During the 1997 hunting season, Nulato residents harvested 211 ducks and 160 geese (Webb 1999).

Ruby

Residents mainly subsist along the Yukon River corridor and its smaller tributaries. The Nowitna is also used for subsistence activities. From 2001–2007, residents have annually harvested an average of 16 moose. Caribou and black and grizzly bear are harvested when available.

Along with whitefish, sheefish, and pike, residents harvest salmon by using fish nets and/or fish wheels. Salmon species make up the majority of harvested fish species. During the 1994–1998 salmon fishing seasons, an annual average of 1,936 Chinook, 3,317 summer chum, 3,086

fall chum, and 975 Coho salmon were harvested. During the 1999–2003 fishing seasons, an annual average of 1,194 Chinook, 1,247 summer chum, 792 fall chum, and 476 Coho were caught (Busher et al. 2008).

Tanana

Residents mainly subsist along the Yukon and Tanana River corridors and their tributaries. They also use the Nowitna for subsistence activities. Moose, waterfowl, and small game are harvested on the Nowitna.

Similar to other communities in the area, residents depend mainly on moose and salmon but also harvest caribou, bear, non-salmon fish species, small game, berries, and other plant material when available. From 2001–2007, residents annually harvested eight moose (ADF&G 2008). During the 1994–1998 salmon fishing season, an annual average of 3,389 Chinook, 4,073 summer chum, 24,105 fall chum and 3,294 Coho salmon were harvested (Busher et al. 2008). During the 1999–2003 fishing season, an annual average of 3,621 Chinook, 2,373 summer chum, 12,406 fall chum and 4,200 Coho were caught (Busher et al. 2008).

3.4.4 Recreation

3.4.4.1 Overview

Recreational visitor access to the Refuge is by boat, snowmobile, or small airplane. The Refuge issues special use permits for commercial air and boat taxis each year. Some visitors arrive in private boats or airplanes. There are no recreational facilities located on the Refuge. The primary purpose of most recreational visits to the Refuge is to go moose hunting or fishing. Wildlife observation and photography, camping, berry picking, and other incidental activities also occurs.

3.4.4.2 Moose Hunting

The Refuge lies within portions of Game Management Units (GMU) 21B, 21C, 21D, 24C, and 24D (see Figure 1-3). A portion of the Koyukuk is within the Koyukuk Controlled Use Area. This area is closed during moose hunting season to the use of aircraft for the purposes of hunting moose. Since fly-in hunting is primarily recreational, the Controlled Use Area generally restricts recreational hunters. The bulk of recreational hunting on the Refuge occurs in GMU 21B and 21D along the Nowitna and Koyukuk rivers.

In 1993, permitting regulations were restructured on all Alaska National Wildlife Refuges, and nine, sole-use big-game guide areas were established on the Refuge. Five sole-use big-game guide areas were allocated to the Koyukuk, three to the Nowitna, and one to the Northern Unit Innoko (see Figure 3-11). At present, there are three big-game guides permitted to operate on the Koyukuk (one guide holds the permit for all three areas), two on the Nowitna (one guide holds the permit for two areas), and none on the Northern Unit Innoko. Each big-game guide, under his/her prospectus application, is required to report the number of clients, moose taken, and areas hunted.

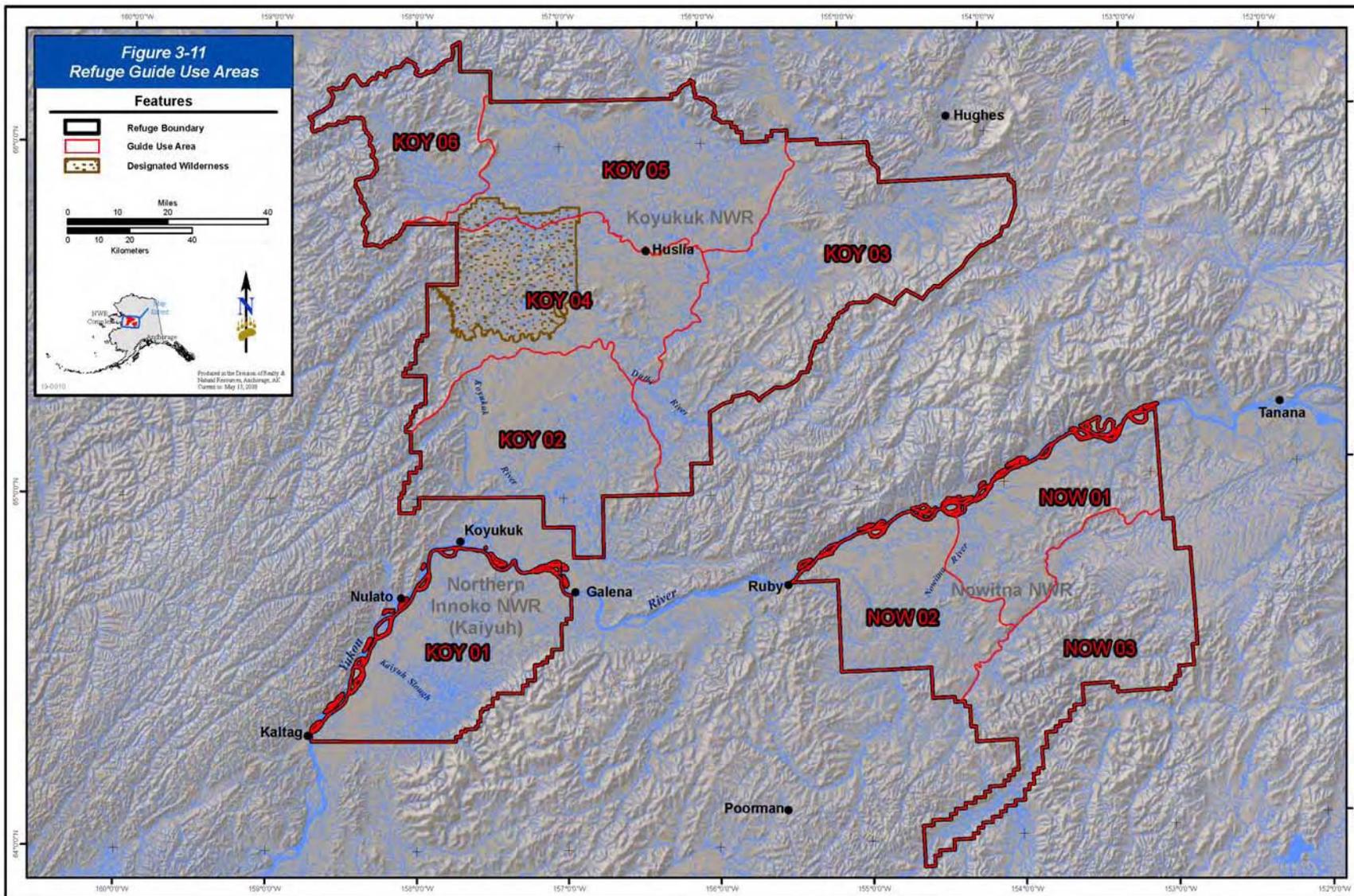


Figure 3-11. Refuge guide use areas

3.4.4.3 Fishing

Each year, the Refuge issues one or two special use permits for fishing guides who primarily advertise opportunities to catch trophy-sized northern pike. At present, one fishing guide operates on the Nowitna and one on the Northern Unit Innoko.

3.4.4.4 Environmental Education and Interpretive Programs

The focus of the Environmental Education program is to promote a greater public understanding and appreciation of the ecology of fish and wildlife, habitat preservation, and refuge management. Program activities include school and community programs held in the eight adjacent villages; development and distribution of educational resources, curricula, and teaching kits; and public contact via an informational kiosk, displays, radio programs, newsletters, brochures, and web-sites. The Refuge partners with the Galena schools and Loudon Tribal Council to conduct a two-week science camp for elementary students each summer. The refuge staff has also participated in other village science camp programs as opportunities arise.

3.4.5 Economy

The region surrounding the Refuge is sparsely populated and relatively undeveloped. Opportunities for year-round salaried employment are fairly limited, and overall income is low. Hunting and fishing remain vitally important to the subsistence lifestyle and local economy. The harvest of big game and fish predominates. It is supplemented by waterfowl harvest and the use of plant resources. Harvest of these traditional foods is basic to a subsistence-oriented economy. Grocery prices are among the highest in the State because transportation charges to small remote communities are high.

Traditional cash-generating activities of the region (gold mining, commercial fishing, firefighting, and trapping) all suffered significant declines during the 1990s (Windisch-Cole 2001). In 2006, the economy of the Yukon-Koyukuk Census Area supported nearly 2,200 year-round jobs, and over 65 percent were local, State, or federal government positions (Alaska Department of Commerce, Community, and Economic Development 2008). Local governments and school districts are a dominant employer. Within the private sector, many jobs are associated with Alaska Native organizations, many of which provide services under contract with non-profit or government entities. Construction activity, another important private sector employer, also largely depends on public funding. Public subsidies are common and needed in most communities to cover annual operating expenses.

Overall wage and salary income within the Yukon-Koyukuk Census Area is well below the State average. In 2004, the median family income was just over \$39,000, more than 45 percent below the statewide median. In early 2008, the unemployment rate was just over 17 percent, compared to less than 8 percent statewide (Alaska Department of Commerce, Community, and Economic Development 2008). The expense of travel and daily life in the area compounds the effect of low employment and low family incomes.

Employment and income statistics do not provide a complete picture of regional economic conditions because of the important role that subsistence hunting and fishing plays in the local economy. Personal income statistics can give a misleading picture of the well-being of residents of communities in which subsistence is a significant source of food and other needs. 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 for the

purchase of fuel, food, firearms, ammunition, fishing gear, snowmobiles, boats, ATVs, vehicles, and associated maintenance costs.

3.4.6 Regional Access

Historically, boats and dog sleds were the only means of access to the Refuge. The advent of outboard motors and snowmobiles has brought many changes to local transportation and the harvest of natural resources. Now almost all visitors to the Refuge use motorboats, snowmobiles, or aircraft for access. There are no established landing strips currently on the Refuge, so aircraft must be equipped for landings on snow, water, or gravel bars. There is currently no known local use of three- or four-wheelers or other off-road vehicles for access to subsistence resources on the Refuge. This finding is based on interviews of elders in the villages of Huslia, Ruby, and Galena.

Residents use trucks and other automobiles, off-road vehicles (primarily four-wheelers), and snowmobiles for transportation within the villages. Boats, airplanes, and snowmobiles are used for travel between villages and in surrounding areas. No roads connect these villages with any other community. All of the villages have airstrips and are served by regularly scheduled commercial flights and local air charter operators. The availability of regularly scheduled flights to Fairbanks or Anchorage varies from village to village. Most villages have a minimum of five daily flights per week. Seasonal barge service is available to all villages near the Refuge, depending on water level. Regular barge service is available to the villages located on the Yukon River. Access to the Refuge is relatively good by interior Alaska standards, and no proposals for additional means of access have been identified.

3.5 Wilderness Values

3.5.1 Introduction

Section 304(g) of ANILCA requires the Service to identify and describe the special values of the Refuge, including wilderness values. The term “values” is often viewed synonymously with a range of similar terms, from subjective beliefs and preferences (e.g., family values) to more objective functions, services, and benefits (e.g., ecological values). Of interest here are the objective kinds of values, specifically those that are related to the condition and wild character of the natural environment.

The 1964 Wilderness Act (Act) recognized wilderness as a resource in and of itself and also established a mechanism for preserving that resource in a national system of lands. The definition of wilderness found in the Act provides a framework for identifying and describing wilderness values. According to the Act, the fundamental qualities of wilderness are undeveloped, untrammeled, natural, and outstanding opportunities for solitude, or a primitive and unconfined type of recreation. These qualities are defined in the following text. In addition, the Act states that wilderness “may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.” The 1987 Plan evaluated eight potential areas (see section 3.5.3 through 3.5.10) for inclusion as wilderness. Only the Koyukuk Wilderness was designated as a Wilderness Area.

3.5.1.1 Undeveloped

This is the most immediately observable and easily measured wilderness quality. Undeveloped simply means free from roads, structures, and other evidence of modern human presence or occupation. The undeveloped quality strongly influences other core wilderness values—in particular, experiential opportunities for solitude and primitive recreation. A lone

structure may have only minimal impacts on natural processes while still serving as a constant reminder of human influence for recreational visitors. Certain kinds of structures or improvements may be considered desirable in a given wilderness setting (e.g., trails) or acceptable according to specific legislation, but that does not diminish their negative impact on the undeveloped quality.

3.5.1.2 Untrammeled

The Wilderness Act states that wilderness is “an area where the earth and its community of life are untrammeled by man.” In other words, wilderness is essentially uncontrolled or unrestricted by purposeful human actions. Synonyms for untrammeled include uncontrolled, unmanipulated, self-willed, and wild (Landres et al. 2005). The untrammeled quality of the wilderness resource is diminished when ecological events or processes are constrained or redirected to suit modern human ends (e.g., by suppressing naturally ignited fires or introducing non-native plants or animals).

3.5.1.3 Natural

Naturalness is a measure of the overall composition, structure, and function of native species and ecological processes in an area. In contrast to the quality of being untrammeled, the natural condition of an area may sometimes be enhanced through purposeful human action (e.g., to restore an eroded stream bank or eradicate an invasive weed).

3.5.1.4 Outstanding Opportunities for Solitude

Solitude in the wilderness context is generally understood to mean freedom from sights, sounds, and other evidence of modern man (Landres et al. 2005). While the relative amount of freedom from these things necessary to experience solitude is highly personal and variable, the Act states only that outstanding opportunities for solitude be provided. Accordingly, encountering other people, hearing mechanized sounds (from aircraft overflights, for example), or seeing the lights of a distant population center are all examples of things that may negatively affect solitude opportunities; while remoteness, low visitor density, and vegetative or topographic screening are things that may enhance solitude opportunities.

3.5.1.5 Outstanding Opportunities for a Primitive and Unconfined Type of Recreation

Primitive and unconfined recreation occurs in an undeveloped setting and is relatively free from social or managerial controls. Primitive recreation in wilderness has largely been interpreted as travel by non-motorized and non-mechanical means. Primitive recreation is also characterized by experiential dimensions such as challenge, risk, and self-reliance. Dispersed use patterns, which frequently occur where there are no facilities, enhance opportunities for self-reliance and solitude. Conversely, some actions aimed at maintaining opportunities for solitude, such as limited permit management systems, may negatively affect opportunities for unconfined experiences.

3.5.1.6 Other Special Features

Lands that exhibit the core wilderness qualities described above may also contain additional special features of scientific, educational, scenic, or historic value. While the Act makes it clear that although these features are not wilderness qualities in and of themselves, their presence may distinguish one area with wilderness values from another. In the context of Alaska refuges, special features might include such things as active volcanoes or sand dunes, unique abundance or concentrations of a given species, fossil deposits, or evidence of prehistoric cultures.

In 1980, 400,000 acres of the Koyukuk was designated as a Wilderness Area by ANILCA. Additionally, as directed by sections 304(g) and 1317 of ANILCA, lands currently administered by the Refuge were reviewed during preparation of the first Plan in 1987 “as to their suitability or non-suitability for preservation as wilderness” (see sections 3.5.3 through 3.5.10 for more detail). The following identification and description of wilderness values is based on that review, with additions and amendments as appropriate.

3.5.2 Characteristics Common to All Units

In designating the Koyukuk Wilderness Area (Figure 3-12), Congress found that it exhibited the characteristics of wilderness described in the Wilderness Act. Refuge lands within the following wilderness review units also exhibit all the core wilderness values: Purcell Mountain, Takkakhдона Hills, Coffee Can Lake, Kaiyuh Flats, Nowitna River, Little Mud, and Big Creek. They are largely undeveloped, untrammeled, highly natural, and support abundant opportunities for solitude and primitive recreation. All of these management units support the full suite of fish and wildlife species and plant communities representative of local ecosystems.

Topographic variation provides a variety of wildlife habitats within each unit. Habitat diversity is created through several natural processes: river meander, ice scouring, spring flooding, and fire. The meandering rivers of the Refuge constantly change course by cutting new channels and creating oxbows, which eventually become isolated oxbow lakes. The floodplains are dotted with lakes in various stages of successional development. They create ideal nesting, staging, and migrating habitats for waterfowl. Meandering rivers also produce diverse terrestrial habitat as erosion destroys mature vegetation on the outside of river bends and deposits gravel bars on the inside of bends. Gravel bars are colonized by early successional plants such as herbs, willows (an extremely valuable moose browse), and cottonwood. During spring breakup events, large blocks of ice scour vegetation growing along the banks of the larger rivers, providing an ideal site for the establishment of early successional plants such as herbs, willows, and cottonwood. Ice jams formed during breakup cause flooding, which replenishes nutrients in the floodplain. Wildland fires set mature (late seral) plant communities back to the early seral stage, provide new wildlife habitat and rejuvenated food sources, release nutrients that sustain interior ecosystems, and maintain the interconnected fire-related processes (e.g., retention of the dominance of black spruce across the interior landscape) that have developed over eons. Hot, dry summers and afternoon thunderstorms provide lightning for ignition that has given the interior a rich fire history.

Although the wilderness review units generally have very few visible signs of human manipulation or permanent human presence, there are scattered trapping cabins and remnants of other uses within some of them. Major rivers are important travel corridors for wildlife and for local residents traveling between villages and/or participating in subsistence activities. Many of the rivers are suitable for float trips. Winter travel by snowmobile occurs mainly on rivers and traditional trails. Travel away from these areas can be quite challenging but offers excellent opportunities for solitude and primitive recreational experiences.

3.5.3 Koyukuk Wilderness

The 400,000-acre designated Koyukuk Wilderness Area lies north of the Koyukuk and Kateel rivers, and encompasses the Nogahabara sand dunes. Formed thousands of years ago when sand from melting glaciers blew up against the Nulato Hills, these spectacular sand dunes are constantly shifting in the wind. The dunes range from 50 to 100 feet high and may be over 300 feet in length. Portions of the dune plant community are relics from the last ice age.

Also within the Koyukuk Wilderness is Three Day Slough, a wildlife-rich and productive area of forest and wetlands north of the Koyukuk River. Travel in the interior of the Koyukuk Wilderness is difficult, but Three Day Slough is navigable by boat during high-water conditions, and the area is popular for fall moose hunting. Away from the Three Day Slough area, most of the topography within the Koyukuk Wilderness consists of rolling stabilized dunes dotted with lakes and covered by black and white spruce, aspen, and paper birch communities.

The following areas were analyzed during preparation of the 1987 Plan and were found suitable for wilderness designation but were not recommended for inclusion as wilderness.

3.5.4 Purcell Mountain Unit (Koyukuk)

The Continental Divide dominates this 840,000-acre unit, forming the northernmost boundary of the unit and the Koyukuk. The divide follows the ridgeline of the Purcell Mountains and forms the headwaters of Huslia River. Elevation in the unit ranges from Purcell Mountain at 3,831 feet to less than 200 feet where the Huslia River enters the Koyukuk River. Extensive wetlands in the unit are characterized by numerous thaw lakes and tightly meandering streams. Part of the Western Arctic caribou herd frequently winter within the Purcell Mountain region. The unit is bounded on the south by the Koyukuk Wilderness, on the east by a block of privately owned or selected lands, and to the west by Bureau of Land Management land. Although difficult to access, the Purcell Mountains and foothills provide good hiking and backpacking opportunities, with scenic vistas in all directions visible from the Continental Divide.

3.5.5 Takhakhdona Hills Unit (Koyukuk)

This unit covers approximately 1,009,000 acres within the eastern portion of the Koyukuk. Topography ranges from 3,000-foot mountains to lowlands below 200 feet in elevation. The most noticeable topographic features are 3,126-foot high Hochandochtla Mountain on the refuge boundary south of the Takhakhdona Hills, the Koyukuk River, and several large lakes within the Koyukuk River floodplain. The unit contains a vast region of productive wetlands that support large populations of waterfowl as well as other boreal forest wildlife. The Koyukuk River is an important migration stream for salmon and an important transportation route for local people and visitors. The Takhakhdona Hills unit includes numerous important archaeological sites in the Hahanudan Lake and Indian River areas, adding to its unique character.

3.5.6 Coffee Can Lake Unit (Koyukuk)

Extensive wetlands of the Koyukuk River floodplain (Koyukuk Flats) dominate this 1,500,000-acre unit. The Koyukuk River drains south along the western portion of the unit. The eastern portion is drained by the Dulbi River, a tributary of the Koyukuk River. Mountains in the eastern and western portions of the unit contribute to topographic and ecosystem diversity. The floodplain is 5–20 miles wide, with meander belts along the rivers and thaw (thermokarst) lakes away from the rivers. Broad, rolling silt plains, mantled in part by dunes and in places where there are abundant thaw lakes, stand 100–200 feet above the central plains and merge into the surrounding uplands. Several low bedrock hills rise from the center of the lowlands. The Galena Mountain caribou herd, a small resident herd, winters near Coffee Can Lake and spends summers on the eastern side of the unit in the Kokrine Hills.

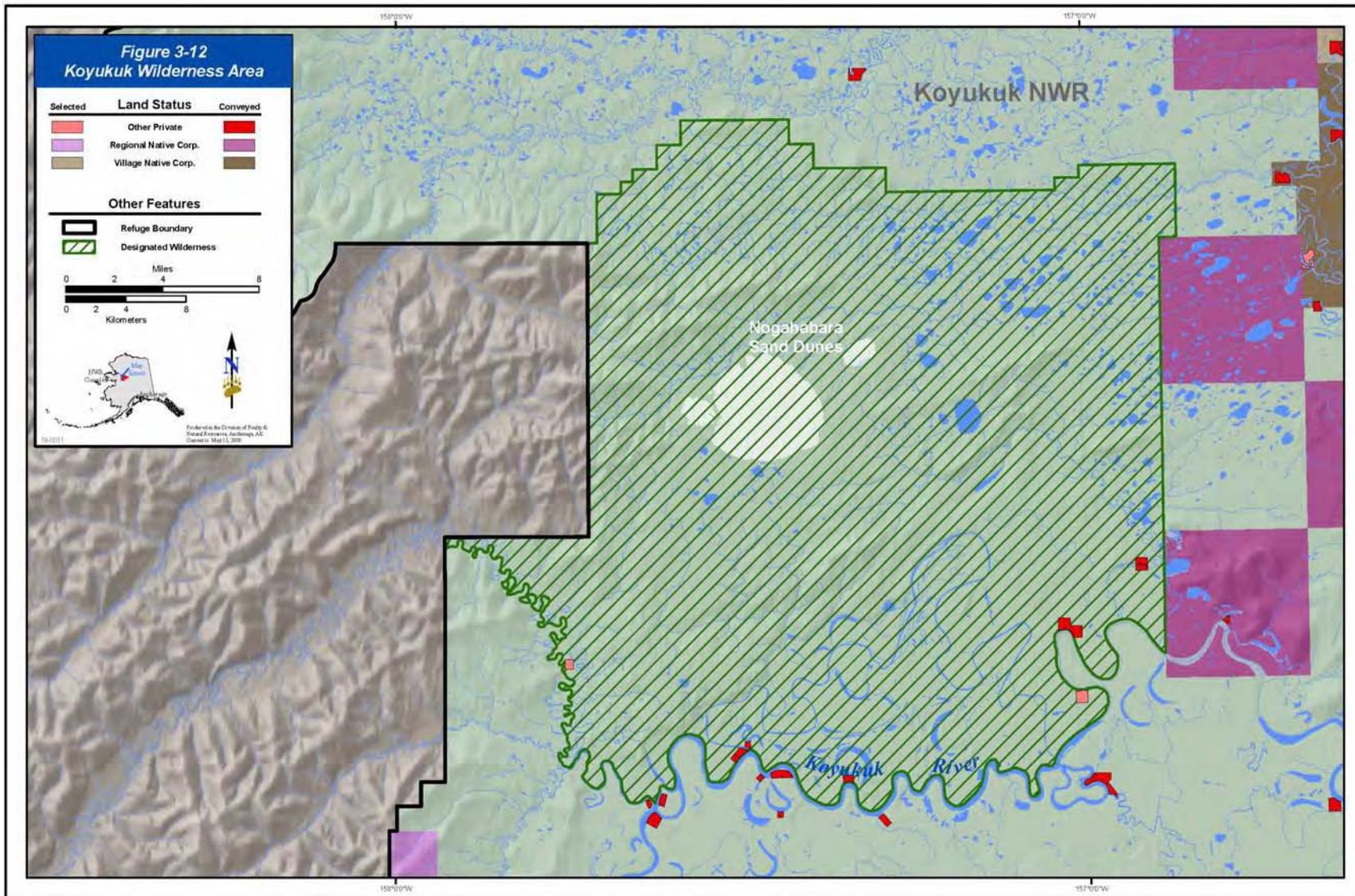


Figure 3-12. Koyukuk Wilderness

3.5.7 Kaiyuh Flats (Northern Unit Innoko)

The southeastern portion of the unit extends up the northwest slope of the Kaiyuh Hills to an elevation of nearly 3,000 feet. However, the majority of the unit is comprised of low lying wetlands with abundant lakes, and meandering streams that drain into the Yukon River. The primary vegetation along the water courses consists of alder, willow, and grasses, with white spruce growing on the better drained sites. The wetland ecosystem found here is subject to frequent spring flooding and the rise and fall of the Yukon River level, which helps produce abundant populations of fish, waterfowl, and furbearers. The area has long been of great importance to local Native subsistence and culture. A large portion of the unit has been selected for private (village and Native corporation) ownership. Federal ownership is approximately 387,109 acres (52 percent). Primary access is by boat; however, navigation can be difficult in the vast maze of wetlands.

3.5.8 Nowitna River Unit (Nowitna)

The dominant feature of this 325,000-acre unit is the 223-mile segment of the Nowitna River that was designated by ANILCA as a Wild River in the National Wild and Scenic River System. The wilderness review unit encompasses the Wild River corridor as well as 182,600 additional acres within the Nowitna River floodplain and several Yukon River islands. Most of the unit is a broad flat floodplain with the exception of the 16 miles of Nowitna Canyon where the river cuts through the foothills of the Kuskokwim Mountains.

Wetlands in the Nowitna River floodplain are less acidic and more productive than many other areas in Alaska because spring flooding caused by ice damming during breakup enriches the lakes and sloughs with nutrients and carbonates from the limestone bedrock in the Nowitna headwaters. The carbonates buffer the pH of the naturally acidic wetland waters making nutrients more available for plant uptake.

The large size and high density of white spruce in this unit are uncommon in interior Alaska. The mixture of mature forest and early successional plant communities make the Nowitna River corridor the best winter and spring moose habitat on the Nowitna. Mature spruce forests provide nesting areas for raptors and are excellent marten habitat.

Most public use of the unit occurs on the Nowitna River during fall moose hunting season, and includes boat and floatplane use. There are several Native allotments, trapping cabins, and one administrative cabin located along the Nowitna River. However, most of these are not visible and generally do not detract from the wild character of the river. Outside of moose hunting season and summer boat traffic on the Yukon River, visitors are unlikely to encounter others within the unit.

3.5.9 Little Mud Unit (Nowitna)

Bounded to the west by the Nowitna River corridor and extending east to the refuge boundary, this unit encompasses nearly 1,132,800 acres. The Little Mud River is one of three major tributaries of the Nowitna River that flow across the unit from northeast to southwest. Several islands in the Yukon River are also included in this unit. The Palisades lies along the Yukon River. It is an impressive series of silt bluffs extending seven miles along the south bank. The bluffs are locally called the “Boneyards” because Pleistocene fossils often wash out of the frozen silt as the bluffs erode. The Palisades are an important site for paleo-environmental research.

The northern third of the Little Mud Unit is part of the Nowitna Lowlands, a broad plain studded with marshes, bogs, and thaw ponds. The remainder of the unit consists of vegetated sand dunes and bedrock hills rising to over 2,000 feet in elevation. The Boney Creek Dissected Benchlands on the eastern edge of this uplifted region are an unusual geological feature that was recommended as a Geological Landmark in Alaska (Young and Walters 1982). These flat-topped mesas, dissected by small parallel drainages, resemble canyon land topography associated with the southwestern United States.

Access to this unit of the Nowitna is extremely difficult, and human use is primarily limited to areas along the Yukon River. There is one administrative cabin in the unit.

3.5.10 Big Creek Unit (Nowitna)

This unit covers the Nowitna west of the Nowitna River unit. The majority of the 418,000-acre unit is composed of the flat wetlands of the Nowitna Lowland but also includes several Yukon River islands. A high ridge rising to 2,300 feet, which is an extension of the Kuskokwim foothills, makes up the southern end of the unit. Vegetation in the lowlands is primarily sparse black spruce and an understory of Labrador tea, bog blueberry, cranberry, and sphagnum moss. The high country is forested with white spruce and paper birch, giving way to subalpine broadleaf scrub at timberline. Moose hunting, fishing, berry picking, wildlife viewing, and camping occur in this unit; but it is seldom visited, and recreation is concentrated on the Sulatna and Yukon rivers where access is good and wildlife resources are most abundant.

3.6 River Values

3.6.1 Introduction

Section 304(g) of ANILCA requires the Service to identify and describe certain values of the Refuge including “...archeological, cultural, ecological, geological, historical, paleontological, scenic, or wilderness values...” River resources may contain a variety of these and other values and thus should be described and evaluated.

Section 5(d) of the 1968 Wild and Scenic Rivers Act (U.S. Congress 1968) requires that federal agencies consider river values in developing land use plans:

“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, and all river basin and project plan reports submitted to the Congress shall consider and discuss any such potentials. The Secretary of the Interior and the Secretary of Agriculture shall make specific studies and investigations to determine which additional wild, scenic and recreational river areas within the United States shall be evaluated in planning reports by all Federal agencies as potential alternative uses of the water and related land resources involved.”

The act recognizes the importance of a river’s free-flowing nature and specific “outstandingly remarkable values” such as scenery, recreation, geology, fish and wildlife, history, and any other features that make a river unique. Thus, an analysis of river resources consists of an examination of the river’s hydrology, including man-made alterations, and an inventory of its natural, cultural, and recreational resources and other features. In order to be assessed as “outstandingly remarkable,” a river-related value must be a unique, rare or an exemplary feature that is significant at a comparative regional or national scale. While the spectrum of

resources that may be considered is broad, all values should be directly river-related and should:

1. be located in the river or on its immediate shore lands (in Alaska, generally within one-half mile on either side of the river);
2. contribute substantially to the functioning of the river ecosystem; and/or
3. owe their existence or location to the presence of the river.

Rivers and streams that are both free-flowing and possess at least one outstandingly remarkable value meet the eligibility criteria put forth by the Wild and Scenic Rivers Act. These rivers should then be classified as wild, scenic, or recreational based upon the type and degree of human development(s) associated with the public lands involved at the time of the review. The actual classification is determined by Congress. The Nowitna River has been designated and is managed as a wild river (Figure 3-13).

The river classifications are described as:

Wild

These are waterways or sections of waterways on public lands that are free of impoundments and generally inaccessible except by trail and with watersheds or shorelines essentially primitive and waters unpolluted.

Scenic

These are waterways or sections of waterways on public lands that are generally free of impoundments with watersheds still largely primitive and shorelines still largely primitive and largely undeveloped but still accessible by roads.

Recreational

These are the waterways or sections of waterways on public lands that are readily accessible by road or railroad, may have some development along their shorelines, and may have undergone some impoundment or diversion in the past.

All eligible rivers on the Refuge would be categorized a wild as there are no roads, impoundments, or diversions affecting rivers within the Refuge.

3.6.2 River Values

The Wild and Scenic Rivers Act (U.S. Congress 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. Guidelines were developed by the Interagency Wild and Scenic Rivers Coordinating Council to provide greater consistency in identifying “outstandingly remarkable values” (Diedrich and Thomas 1999). They illustrate minimum thresholds to establish “outstandingly remarkable values” but are not all-inclusive and should be adapted to suit specific areas under consideration. Descriptions of the categories of “outstandingly remarkable values,” as developed informally by refuge staff consistent with national general guidelines, are described in section 3.6.2.1.

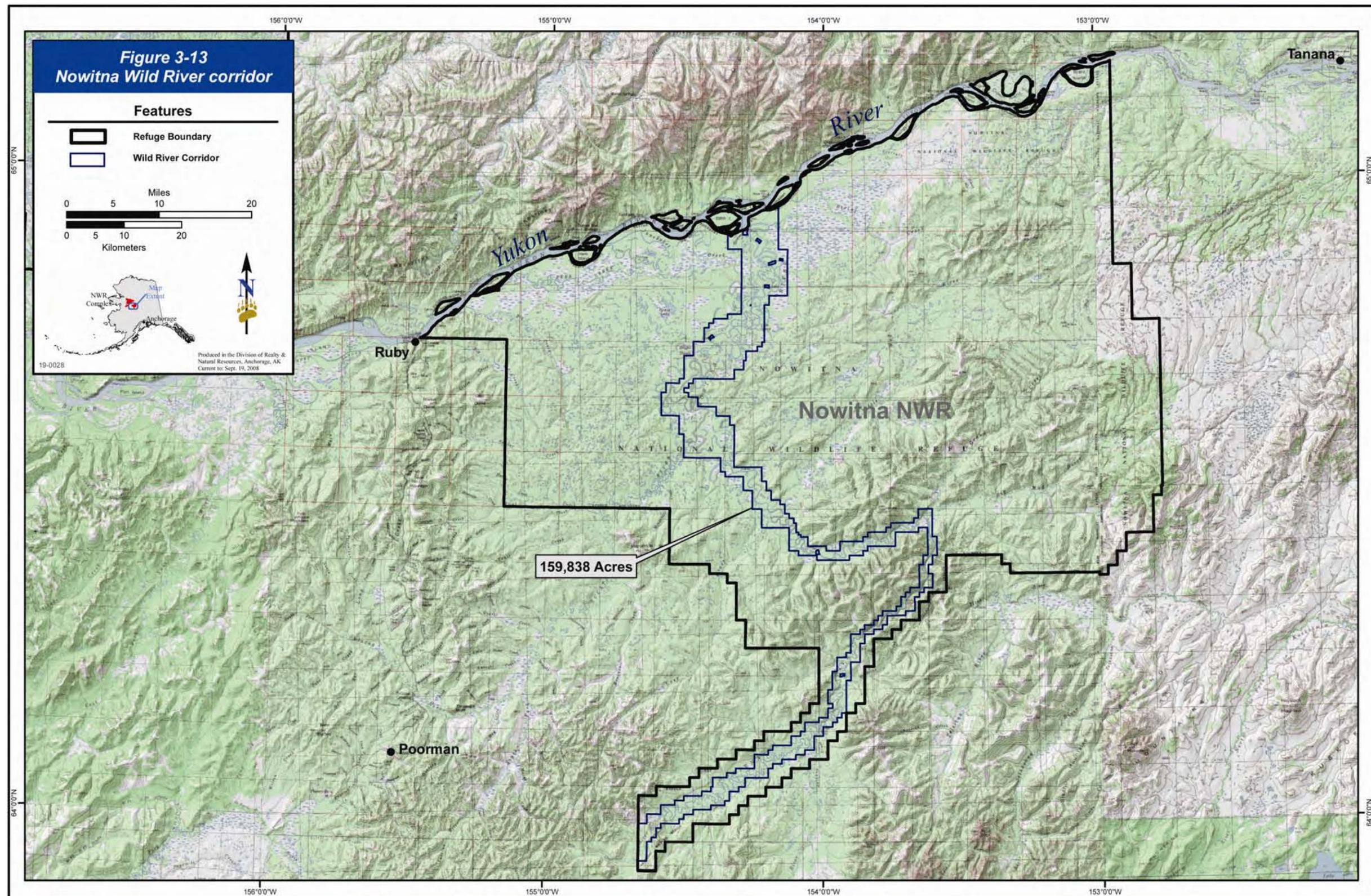


Figure 3-13. Nowitna Wild River corridor.

3.6.2.1 Scenery

Landscape elements such as landform, vegetation, water, color, and related factors provide exemplary scenery and visual attractions over most of the river or river segment. Factors such as seasonal variations in vegetation, or visibility, size, and appropriateness of cultural modifications may be considered.

3.6.2.2 Recreation

The river or corridor possesses 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, hiking, fishing, and hunting.

3.6.2.3 Wildness

Wild rivers are natural and undeveloped (free from the effects of modern civilization) and provide opportunities for solitude and primitive and unconfined types of recreation.

3.6.2.4 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.

3.6.2.5 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 rare, threatened, endangered, or sensitive species. Diversity of species and habitats is also an important consideration.

3.6.2.6 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. Diversity of species and/or habitats may also be of remarkable quality.

3.6.2.7 Cultural Values

The river or corridor contains an area significant to traditional cultures. Examples might include sites that support traditional activities or religious ceremonies.

3.6.2.8 History

The area contains a site or feature associated with a significant event, an important person, or a cultural activity of the past that is unique to the region. Historic sites and features are generally defined as 50 years old or older and may be listed on the National Register of Historic Places.

3.6.2.9 Prehistoric Values

The river or corridor contains an area important for interpreting human prehistory, including sites of archaeological significance. Sites must have unique or rare characteristics or exceptional human interest value.

3.6.2.10 Other Values

No specific national evaluation guidelines have been developed for the “other values” category, but other river-related values such as hydrology, paleontology, and botany may be considered.

3.6.3 Rivers and River Segments

In interior Alaska, rivers provide vital habitat and function as important travel corridors for wildlife and people. Rivers support subsistence activities and attract recreational users interested in fishing, hunting, boating, and wildlife observation. Fish and wildlife travel and feed in and along rivers and rear young in associated terrestrial habitat, ponds, and wetlands.

The following qualities are common to all refuge rivers and meet classification criteria for Wild River designation under the Wild and Scenic Rivers Act (U.S. Department of the Interior, U.S. Department of Agriculture 1982):

All rivers within the Refuge are free-flowing and free of impoundments.

Shorelines are primitive, with little or no evidence of human activities. Trapline cabins and fish camps are generally the only developments along rivers, are fairly uncommon and inconspicuous, and are culturally and historically appropriate for the region.

Rivers are generally inaccessible by land, with no provisions for vehicle travel within the river area and few trails.

Water quality meets or exceeds levels necessary for aesthetics and propagation of fish and wildlife using the river.

Following is an inventory of free-flowing rivers or river-segments located within the Refuge. Based upon known river qualities, Table 3-14 is a list of rivers evaluated by refuge staff for outstandingly remarkable values. Appendix K lists all of the rivers examined.

Table 3-14. Rivers examined.

Refuge	River Considered
Koyukuk	Billy Hawk Creek
Koyukuk	Cottonwood Creek
Koyukuk	Dakli River
Koyukuk	Dulbi River
Koyukuk	Dulbi Slough
Koyukuk	Gisasa River
Koyukuk	Hogatza River
Koyukuk	Holtnakatna Creek
Koyukuk	Huslia River (north and south forks)
Koyukuk	Indian River
Koyukuk	Kateel River
Koyukuk	Koyukuk River
Koyukuk	Little Indian River

Refuge	River Considered
Koyukuk	Natlaratlin
Koyukuk	Nayuka River
Koyukuk	Nulitna
N. Unit Innoko	Bishop Creek
N. Unit Innoko	Bonanza Creek
N. Unit Innoko	Eddy Creek
N. Unit Innoko	Gorton Creek
N. Unit Innoko	Green Water Creek
N. Unit Innoko	Kaiyuh Slough
N. Unit Innoko	Khotol River
N. Unit Innoko	North Creek
N. Unit Innoko	Soonkakat River
N. Unit Innoko	Squirrel Creek
N. Unit Innoko	Tsurotlurna slough
N. Unit Innoko	Wounded Cub Creek
N. Unit Innoko	Yukon Creek
Nowitna	Bering Creek
Nowitna	Big Creek
Nowitna	Big Mud River
Nowitna	Blind River
Nowitna	Deer Creek
Nowitna	Grand Creek
Nowitna	Junekaket Creek
Nowitna	Klatsuta River
Nowitna	Little Mud River
Nowitna	Our Creek
Nowitna	Sethkokna River
Nowitna	Sulatna River
Nowitna	Sulukna River
Nowitna	Susulatna River
Nowitna	Titna River
Nowitna	Yukon River

The following rivers or river segments were informally identified by refuge staff as having exceptional values.

Billy Hawk Creek - Outstandingly Remarkable Values: *Wilderness, Wildlife, and Fish* (Koyukuk)

Billy Hawk Creek is a tributary to the Huslia River. Its headwaters lie in the Purcell Mountains a few miles north of the northeast corner of the Koyukuk. This stream flows over refuge land for most of its length and is difficult to access even by floatplane, and as such, provides recreation opportunities in a wilderness setting where solitude is of a degree uncommon to other areas of the Refuge. The river is one of the major chum salmon spawning areas on the Koyukuk. Grizzly and black bear opportunistically feed on spawned-out chum salmon, other wildlife, and vegetation in the corridor. Tracks and scat of bear, lynx, wolf, wolverine, beaver, river otter, and other mammals are commonly found along the river, though actual observations are less so. During the summer months, common birds on the river include White-fronted geese, Lesser Canada geese, swallows, and numerous species of ducks.

Dakli River - Outstandingly Remarkable Values: *Scenic and Wildlife* (Koyukuk)

The Dakli River originates in the southwestern flanks of the Zane Hills and flows south over the northern boundary of the Refuge, joining the Koyukuk River on one of its meander bends. The broad river valley provides panoramic view of the Purcell Mountains and Zane Hills. The valley is used every winter by some of the Western Arctic caribou herd. The Dakli River is the traditional caribou hunting area of people from Huslia.

Dulbi River - Outstandingly Remarkable Values: *Scenic, Wildlife, Cultural, and Historic* (Koyukuk)

The Dulbi River headwaters are located outside the Koyukuk Refuge's southeast boundary near Hochandochtla Mountain. It flows southwesterly for more than half of its length before turning northwest before it crosses into the Refuge. . The lower section of the river has a high moose density. Moose commonly feed on the willows along the river. Grizzly and black bear opportunistically feed on fish, other wildlife, and vegetation in the river corridor. Tracks and scat of bear, lynx, wolf, wolverine, beaver, river otter, and other mammals are commonly found along the river, though actual animals observed are less so. During the summer months, common birds on the river include White-fronted geese, Lesser Canada geese, swallows, and numerous species of ducks. The river is a major breeding and molting area for waterfowl. The Dulbi River is important to the villages of Huslia, Galena, and Koyukuk for waterfowl hunting, moose hunting, and trapping. Two abandoned villages and several sites that are important to Alaska Native history are located along the Dulbi River, including Hadokhten and Dalbi villages.

Gisasa River - Outstandingly Remarkable Values: *Historic and Fish* (Koyukuk)

The Gisasa River flows 70 miles southwest to northeast, from its headwaters in the Nulato Hills to its mouth on the Koyukuk River in the southwest corner of the Koyukuk. Only the lower third lies within the Refuge. The river is important for anadromous fish (Chinook and chum salmon) and resident northern pike. The (Service) Fairbanks Fishery Resource Office maintains a fish counting weir on the lower portion of the river. The Gisasa River is important to the village of Koyukuk for moose hunting and winter trapping. A historic Native village site was located at the river mouth.

Hogatza River - Outstandingly Remarkable Values: *Scenic, Wilderness, and Historic* (Koyukuk)

The Hogatza River flows 120 miles southwest, from its headwaters in the foothills of the Endicott Mountains to its mouth on the Koyukuk River near the northern border of the Refuge. The Hogatza River is a meandering clear water stream subject to frequent high water events. This river is difficult to access even by floatplane, and as such, provides for recreation opportunities in a wilderness setting where solitude is of a degree uncommon to other areas of the Refuge. Travel along the river provides spectacular views of the east side of the Zane Hills. The river contains the Hog River landing site, which is part of the area's mining history.

Kateel River - Outstandingly Remarkable Values: *Scenic, Fish, and Historic* (Koyukuk)

The headwaters of the Kateel River lie in the Nulato Hills. The 115-mile long river flows northeast and then southeast before joining the Koyukuk River just inside the western border of the Refuge. Only the southeastern trending portion of the river lies within the Refuge. The Kateel River has two major tributaries: Aravesta Creek in the Nulato Hills outside the Refuge; and Honhosa River, which also originates in the Nulato Hills outside the Refuge but flows nearly half its length inside the Refuge. Floating down the river provides varying views of a narrow river valley and an outstanding experience of wildness, as the river twists and turns through this unusually narrow river valley. The river is important for anadromous fish and resident northern pike. The Kateel River is an important chum and Chinook salmon spawning area. A historic Native village site was located at the river mouth.

Koyukuk River - Outstandingly Remarkable Values: *Scenic, Wilderness, Fish, Wildlife, Historic, and Prehistoric* (Koyukuk)

The headwaters of the Koyukuk River are at the confluence of its Middle and North forks near Bettles. From these headwaters, the river flows 424 miles to its mouth on the Yukon River. The river is a major natural landmark on the Refuge, meandering 300 miles across the Refuge from northeast to southwest. The river commonly floods during spring runoff and occasionally after high intensity fall rains. The river contains 20 species of fish, including salmon, cisco, sculpin, lamprey, whitefish, northern pike, Dolly Varden, and sheefish. The river is a crucial migration corridor for anadromous fish, including Chinook and chum smolt heading downstream to the ocean and adults returning upstream to spawn. The river corridor, with its abundant willow, provides critical habitat for moose. The Koyukuk River corridor has one of the highest moose population densities in the State—up to 12 moose per square mile in some areas. The river is used extensively by the villages of Koyukuk, Huslia, Hughes, and Galena for fishing, hunting, trapping, and transportation. The river is used in the summer months to barge goods and fuel to Huslia. Numerous historic Native villages and archeological sites (some dating back over 10,000 years) are located along or near the river.

Little Indian River - Outstandingly Remarkable Value: *Historic* (Koyukuk)

The Little Indian River drains an uplands area adjacent and east of the Refuge. The headwaters of the river lie just outside the Refuge. The river flows for most of its length in the Refuge. Batza Tena is one of the few known obsidian sources in Alaska. Batza Tena played a significant role in cultures inhabiting the area during the last 10,000 years, as well as aboriginal cultures as far away as central Canada. Also located near the river is the "Trading Place," reported to have been the traditional location where Kobuk Eskimo would announce their arrival to local Koyukon Athabaskan in order that trading activities might commence.

Kaiyuh Slough - Outstandingly Remarkable Values: *Hydrology, Fish, Wildlife, and Recreation* (Northern Unit Innoko)

Kaiyuh Slough is a 25-mile long waterway with unique hydrologic properties. The slough connects lakes in Kaiyuh Flats and the Khotol River with the Yukon River. During part of the year when the Yukon River water level is higher than the water level on Kaiyuh Flats lakes, the slough serves as an inlet to the lakes and the Khotol River from the Yukon River. When the level of the Yukon River is below that of the lakes, the slough serves as an outlet for the lakes, and flow direction will reverse. Kaiyuh Slough lies entirely within the Refuge. This reverse flow feature helps create the habitat used by so many different species of waterfowl and other wildlife. The slough has the highest beaver population in the area, with over 30 animals per square mile in some places. The slough provides ideal habitat conditions for large northern pike, which in turn provides for a very productive pike fishery. Several historic Native villages and archeological sites are located along the slough or in the connected lakes.

Yukon River - Outstandingly Remarkable Values: *Recreation, Geologic, Fish, Wildlife, Historic, and Prehistoric* (Nowitna)

The Yukon River commonly floods during spring runoff and occasionally after high intensity fall rains. The river is a crucial migration corridor for anadromous fish (Chinook, chum, Coho salmon, and sheefish), including salmon smolt heading downstream to the ocean and adults returning upstream to spawn. Many of the river islands provide critical winter moose habitat. The river is used extensively by local people for transportation, fishing, hunting, and trapping. The river is used in the summer months to barge goods and fuel to villages up and down the river. Several historic villages, archeological sites, and the old telegraph line (from the 1890s) are located along the river—all of which are important parts of Native and Alaska history. An area of frozen silt bluffs known as the Palisades or “Boneyards” lies along a seven-mile stretch of the Yukon River. This area is home to the remains of ice age animals and plants, making it both unique and an extremely important component for understanding this area’s prehistoric past.

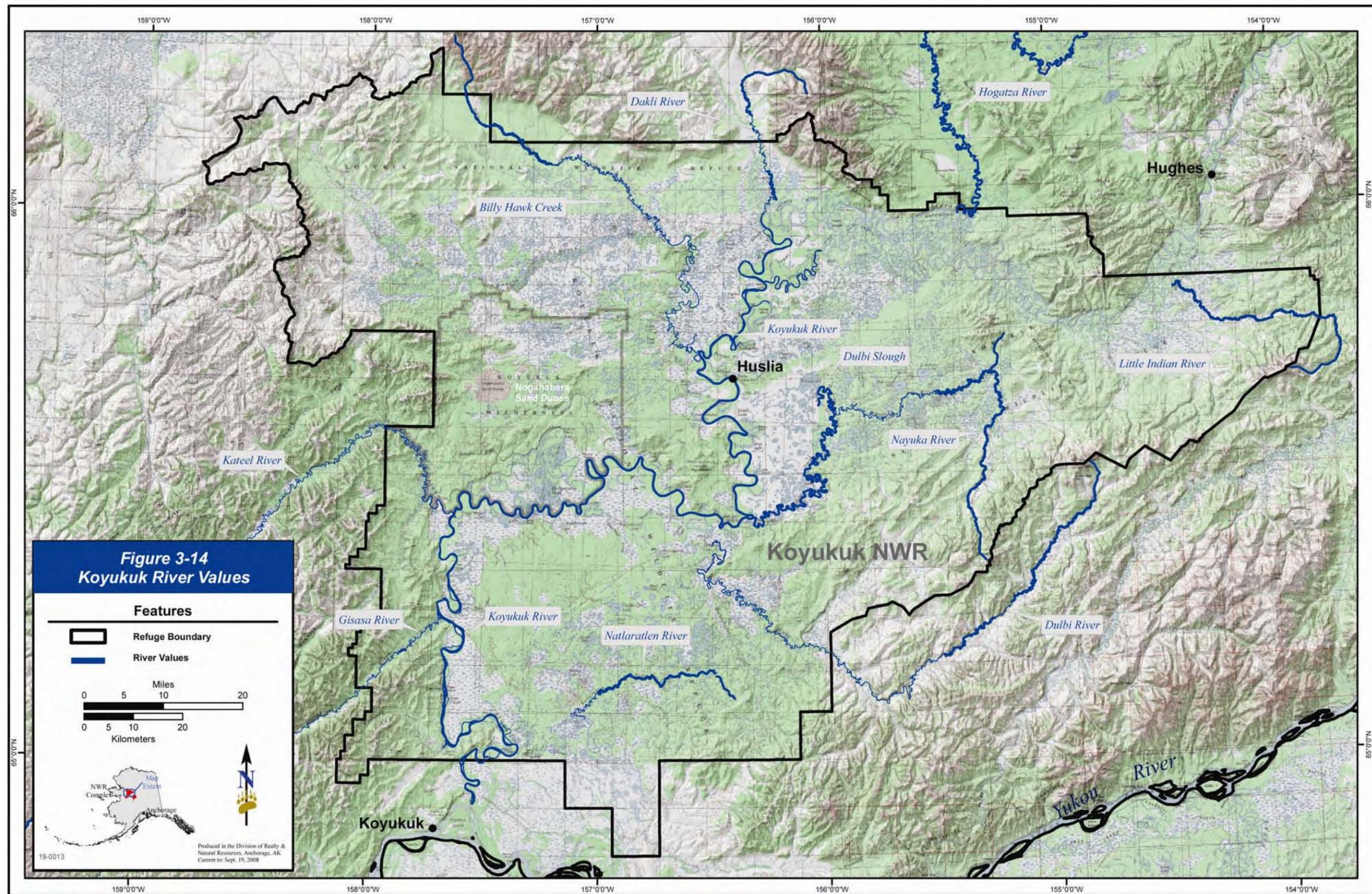


Figure 3-14. Koyukuk Refuge river values

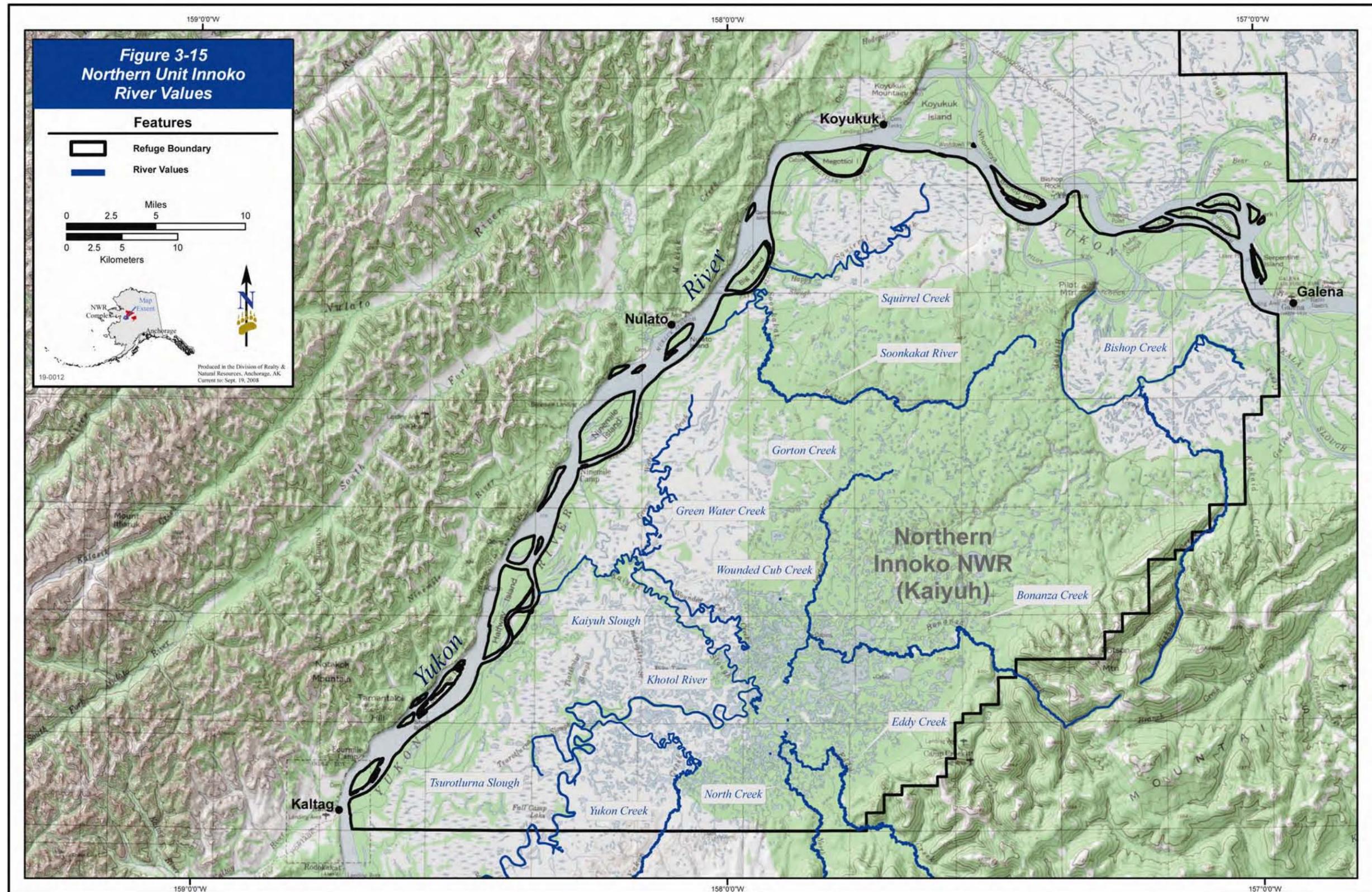


Figure 3-15. Northern Unit Innoko Refuge river values

3.7 Refuge Infrastructure and Administration

3.7.1 Administrative Facilities

The Refuge is administered out of the headquarters office located in Galena. The Galena facility consists of an office building and warehouse/maintenance shop that is leased from Gana-A'Yoo Limited, an airplane hangar located on State-owned property adjacent to the Galena airport, and a storage yard/gas facility located on the old Galena Air Force Base. The Refuge owns eight homes scattered throughout the city and one duplex located on the old Galena Air Force Base. There are two seasonal floatplane docks—one located on Alexander Lake behind Service Quarters #3 and the other on the Yukon River in front of the office.

The Hog River and Gisasa Weir administrative cabins are located on the Koyukuk. The Round Lake and Lower Nowitna administrative cabins are located on the Nowitna.

There are four remote automated weather stations (RAWS) located on the Refuge. The Kaiyuh RAWS is located on the Northern Unit of Innoko. The Cottonwood and Koyukuk RAWS are located on the Koyukuk. The Round Lake RAWS is located on the Nowitna.

Four radio repeater sites are located on the Refuge: Roundabout Mountain and Tough Mountain on the Koyukuk; Totson Mountain on the Northern Unit Innoko; and Hill 2321 on the Nowitna. There is only one leased radio repeater site, Kokrines, which is on BLM land and serves the Nowitna. Each repeater site consists of a structure enclosing a radio and battery bank system.

3.7.2 Staffing

The current staffing at the Refuge consists of 14 permanent positions. The Refuge occasionally hires temporary biological technicians and maintenance helpers, Student Career Experience Program personnel, and other student program participants. The Refuge has a volunteer program that involves up to six individuals annually.

Current authorized refuge staff includes:

- Wildlife refuge manager
- Deputy wildlife refuge manager
 - General biologist – subsistence
 - Refuge information technician
 - Administrative support assistant
 - Refuge clerk
 - Park ranger
 - Maintenance worker
- Supervisory wildlife biologist/pilot
 - Wildlife biologist
 - Wildlife biologist/GIS specialist
 - Airplane pilot
- Law enforcement/park ranger
- Fire management officer

4. Implementation and Monitoring

Implementation of the Koyukuk, Northern Unit Innoko, and Nowitna National Wildlife Refuge Comprehensive Conservation Plan (Plan) will be accomplished, in part, through various step-down plans (section 4.1). Each step-down plan has its own program focus, identifying and directing the implementation of strategies designed to achieve objectives outlined in the Plan (chapter 2, section 2.1). Implementation also includes identifying partnership opportunities that assist in accomplishing refuge objectives (see section 4.2).

Monitoring the progress of implementing the Plan is accomplished by a variety of methods (section 4.3). Evaluation of monitoring results may lead to an amendment or a revision of the Plan (section 4.4).

4.1 Step-Down Plans

Step-down management plans are plans that deal with specific management topics, such as the inventorying and monitoring of wildlife populations or the management of fire on the Refuge. They describe specific, topic-related management strategies and implementation schedules and provide the details necessary to implement the goals and objectives in this revised Plan. Step-down plans identified for the Refuge include the following:

- Wildlife Survey and Inventory Plan (June 2008)
- Fisheries Management Plan Nowitna National Wildlife Refuge (1991)
- Fisheries Management Plan Koyukuk National Wildlife Refuge (1993)
- Cultural Resource Guide (1996)
- Koyukuk and Northern Innoko National Wildlife Refuge Fire Management Plan (November 2005; scheduled to be updated in 2010)
- Nowitna National Wildlife Refuge Fire Management Plan (December 2004; scheduled to be combined with the Koyukuk and Northern Unit Innoko Fire Management Plan and updated in 2010)
- Koyukuk and Nowitna National Wildlife Refuges Media and Community Relations Guide (August 2006)
- Koyukuk/Nowitna Station Safety Plan (February 2004)
- Occupant Emergency Plan (2005)
- Spill Prevention Control and Countermeasure Plan (2005)
- Plan of Study: Water Resources Investigation—Koyukuk National Wildlife Refuge (June 1998)
- Plan of Study: Hydrologic Resources Investigation Nowitna National Wildlife Refuge (June 1998)
- Wilderness Stewardship Plan (to be prepared within two years of approval of a U.S. Fish and Wildlife Service wilderness policy)
- Land Protection Plan (scheduled to be completed in 2012)

4.1.1 Wildlife Survey and Inventory Plan

Wildlife and habitat inventory and monitoring plans have been required by the U.S. Fish and Wildlife Service policy for a number of years. Refuge staff prepared the initial habitat inventory and monitoring plan in 1991. This plan was updated in June 2008. Recently, the Alaska Region of U.S. Fish and Wildlife Service implemented a new policy mandating development of inventory and

monitoring plans (I&MP) for each refuge. The policy requires the Refuge to review the I&MP every two years. Regional office review is required every five to eight years. Updates to the I&MP will be made as indicated from these reviews. The refuge biological program is scheduled to be reviewed January 2010.

4.1.2 Fisheries Management Plans

The 1991 Nowitna and 1993 Koyukuk fishery management plans provide a description of habitats and fish species known or expected to occur within the Refuge. The plans identify the purposes of the Refuge (as defined in ANILCA) as goals, provide objectives for each goal, and list tasks designed to meet each objective. Some of the tasks list Alaska Department of Fish and Game as the responsible office and may not fall under the jurisdiction of the Refuge, although responsibilities may have changed since the fishery management plans were developed.

Many of the objectives listed in the two fishery management plans have not been addressed or have been only partially addressed, primarily due to lack of funding and staffing. Some progress has been made in implementing the fish harvest monitoring objectives. Special use permits for commercial recreational guided operations include reporting requirements for fish harvest rates. The Refuge also continues to coordinate law enforcement efforts with the State throughout the salmon season. Monitoring and evaluating subsistence harvest of fish is an ongoing project with the Service's Regional Subsistence Office and the Alaska Department of Fish and Game Commercial Fish Division, which focuses on the subsistence harvest of salmon. Harvest information is collected by the refuge information technician via personal interviews and Alaska Department of Fish and Game permit returns.

Both fishery management plans were scheduled to be updated every five years. The Nowitna plan is 17 years out of date, and the Koyukuk plan is 15 years out of date. There are no immediate plans to revise either plan.

4.1.3 Cultural Resource Guide

The cultural resource guide assists refuge staff in meeting legal requirements to protect and manage the cultural resources of the Refuge. The guide specifies how the cultural resource guidance provided by law and regulation, the Service Manual, and the Cultural Resource Management Handbook is to be applied to the Refuge. It outlines roles and responsibilities, summarizes legislation governing management of cultural resources, and contains information of use to management. It describes the current state of knowledge of the prehistory and history of the region. It includes a list of projects that would fill in knowledge gaps or complete existing work. This guide was completed in 1996 and is scheduled to be updated.

4.1.4 Fire Management Plan

The fire management plan (FMP) describes how the Refuge will respond to wildland fire and includes management responses for fire management activities (suppression, prescribed fire, and wildland fire use). The FMP lists specific management objectives regarding the use of fire. The Refuge has been assigned different fire management options based on resource protection needs. The FMP identifies Refuge and Bureau of Land Management–Alaska Fire Service responsibilities along with interagency fire management coordination. Post-fire monitoring and evaluation is an integral part of the FMP. The refuge fire management officer oversees the implementation of the FMP. The FMP and fire management options are reviewed and updated annually. The Koyukuk/Northern Unit Innoko and Nowitna FMP will be combined and revised by 2010.

4.1.5 Media and Community Relations Guide

This plan provides guidance and refuge information for use by a public information officer in the event of a Type I or II incident on the Refuge.

4.1.6 Station Safety and Occupant Emergency Plans

These plans focus on providing a safe and healthy environment for employees and visitors. They aim to minimize the potential for injury to employees and the public and to prevent property damage. The safety plan describes programs that train personnel to deal with the environment factors, work materials, and machines that may pose hazards. Its goal is to make safety and environmental health an integral part of every task. These plans contain contact persons and phone numbers to be used in the event of an emergency and are posted at an accessible location in the refuge office. Both plans are periodically reviewed and revised as needed.

4.1.7 Spill Prevention Control and Countermeasure Plan

This plan outlines the procedures, methods, and equipment used at the Refuge to comply with Environmental Protection Agency oil spill prevention, control, and countermeasure standards; and inspection, reporting, training, and recordkeeping requirements. The original plan was implemented in 2005.

4.1.8 Plan of Study: Water/Hydrologic Resources Investigation

These plans were completed in June 1999 for the Koyukuk and Nowitna. They guide an inventory and assessment of refuge water resources. Results of the study will be used to quantify in-stream flow water rights for the maintenance and protection of fish and wildlife habitat. Implementation will be determined by the availability of funding and staffing.

4.1.9 Wilderness Stewardship Plan

A Wilderness Stewardship Plan will be prepared for the Koyukuk Wilderness within two years of the Service adopting a national wilderness policy. This plan will provide additional detailed guidance for management of the Koyukuk Wilderness.

4.1.10 Land Protection Plan

The Refuge Land Protection Plan focuses on private lands within the refuge boundaries with the goal of identifying and conserving high-quality habitat on those lands. It provides a framework for refuge and private landowner cooperation. Land conservation measures will be pursued only with landowners willing to work with the Service and does not obligate the Refuge or landowners to undertake any of the identified measures. The Refuge must consider management goals, priorities, and availability of funds when approached by private landowners with land conservation proposals. This plan is scheduled to be completed in 2012. It will be revised thereafter if changing land status warrants revision.

4.2 Partnership Opportunities

Partnerships with other organizations are among the ways the Service fulfills the mission statement of “working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people”. The Refuge contains several different and dynamic ecosystems. Many of the refuge resources are of regional, State, national, and international importance. The Service recognizes that the public, organizations, and other governmental agencies have interests in the Refuge. Implementation of many refuge programs

requires involvement from these interested parties. The Refuge looks for opportunities to coordinate activities with the following:

- State of Alaska
- Other federal agencies
- Federal Subsistence Western Interior Regional Advisory Council
- Migratory Bird Co-management Council
- Tribal governments in Galena, Hughes, Huslia, Kaltag, Koyukuk, Nulato, Ruby, and Tanana
- Gana-A'Yoo (Galena, Koyukuk, Nulato, and Kaltag); K'oyitl'ots'ina, Limited (Hughes and Huslia); Dineega (Ruby); and Tozitna, Limited (Tanana) village corporations
- Tanana Chiefs Conference, Inc. (a regional Native non-profit organization)
- Local governments in Galena, Hughes, Huslia, Kaltag, Koyukuk, Nulato, Ruby, and Tanana
- Yukon Koyukuk and City of Galena school districts
- University of Alaska Fairbanks (UAF), University of Alaska Anchorage (UAA), and the University of Alaska Fairbanks museum
- Nongovernmental organizations (including Friends of Alaska National Wildlife Refuges, Alaska Geographic, and Ducks Unlimited)
- Other groups not listed here

Refuge biologists routinely cooperate with biologists from the Alaska Department of Fish and Game and the Bureau of Land Management (BLM) to assess status and trends of moose on and near the Refuge. The Refuge has cooperated with the U.S. Geological Survey, Biological Resources Division, on two regional projects (swan marking and banding and moose calf performance on winter range) and the Natural Resources Conservation Service (monthly snow depth surveys). A revised land cover map and report was developed for the Refuge and surrounding areas in 2002 in cooperation with BLM and Ducks Unlimited. The Refuge annually cooperates with the Boreal Partners in Flight and Friends of Alaska National Wildlife Refuges.

Interagency wildland fire cooperation is crucial when undertaking fire management activities. The BLM Alaska Fire Service (AFS) provides suppression services for all of the Department of Interior agencies in Alaska. AFS is in charge of detecting, monitoring, and suppressing fires on all federal and Native-owned lands.

The Refuge has been awarded Service Challenge Cost-Share Grants, which have focused on activities on and near the Refuge and in Galena. Cost-share projects have included Galena Science Camps, co-funding the UAF Interior-Aleutians Yukon-Koyukuk Center at Galena, a solar energy demonstration project housed at the Yukon-Koyukuk Center, a swan nesting ecological study, Nogahabara sand dunes cultural artifact and beetle surveys, oral history interviews with local trappers, and village invasive species workshops.

Wildlife research is not expected to increase considerably on the Refuge. Public and private partners will be routinely sought where mutual research interests exist and study objectives are similar.

4.3 Monitoring and Evaluation

Monitoring helps the Refuge track the progress being made on implementing the Plan. Results of monitoring activities show how objectives are being achieved and progress is being made towards accomplishing goals. The Refuge's I&MP addresses achieving many of the refuge objectives. It

may involve the collection of baseline data which could lead to additional monitoring efforts (see chapter 2, section 2.1). Monitoring and evaluation are an integral part of the fire management plan. Most of the other step-down plans provide detailed methods for inventorying and monitoring activities. Table 4.1 displays possible monitoring indicators, actions to be measured, and possible management actions in response to indicators for fish and wildlife, their habitats, plants, recreational uses, and contaminants. Activities will be refined as step-down plans are updated.

Table 4-1. Examples of inventory/monitoring questions and possible management actions.

Inventory or Monitoring Question	Measured Characteristics	Goal(s) of Inventory or Monitoring Activity	Possible Management Actions	Possible Sampling Procedure
What wildlife and plant species occur on the Refuge?	Species, location, and density of birds	Collect baseline information	NA: baseline data.	Birds surveyed using point count method with distance estimation
	Species, location, and density of small mammals	Collect baseline information	NA: baseline data.	Small mammals collected using live traps
	Species and location of terrestrial insects	Collect baseline information	NA: baseline data.	Insects collected using various trap and net methods
	Species, location, and density of herbaceous and woody plants	Collect baseline information	NA: baseline data.	Plants collected using various direct and random search methods
	Habitat information associated with bird, small mammal, and insect data	Associate different habitats with various species of birds, small mammals, and insects	Information will eventually allow the Refuge to better predict how habitat disturbances may affect birds, small mammals, and insects	Habitat data collected according to Service data standards
How many moose are on the Refuge, and what is their population trend?	Population density	Detect changes in population levels and distribution that can affect population	Research potential causes of changes in populations Modify recreational and subsistence harvest regulations	Aerial surveys to determine population density at 1–3-year intervals Capture and fit with radio telemetry collars
How many wolves use the Refuge?	Number, size, and distribution of packs	Detect changes in number of packs, pack sizes, and distribution over time	Research potential causes of population changes	Aerial surveys in winter Capture and fit with radio telemetry collars

Inventory or Monitoring Question	Measured Characteristics	Goal(s) of Inventory or Monitoring Activity	Possible Management Actions	Possible Sampling Procedure
How many beaver are on the Refuge?	Number, distribution, and size of fall food caches	Detect changes in number and sizes of active caches	Research potential causes of change Modify trapping regulations if needed	Aerial surveys Aerial photography
How does fire affect refuge resources?	Small mammal species diversity and population density Plant species diversity and structure Forest age Fire intensity	Document change in small mammal communities over time Document change in plant communities and habitats over time Document change in forest age and types over time Map/document the different severity categories of new fires NA: baseline data	NA: baseline data Allows better prediction of fire effects based on refuge-specific information NA: baseline data Establish permanent plots Change management options	Sampling on permanent plots Collect tree age data Satellite imagery and aerial photography Satellite imagery and ground truthing
Are there any invasive plants on the Refuge?	Presence of invasive plants	Document location and diversity of invasive plants	Eradication	Directed searches and opportunistic observation
What are the trends in goose populations on the Refuge?	Number and distribution of molting interior greater White-fronted and Canada geese	Detect changes in goose numbers and/or distribution Provide data for regional investigations of interior greater White-fronted geese	Research potential causes of changes in numbers Modify recreational harvest regulations along flyway and/or subsistence harvest regulations in Alaska	Aerial line transect survey Capture and release of molting White-fronted geese
How many swans utilize the Refuge?	Number of swans and cygnets on the refuge	Document number and distribution of swans and cygnets on refuge	Research potential causes of population changes	Aerial line transect surveys
What are the trends in land bird populations?	Species and number of birds	Collect data to contribute to statewide and nation-wide databases	Research potential causes of populations changes	Breeding bird survey routes

Inventory or Monitoring Question	Measured Characteristics	Goal(s) of Inventory or Monitoring Activity	Possible Management Actions	Possible Sampling Procedure
How many salmon migrate up the Yukon and Koyukuk rivers and into refuge streams?	Species and number of salmon passing through a weir	Collect data to contribute to management of Yukon River salmon fishery	NA: baseline data	Document species, numbers, sex ratio, and run timing of salmon passing a specific point
What parts of the Refuge do whitefish use on a seasonal basis?	Locations of broad and humpback whitefish and least cisco	Track movements of fish to identify migratory patterns, including spawning and wintering areas. Collect morphological and genetic data on whitefish	NA: baseline data Protect important seasonal habitats Document movement of fish to off-refuge sites	Radio telemetry
What are the current levels of visitor use on refuge lands and what are the trends?	Number of visitors and parties, lengths of stay, sites visited, and activities occurring on the refuge	Collect baseline data	NA: baseline data	Compile information from guide reports, air taxi operator reports, and staff observations
Is recreational use on the Refuge displacing subsistence users?	Number and type of displacement incidents observed or reported	Collect baseline data	Increase visitor education Work with guides, transporters, and subsistence users to resolve issues Modify stipulations on permits	Collect information from local residents, guides, air taxi operators, and staff
How will stream flow be protected to meet primary refuge purposes?	Stream discharge	Protect water quality and quantity	File and obtain water rights with the State	Stream gauging year round for a minimum of 5 years

Inventory or Monitoring Question	Measured Characteristics	Goal(s) of Inventory or Monitoring Activity	Possible Management Actions	Possible Sampling Procedure
Is the known Hogatza River mining site leaking containments into the Koyukuk River?	Water quality downstream of mining sites	Collect baseline data	To be determined based upon findings	Use standard procedures to assess water quality
How are visitors getting information on the Refuge, and are they finding the information they seek?	Type of information requested, information sources, information lacking	Collect baseline data	Modify methods of providing and obtaining information to increase ease of use, sources, and types of information available	<p>Invite users to complete a comment sheet/survey on the refuge web-site</p> <p>Ask guides and air taxi operators to distribute surveys to their clients</p> <p>Distribute surveys at special events; staff conversations with visitors</p>

4.4 Plan Amendment and Revision

Periodic review and change of this revised Comprehensive Conservation Plan and its various step-down plans will be necessary. As knowledge of refuge resources, users, and uses improves, changes in management may be identified. Fish and wildlife population, user groups, adjacent land users, and other management considerations change with time, often in unforeseen ways. Challenges also may be encountered in trying to implement the Plan.

Revisions are a necessary part of the adaptive management approach used by the Service. This means that objectives and strategies to reach goals can be adjusted. Most of the resulting changes will fine-tune the Plan. These changes will not require modification of this document because minor changes will be addressed in the more detailed refuge step-down and annual work plans. Once the biological program review has been conducted and the Inventory and Monitoring Plan is approved, there may be a change in the direction of the refuge biological program. Only if a major change is required in management of the Refuge would it be necessary to create a new revised Comprehensive Conservation Plan with a new environmental assessment.

To enable refuge users; adjacent landowners; local, State and federal agencies; and other interested parties to express their views on how the Refuge is managed, the Refuge will periodically hold meetings or use other informative techniques, such as comment cards and surveys, to solicit comments for evaluation purposes. By encouraging public input, the Refuge will be better able to serve the public, to determine any potential problems before they occur, and to take immediate action to resolve existing problems.

The Refuge will periodically review public comments, local and State government recommendations, staff recommendations, research studies, and other information to determine if revisions to the Plan are necessary. If major changes are proposed, public meetings will be held, and a new environmental assessment or an environmental impact statement may be necessary. Full review and updating of this Plan will occur approximately 15 years after its approval.

4.5 Funding and Personnel Requirements

To accomplish the goals and objectives set forth in section 2.1 of this plan and the goals and objectives of the step-down plans, additional funding would be needed to fund the additional staff and support their programs. Additional staffing identified in this Plan includes: one GS-9 biologist (see section 2.1.1 Objective 5), one GS-9/11 fisheries biologist/hydrologist (see section 2.1.1 Objective 3), one GS9/11 assistant fire management officer (see section 2.13 Objective 5), and one GS-8 refuge information technician (see section 2.1.12 Objective 1). The additional cost of this staff (based on FY 2009 salary rates) would be approximately \$187,908 to \$208,106, depending upon the grade level of incoming staff. The actual cost of supporting their respective fields of work and providing adequate office space is estimated to be \$80,000 to \$100,000 for support costs and up to \$250,000 for new office space.

5. Consultation and Coordination with Others

5.1 Interagency agreements

5.1.1 Wildland fire suppression services

The U.S. Fish and Wildlife Service (Service) signed a memorandum of understanding with the Bureau of Land Management (BLM), Alaska Fire Service (August 2006) to provide wildland fire suppression and preparedness services for the Service Region 7 refuges.

5.1.2 Radio repeater sites

The Service and BLM have an agreement whereby BLM provides annual maintenance of the Refuge's radio repeater and remote automated weather station sites and its equipment. The Service has a permit with the BLM for the Kokrines radio repeater site. BLM has a permit with the Service for the Totson Mountains repeater site on the Northern Unit Innoko.

5.1.3 Others

The Refuge is party to several region-wide agreements between the Service and various State of Alaska departments and other federal agencies including:

- Alaska Department of Public Safety and Alaska State Troopers for law enforcement cooperation
- Koyukuk Moose Management Plan

5.2 Section 7 compliance

There are no known federally threatened or endangered species on the Refuge. Therefore, no action is required under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 stat 884, as amended).

Appendix A
Legal Guidance and Planning Coordination

A. Legal Guidance and Planning Coordination

1.1 Introduction

Management of the Refuge is dictated, in large part, by the legislation that created the unit and the purposes and goals described in chapter 1. However, other laws, regulations and policies also guide the management of the Refuge. This appendix identifies the acts and policy guidance that are integral in the development of this Plan.

1.2 Legal Guidance

Operation and management of the Refuge is influenced by a wide array of federal laws, treaties, and Executive orders. Among the most important are the National Wildlife Refuge System Administration Act, as amended by the National Wildlife System Improvement Act; the Refuge Recreation Act; the Endangered Species Act; the Wilderness Act; and the Wild and Scenic Rivers Act. These acts are described briefly, along with other acts and legal guidance that influence management of the Refuge.

1.2.1 International Treaties

Several treaties affect how the Service manages the Refuge. Among these are migratory bird treaties with Canada, Mexico, Japan, and Russia 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 management provisions such as (1) prohibiting disturbance of nesting colonies; (2) allowing the Secretary of the Interior to establish seasons for the taking of birds and the collection of their eggs by “indigenous inhabitants” of Alaska for their own nutritional and other essential needs; (3) directing each nation to undertake, to the maximum extent possible, measures necessary to protect and enhance migratory bird environments and to prevent and abate pollution or detrimental alteration of their habitats; and (4) 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.

Of the migratory bird species of concern in the treaties, those that use the Refuge include several Species of Concern identified by the state of Alaska: American peregrine falcon, Arctic peregrine falcon, Northern goshawk, Olive-sided flycatcher, Gray-cheeked thrush, Townsend’s warbler, and Blackpoll warbler.

1.2.2 National Guidance

Alaska National Interest Lands Conservation Act of 1980 as amended, 16 U.S.C. 140hh-3233, 43 U.S.C. 1602-1784 (ANILCA).

ANILCA amended the Alaska Native Claims Settlement Act, the Alaska Statehood Act, and the Wild and Scenic Rivers Act, and modified portions of the Wilderness Act as it applies to Alaska lands. It expanded the federal conservation system in Alaska (including national parks, refuges, forests, wilderness areas, and wild and scenic rivers.) Specifically, title III of ANILCA established new refuges, identified the purposes of each refuge, and provided administrative guidance for management of refuges in Alaska, including requiring the preparation and periodic updating of a comprehensive conservation plan for each refuge.

In addition, ANILCA provided comprehensive management guidance for all federal public lands in Alaska, including provisions regarding wilderness; subsistence; transportation and utility corridors; oil and gas leasing; mining; public access; and hunting, fishing, and trapping. The Nowitna Wild and Scenic River was designated on the Nowitna National Wildlife Refuge by ANILCA. Section 1317 required that all refuge lands not designated as wilderness be reviewed for their suitability for wilderness designation, in accordance with the provisions of the Wilderness Act. The Wilderness Review conducted as part of the Final Refuge Comprehensive Conservation Plans recommended that—although all refuge lands are suitable for designation as wilderness—no additional lands would be recommended for inclusion in the National Wilderness Preservation System.

Alaska Native Claims Settlement Act of 1971 as amended, 43 U.S.C. 1601-1624 (ANSCA).

The purpose of this act was to provide for “...settlement of all claims by Natives and Native groups of Alaska, based on aboriginal land claims.” It provided for grants of land and money and the establishment of Native corporations to maintain the economic affairs of Native organizations. In exchange, all aboriginal titles and claims, including any fishing and hunting rights, were extinguished. Section 12(a) allowed village corporations to select lands in national wildlife refuges, with several stipulations. Section 22(g), however, stated that these lands were to “...remain subject to the laws and regulations governing use and development of such refuge.” Other refuge lands were selected under section 14(h) (1), which allowed regional corporations to select cemetery sites and historical places. Section 17(b) provided for public easement across Native lands for access to federal lands. Section 17(d) (2) (A) provided the basis for the enactment of ANILCA.

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

This act establishes a unifying mission for the National Wildlife Refuge System (System), a mission that, first and foremost, focuses on the conservation of fish, wildlife, plants, and their habitats. It requires the preparation of a comprehensive conservation plan for each unit of the System. Furthermore, it reinforces and expands the “compatibility standard” of the Refuge Recreation Act, which requires that public uses must be determined to be compatible with refuge and agency missions and purposes before they can be allowed and establishes a process for determining compatibility. The act also identifies six priority wildlife-dependent recreation uses; clarifies the authority of the Secretary of the Interior to accept donations of money for land acquisition; and places restrictions on the transfer, exchange, or other disposal of lands within the System.

The Refuge Recreation Act of 1962 as amended, 16 U.S.C. 460k-460k-4

This act requires that any recreation use on areas of the System be “compatible” with the primary purpose(s) for which the area was acquired or established. It also requires that sufficient funding be available for the development, operation, and maintenance of recreation uses that are not directly related to the area’s primary purpose(s).

National Environmental Policy Act of 1969 as amended, 42 U.S.C. 4321-4347 (NEPA)

This act and the implementing regulations developed by the Council on Environmental Quality (40 CFR 1500-1508) require federal agencies to integrate the National Environmental Policy Act process with other planning at the earliest possible time to provide a systematic interdisciplinary approach to decision making; to identify and analyze the environmental effects of their actions; to describe appropriate alternatives to the proposed actions; and to involve the affected state and federal agencies, tribal governments; and public in the planning and decision making process.

Endangered Species Act of 1973 as amended, 16 U.S.C. 1231-1544 (ESA)

The Endangered Species Act provides for the conservation of threatened and endangered species of fish, wildlife, plants, and their critical habitats by federal action and by encouraging the establishment of state programs. Although not specifically addressing the System, it does directly affect management activities on national wildlife refuges. It directs federal agencies to take actions that would further the purposes of the act and to ensure that actions they carry out, authorize, or fund do not jeopardize endangered species or their critical habitat (section 7).

The Wilderness Act of 1964, 16 U.S.C 1131-1136

This act (P.L. 88-577) defined the wilderness resource and established the National Wilderness Preservation System. It provides the framework for designation by Congress of new units to the System and prescribes for their management. A Wilderness Review, which is required by section 1317 of ANILCA, was undertaken during development of the Refuge's 1987 Comprehensive Conservation Plan and Environmental Impact Statement following the framework and guidance provided by the Wilderness Act. The review found all non-designated refuge lands suitable for Wilderness designation, but no lands were recommended for inclusion in the National Wilderness Preservation System. The Refuge currently has 400,000 acres of designated wilderness.

The Wild and Scenic Rivers Act of 1968, 16 U.S.C. 1271-1287

This act establishes a National Wild and Scenic Rivers System and describes the methods and standards through which additional rivers may be identified and added to the system. Section 5(d)(1) requires that in all planning by federal agencies for the use and development of water and related land resources, consideration be given to potential wild, scenic, and recreation rivers. Rivers are added to the national system based on their free-flowing character and their outstandingly remarkable scenic, recreation, geologic, fish and wildlife, historic, cultural, ecological, or other, values. Rivers in the system are managed to maintain and to protect these outstandingly remarkable values for present and future generations. For Wild and Scenic Rivers in Alaska, ANILCA also provided direction for management of designated rivers. The Nowitna Wild River was designated on the Nowitna National Wildlife Refuge.

The Federal Water Pollution Control Act of 1972, as amended by The Clean Water Act of 1977, 33 U.S.C. s/s 1251 et seq.

This act 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, limits the discharge of pollutants or toxins into water, and 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.

Other Laws

Laws that affect mineral leasing, recreational use, commercial fishing, preservation and protection of cultural and historic resources, and other activities on federal lands are also considered in the comprehensive conservation planning process.

1.3 Policy Guidance

Programmatic guidance and policy documents provided additional direction for the management of national wildlife refuges throughout the System (see <http://www.fws.gov/policy> for more information). While it is not practical to provide information about all of these documents in this Plan, they are critical to management of the Refuge. Much of the management direction

described in chapter 2 and throughout this plan is influenced by the guidance from these programmatic and policy documents. Several of these documents guide us to use an ecosystem approach in refuge management. In other words, we must consider the health of the entire ecosystem when managing a refuge. This concept requires close coordination with others. In this section, we provide a brief description of this concept and of several of the national and regional (Alaska) management plans and programs that were considered during the development of this Plan. Other key policies, such as the compatibility policy, are described in chapter 2 because they provide guidance in this Plan.

1.3.1 Ecosystem Approach to Management

The goal of the Service's ecosystem approach is to constantly strive to contribute to "the effective conservation of natural biological diversity through perpetuation of dynamic, healthy ecosystems" while carrying out the Service's mission and mandates and through working closely with others (USFWS 1996). This is an ambitious goal and success lies in the coordinated efforts of many public agencies, private organizations, landowners, and citizens. Many programs and initiatives contribute to the conservation of biological diversity. Most obvious are actions that lead to the protection of habitat and the recovery of fish and wildlife populations in jeopardy. Less obvious, but equally significant, are actions that restore important habitats, reduce environmental degradation and contamination, monitor the integrity of natural systems, regulate the harvest of migratory birds, and provide technical assistance to private landowners.

The Service cannot fulfill this goal alone. Only through an approach in which we work with others to conserve the nation's biological heritage, will the goal be realized. An ecosystem management approach recognizes that institutions other than refuges have responsibilities and authorities for resources that lie both within and outside the each refuge.

Fish and wildlife population and habitat goals are based on species biology, population dynamics, and ecological processes that may be international in scope (e.g., migratory waterfowl). Managers must think and function at multiple scales simultaneously. Planning and implementation of management actions within the Service's ecosystem units must be flexible enough to address site-specific conservation priorities and reflect the broader population and habitat needs of widely ranging species.

1.3.2 National Management Plans

Nature is not constrained by the administrative boundaries that are used to determine ownership or management of specific areas of land. Without physical barriers and with available habitat, wildlife and fish freely roam through lands and waters regardless of ownership or management. To ensure the conservation of the many species that migrate across state lines, there are several national efforts designed to monitor and protect these species. These plans were reviewed during the revision of each refuge Plan to ensure that the revised management direction is consistent with these national conservation plans.

North American Waterfowl Management Plan

This conservation plan seeks to restore waterfowl populations in Canada, the United States, and Mexico to 1970s levels. The international partnership has worked to identify priority habitats for waterfowl and has established goals and objectives for waterfowl populations and habitats (USFWS 1998). The Refuge provides breeding and migration habitat for a variety of waterfowl.

Partners in Flight – Bird Conservation Plans

Partners in Flight is a cooperative effort involving partnerships among federal, state, and local government agencies; philanthropic foundations; professional organizations; conservation groups; industry; the academic community; 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, to establish objectives and strategies to provide needed conservation activities, and to implement and monitor progress on the plans.

U.S. Shorebird Conservation Plan

This conservation plan seeks to stabilize populations of all shorebirds that are in decline because of 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 quantity and quality to support shorebird populations in each region. Ultimately, the goal of the conservation plan is to restore and maintain shorebird populations throughout the Western Hemisphere through an international partnership (Brown et al. 2000).

North American Waterbird Conservation Plan

Waterbird Conservation for the Americas is a partnership that was created to “support a vision in which the distribution, diversity, and abundance of populations and habitats of breeding, migratory, and non-breeding waterbirds are sustained or restored throughout the lands and waters of North America, Central America, and the Caribbean.” Their plan “provides a continental-scale framework for the conservation and management of 210 species of waterbirds in 29 nations throughout North America. Sixty species of migratory waterbirds, including such diverse groups as loons, grebes, cranes, jaegers, gulls, and terns, occur on the Refuge, most of them as breeders.

1.3.3 Regional Management Plans

In addition to the national conservation plans, the Refuge Plan must consider the conservation plans and management goals of neighboring lands of the region. Currently there are no regional plans to review.

Appendix B
Coordination with the State of Alaska

B. Coordination with the State of Alaska (State), Including the Master Memorandum of Understanding with the Department of Fish and Game

1.1 Introduction

Consistent with the principles of ecosystem management and the laws and policies described in Appendix A, effective management of the Refuge must be done in close coordination with the state of Alaska. This appendix is not intended to be a comprehensive list of State agencies, but rather describe the primary State agencies that share concern and responsibilities for fish, wildlife, and other natural resources.

1.2 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. The Service has primary responsibility for management of migratory birds, endangered species, and other species mandated by Federal law. 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 (section 1.2.1). This memorandum sets the framework for cooperation between the two agencies.

Through the direction of the 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 (GMU); most of these are further divided into subunits (see Figure 1-3). State management objectives are developed for wildlife populations within the GMU. All Refuge lands lie within GMU 21 (subunits B, C, and D) and GMU 24 (subunits C and D). Management objectives for wildlife and fish populations on the Refuge are discussed in chapter 3.

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. Biological staff from ADF&G also provides 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 State police officers of the Alaska Department of Public Safety.

ADF&G Division of Wildlife Conservation 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 and habitat, 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.

ADF&G Division of Sport Fish is responsible for the State's recreational fishery resources: 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 the 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.

ADF&G Division of Subsistence is the research branch of the department responsible for providing comprehensive information on the customary and traditional use of wild resources. Information is provided to meet management goals, aid in regulation development, facilitate collaborative agreements, assess environmental impacts, and describe the unique role of wild resources in Alaska.

1.2.1 Master Memorandum of Understanding Between the Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service

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 uses 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 which 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 which 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 which 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 provision 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 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 which affect 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
Department of Fish and Game

/signed/ Ronald O. Skoog
Commissioner

March 13, 1982
Date

U.S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service

/signed/ Keith M. Schreiner
Regional Director, Alaska

March 13, 1982
Date

1.3 Alaska Department of Natural Resources

The Alaska Department of Natural Resources (DNR) and its divisions are also key management partners, coordinating with the Service and other federal and State agencies in managing public lands (federal and State) in Alaska. DNR manages all state-owned lands, water, and surface and subsurface resources except for fish and game. DNR - Division of Mining, Land and Water manages the State's water and land interests within the National Wildlife Refuges. Interest in water rights, navigable waters, ownership of submerged lands, and rights-of-way over refuge lands will increase during the lifetime of this Plan.

1.4 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 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
Inventory and Monitoring Plan

Executive Summary

Wildlife Inventory Plan Koyukuk/Nowitna National Wildlife Refuge Complex

**Koyukuk National Wildlife Refuge
Nowitna National Wildlife Refuge
Northern Unit Innoko National Wildlife Refuge**

**Galena, Alaska
July 2008**

The role of wildlife inventory on the Refuge: The aim of wildlife and fishery inventory is to provide baseline data on status, distribution, population trends, and habitat use of the most important resource species on the refuge complex. This information is crucial to making scientifically supportable land and resource management decisions. Such inventories were mandated in ANILCA. Identified in the purposes of the refuges are the following species: Peregrine falcon, waterfowl (especially Canvasback ducks, White-fronted geese and Trumpeter swans), moose, caribou, black bear, furbearers (especially marten), salmon, sheefish, and northern pike. Because these species were specifically mentioned in ANILCA, the Comprehensive Conservation Plans and the Refuge Operational Plan also indicate the importance of their monitoring. It was within this framework that the objective of the inventory plan was set: “to provide a management tool for monitoring trends in distribution and abundance of wildlife on the refuges.” The Wildlife Inventory Plan (WIP) defines the means by which refuge staff will obtain consistent and reliable baseline data for species of local, regional, national, and international significance. The choice of species to address was based largely on mandates and anticipated resource conflicts or threats to the species.

Once the species of interest were identified based on ANILCA, the Comprehensive Conservation Plan, and other legal mandates, refuge staff reviewed published literature, refuge progress reports, and files, plus they consulted with active researchers and other refuge and Alaska Department of Fish and Game (ADF&G) biologists to formulate each procedure. The procedures were then peer reviewed in Alaska and other states by experienced field personnel. Finally, each procedure was field tested and necessary changes made to the procedure or cost estimate. In cases where criteria were available, such as for moose and caribou, the levels of population density, or age/sex ratios that would trigger concern or management recommendation are given in the specific procedure.

Once procedures were developed, priorities for the individual procedures were set, again based on mandates, anticipated issues, significant conflicts, and existing information needs. The staff was unanimous in the philosophy that each inventory procedure should be implemented fully and thoroughly, so the indicated sample sizes would provide quality data with reliability to adequately support management decisions. If budget cuts need to be made, the plan dictates that full procedures are to be dropped from the bottom of the list. For the expensive procedures, a three-tiered approach was used consisting of “primary” procedures/species (designated as mandatory inventories), “secondary” procedures/species (designated as optional), and finally, the third tier, which includes periodically scheduled, cyclic population estimates and censuses of species such as moose and swans. In this manner, least important would be cut first. Refuge staff relies on the Service’s Fairbanks Fisheries Resource Office for all fisheries management and inventories. The biological staff at the Refuge recommends that fishery projects become fully integrated into the station inventory procedures in the future.

Budgeting for wildlife inventories: In fiscal year (FY) 2007–2008, the primary wildlife procedures budget was \$75,000, with an additional estimated \$300,000 of permanent salaries and \$50,000 for fuel that were in the base budget. The total costs of primary wildlife inventory work represented approximately 25 percent of the total refuge budget in FY 2007. It is the collective opinion of all of the professional staff on the Refuge that we are currently understaffed and require additional positions to adequately fulfill wildlife inventory needs.

For baseline resource data to be reliable and defensible, it must be collected consistently over a period of years. The great degree of annual variation we observe in wildlife statistics allows very limited utility from a single year of data. We look at consistent, standardized wildlife inventory work over a period of many years as an investment in the future ability of the Service to make sound resource decisions that have strong scientific reliability. We cannot wait for the need for data to arise before deciding to gather it, because in most instances, it will be too late to gather reliable data applicable to the decision at hand. Finally, the combination of an investment in wildlife and fisheries inventories, combined with carefully directed scientific research projects to answer specific management questions, provide two sides to an integrated “resource management triangle” that, if followed, will best protect the refuge ecosystems. If a refuge unit cannot provide defensible data concerning the health of its ecosystems, the basic ANILCA mandate has been compromised.

Moose - Information needs: Because moose are the most important subsistence and sport hunting species, we have to answer questions on the status and health of populations on the Refuge. Annual information on bull/cow ratios, calf/cow ratios, recruitment, harvest patterns, and predation are collected and provided to the Subsistence Division, ADF&G advisory committees, Native groups, the Regional Office, and the public.

Refuge response: Aerial surveys of standardized trend areas are flown every year during November (post-hunt/rut). Areas of lesser importance are designated as secondary trend areas and are surveyed when funding permits. Large scale population estimates are obtained for significant portions of the Complex every 5–10 years. The plan includes specific criteria on age and sex ratios obtained from trend counts that trigger concern for a population, and at which point more data and possible regulatory proposals are warranted. Hunter check stations are operated on both the Nowitna and Koyukuk rivers to obtain accurate and immediate harvest totals in the most intensely hunted areas.

Caribou - Information needs: The Galena Mountain caribou herd has fluctuated from 100 to 300 animals and is currently estimated at 150–200 animals. The fall hunting season has been closed for this herd. In some years, portions of the Western Arctic caribou herd (WAH) winter north of Galena on the Koyukuk National Wildlife Refuge, where these large numbers of caribou overlap on the winter range of a much smaller Galena Mountain herd (GMH). When dilution rates are adequate, hunting is opened by special action.

Refuge response: The wildlife inventory plan calls for simple distribution and abundance surveys in the overlap area once per winter, and twice per winter for the larger WAH area. Specific guidelines are given as to the acceptable level of dilution of GMH caribou among WAH caribou (in percent) at which time hunting opportunity will be provided. In conjunction with a cooperative ADF&G and Bureau of Land Management (BLM) caribou study, radio telemetry and the secondary procedures described in the plan attempt to address productivity, genetic identity, and seasonal range use.

Wolves - Information needs: Wolf density and predation rate information, in combination with moose density data, are required to estimate sustainable harvests of ungulates. The Service must be able to make supportable comments to sport and subsistence hunting regulation proposals.

Refuge response: Standardized aerial surveys using the ADF&G sample unit probability estimator (SUPE) method have been implemented on the Nowitna, Northern Unit Innoko (Kaiyuh), and Koyukuk refuges. Surveys will be repeated every 5–10 years and perhaps more often if dictated by resource problems or controversies, such as upcoming wolf management on or near all three refuge units. The SUPE method relies on aerial snow track surveys and the

probability of track encounter and will be supplemented with an annual incidental wolf pack observation record.

Furbearers - Information needs: Trapping has traditionally been one of the more important subsistence activities on the Complex. Past furbearer trend information utilized index information available from track counts and harvest surveys.

Refuge response: In the mid 1990s, a combination of low fur prices and a more steady year-round income in the villages led to a decrease in trapper activity on the Complex. Currently, the furbearer inventory plan is suspended indefinitely due to a lack of trapper activity.

Duck production - Information needs: Despite 10 years of statistically accurate baseline production and summering adult population studies on the Complex, the annual Migratory Bird Management (MBM) breeding pair indices are more cost effective and adequate enough to make population management decisions on a refuge and flyway basis. We know that the Koyukuk basin is the second most valuable production area in the interior (just behind Yukon Flats).

Refuge response: The duck production inventory plan has been suspended indefinitely due to high variability and high cost.

Goose production - Information needs: We are unable at this time to estimate the total number of nesting and summering White-fronted and Canada geese on the Refuge, although good production and molting trend information is in place. The White-fronted goose population appears to be recovering gradually from the marked decline observed in the early 1990s.

Refuge response: The WIP provides for continued production trend surveys along three rivers that are known production areas. With the addition of the aerial molting survey, we can also index total adults; breeding pairs; and young, molting non-breeding adults; and estimate minimum total numbers present.

Swan production - Information needs: On the Koyukuk Refuge, the non-hunted population of Trumpeter swans and the hunted population of Tundra swans overlap. A study conducted from 2004–2006 showed an even distribution of 50 percent for both species nesting on the Koyukuk Refuge, an 80 percent Trumpeter and 20 percent Tundra swan overlap on the Northern Unit Innoko, and 100 percent Trumpeters on the Nowitna Refuge. Previously, population counts were presented as simply “swans” without knowing the proportion of each species. Continued annual trend surveys and follow-up distribution studies should be conducted at or near the five-year MBM statewide Trumpeter swan censuses to better enumerate population changes for each species on the Refuge.

Refuge response: Due to their high sightability in aerial surveys and past statewide censuses, we are perhaps in the position of having in place the best quality baseline resource information than for any other species. The WIP identifies a minimal number of trend maps to be surveyed aerially every year. A refuge-wide survey that is part of the statewide cooperative survey is planned for every fifth year.

Passerine birds - Information needs: The recent emphasis on neotropical migrants highlights the importance of Alaska's contribution to larger nationwide and continent-wide databases. This station has been a contributor to the Breeding Bird Survey (BBS) since 1985 and the Christmas Bird Count (CBC) since 1982.

Refuge response: Continued contribution to the BBS and CBC using at minimal cost are planned. Recommended passerine bird census techniques are contained in the WIP to assist in planning future studies such as off-road point counts and bird use on post-fire seres.

Raptors - Information needs: Raptors are very sensitive to disturbance and hence serve as “indicator” species. Peregrine falcons and Harlan's and Rough-legged hawks nest on cliff habitats along the Koyukuk and Yukon rivers. Ready access in these areas provides for ease of inventory but also allows for possible frequent disturbance by anyone interested in taking raptor chicks; therefore, continued minimal monitoring is warranted.

Refuge response: A standardized survey route along the Yukon River has been surveyed since 1979 by the Service's Endangered Species office in Fairbanks and in cooperation with refuge staff since 1991, with an abbreviated version in place since 1995. When the Peregrine falcon was delisted from endangered status, the survey became the sole responsibility of the Complex. Continued monitoring of the route would be at minimal expense because experienced volunteers are frequently used.

Beaver - Information needs: Beaver have a significant impact on wetland regimes on the Complex. Trapping historically held beaver numbers much lower than present levels.

Refuge response: The WIP identifies a minimal number of trend maps to be surveyed aerially, rotating annually between the Koyukuk/Northern Unit Innoko, and the Nowitna refuges.

Small mammals - Information needs: Small mammals are important prey items for raptors and furbearers. Cycles in distribution and abundance of small mammals, particularly as tied to fire succession, may be the only reliable predictor of marten abundance. Because of their importance to the fire/furbearer relationship, considerable baseline data were gathered on the Koyukuk and Nowitna refuges in the early and mid-1990s.

Refuge response: During the fire/furbearer study, a major effort was made to standardize the methods for snap-trap grids, and these are presented in the WIP for future use. It is recommended that initial inventory work to determine species status and distribution be accomplished on the Koyukuk and Northern Unit Innoko (Kaiyuh) and the same grids resurveyed every five years.

Water Monitoring Plan

for the Koyukuk, Northern Unit Innoko, and Nowitna National Wildlife Refuges

Objectives for collecting data:

- Why collect data?
- Baseline quality data (for use doing what?)
- Resample historical sites from 1988 for contaminants, sediments, physical properties. (Anticipate changes)
- Continuous water temperatures; spawning habitats (poor vs. good)
- Climate change
- Contaminant potential (pipeline spill, sewage/contaminants from villages/military)

What specific types of data to collect:

- Physical properties
 - Water temperature
 - pH
 - Specified conductivity
 - Dissolved oxygen
 - Turbidity
- Chemical properties (lab analysis – major ion, minor ion, and trace ions)
 - pH
 - Bicarbonates
 - Hardness
 - Carbonate
 - Potassium
 - Calcium
 - Lead
 - Iron
 - Aluminum, antimony, barium, beryllium, boron, cadmium, copper, magnesium, manganese, molybdenum, nickel, silver, strontium, thallium, tin, vanadium, zinc, chromium, and selenium
 - Total dissolved solids
 - Specific conductance
 - Nitrate/nitrite

Sodium

Sulfate

Arsenic

Cyanide

Mercury

Organic contaminants – polychlorinated biphenyls (PCB)

- Microbes
- Macroinvertebrates

Where? When? How often do we collect data?

- **Koyukuk** – 9 rivers, 3 creeks, and 9 lakes

Upper Dakli River

Lower Dakli River

Dulbi River

Gisasa River

Honhosa River

South Fork Huslia River

Indian River

Kateel River

Wheeler Creek

Bear Creek

Billy Hawk Creek

Camp 279 Lake

Huslia VBM Lake

Solsmunket Lake

Willow Lake

Beszivit Lake

Klymunget Lake

Coffee Can Lake

Hozatka Lake

105 Lake

- **Kaiyuh** – 1 river, 4 creeks, and 2 lakes
 - Khotol River
 - Kaiyuh Slough
 - North Creek
 - Eddy Creek
 - Bonanza Creek
 - Bishop Creek
 - Pilot Mountain Slough

 - Pike Trap Lake
 - Kaiyuh Duck Banding Site
- **Nowitna** – 5 rivers, 3 creeks, and 4 lakes
 - Sulatna River
 - Lost River
 - Upper Nowitna River
 - Sulukna River
 - Titna River
 - California Creek
 - Beaver Creek
 - Big Creek

 - Round Lake
 - 747 Lake
 - Atchley’s Lake
 - Now11 Lake

- Sample twice a year
- Sample all summer using data loggers
- Once every few years

Who is responsible for collecting data?

- Habitat biologist, subsistence biologist, supervisory biologist

Training needs and supplies

Budget – Avian Influenza, subsistence, fisheries, coop with tribes, and Yukon River Group funds

Make sure it is done on schedule and quality samples are taken and shipped for analysis.

How to maintain the quality of the data?

How will the data be analyzed?

How and to whom will the data be distributed?

- Water Resources
- Fisheries
- ADF&G

Appendix D
Compatibility Determinations

Compatibility Determinations

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Compatibility Determination

Use: Alaska Department of Fish and Game Management and Public Safety Wildlife Enforcement Activities

Primary Use: Uses (other) - State of Alaska management and law enforcement activities

Supporting Uses: Boating (motorized and non-motorized), fixed-wing aircraft landings, helicopter landings, snowmobiling, environmental education and interpretation (not conducted by refuge staff or authorized agents), firewood cutting, 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: Koyukuk and Northern Unit of Innoko/Nowitna National Wildlife Refuge

Establishment and Acquisition Authority:

Koyukuk/Nowitna National Wildlife Refuge was established on December 2, 1980, when Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). It includes Koyukuk National Wildlife Refuge, Nowitna National Wildlife Refuge, and the Northern Unit of Innoko National Wildlife Refuge.

Refuge Purposes:

Section 302(5) (B) of ANILCA states purposes for which the Koyukuk Refuge was established and shall be managed include (purposes ii-iv are the same for all three refuges):

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl and other migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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 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.

[Koyukuk Wilderness] to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to administer for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as wilderness.

Section 302(3) (B) of ANILCA states purposes for which the Innoko 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 waterfowl, peregrine falcons, other migratory birds, black bears, moose, furbearers, and other mammals and salmon;

Section 302(6) (B) of ANILCA states purposes for which the Nowitna 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 trumpeter swans, white-fronted geese, canvasbacks and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free-flowing condition, its water quality, wildlife, geology, and primitive setting.

National Wildlife Refuge System Mission:

The mission of the 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 compatibility determination addresses routine management activities conducted by the Alaska Department of Fish and Game 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 between the Alaska Department of Fish and Game, 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 Alaska Department of Fish and Game 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, motorboats, snowmobiles, non-motorized boats, foot, snowshoes, and cross-country skis. Potential lodging and facilities include tents, tent frames, tent platforms, weather ports, existing permitted cabins, 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 10 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.

Anticipated Impacts of the Use:

Because Alaska Departments of Fish and Game 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, other resources within the Refuge (such as water quality, soil, and vegetation), and visitors. These positive impacts would support refuge purposes and goals and the Service mission.

Public Review and Comment:

Public comment was solicited concurrently with the revision of the Refuge's Comprehensive Conservation Plan.

Refuge Determination (check one below):

- Use is Not Compatible
- Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

A compatibility determination is not required for State activities on lands within the Refuge where a pre-established agreement or memorandum of understanding is in place. 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. 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:

U.S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement, and Wilderness Review for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges. U. S. Fish and Wildlife Service, Anchorage, Alaska.

U.S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan for the Nowitna National Wildlife Refuge. U. S. Fish and Wildlife Service, Anchorage, Alaska.

U.S. Fish and Wildlife Service. 2008. Draft Revised Comprehensive Conservation Plan and Environmental Assessment for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges. U. S. Fish and Wildlife Service, Anchorage, Alaska.

Refuge Determination:

Refuge Manager/
Project Leader Approval:

_____ /signed/ Kenton Moos _____ 4/17/2009
(Signature) (Date)

Concurrence:

Regional Chief
National Wildlife
Refuge System:

_____ /signed/ Todd Logan _____ 4/17/2009
(Signature) (Date)

Mandatory 10-Year Re-evaluation Date: 2019

NEPA Compliance for Refuge Use Decision

- _____ Categorical Exclusion without Environmental Action Memorandum
- _____ Categorical Exclusions and Environmental Action Memorandum
- X _____ Environmental Assessment and Finding of No Significant Impact
- _____ Environmental Impact Statement and Record of Decision

Compatibility Determination

Use: Commercial Big-Game Hunting Guide Services

Primary Use: 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 cutting, natural resource gathering, camping, hiking and backpacking, snowshoeing, wildlife photography and videography, and wildlife observation.

Refuge Name: Koyukuk and Northern Unit of Innoko/Nowitna National Wildlife Refuge

Establishment and Acquisition Authority:

Koyukuk/Nowitna National Wildlife Refuge was established on December 2, 1980, when Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). It includes Koyukuk National Wildlife Refuge, Nowitna National Wildlife Refuge, and the Northern Unit of Innoko National Wildlife Refuge.

Refuge Purposes:

Section 302(5) (B) of ANILCA states purposes for which the Koyukuk Refuge was established and shall be managed include (purposes ii–iv are the same for all three refuges):

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl and other migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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 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.

[Koyukuk Wilderness] to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to administer for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as wilderness.

Section 302(3) (B) of ANILCA states purposes for which the Innoko 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 waterfowl, peregrine falcons, other migratory birds, black bears, moose, furbearers, and other mammals and salmon;

Section 302(6) (B) of ANILCA states purposes for which the Nowitna 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 trumpeter swans, white-fronted geese, canvasbacks and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free-flowing condition, its water quality, wildlife, geology, and primitive setting.

National Wildlife Refuge System Mission:

The mission of the 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 is a re-evaluation of the compatibility of use of federal lands within the Refuge for big-game guided hunting. The compatibility of recreational hunting on the Refuge is evaluated in a separate compatibility determination. Koyukuk/Nowitna Refuge has eight exclusive commercial big-game guiding areas. These areas are awarded to five guides currently.

The 2004 Prospectus, which prohibits the use of off-road vehicles by big-game hunting guides and their clients on the Koyukuk/Nowitna Refuge, states:

“The objective of allowing commercial big-game guiding is to make available to the public a variety of quality recreational hunts on areas of the Refuge where such activities are compatible with the mission of the National Wildlife Refuge System and the Refuge’s purposes, and consistent with management objectives. Refuge policies require that sport hunting must reflect well on the Refuge and on the tradition of hunting. It must promote positive hunting values and hunter ethics such as fair chase, and provide participants with reasonable harvest opportunities, less crowding, less competition, fewer conflicts between hunters, relatively undisturbed wildlife, greater hunter safety, less than average crippling loss, and less interference from or dependence on mechanized aspects of the sport. Commercial guiding activities authorized on Refuge lands should contribute to these policies.”

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.”

Koyukuk/Nowitna Refuge is located within State of Alaska Game Management Units (GMU) 21B, 21D, and 24D. Moose and black and brown bear are available to hunt.

Big-game guides are competitively selected to operate on refuge lands through a formal 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 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 and are required to follow written operations plans, which are evaluated by Service personnel during the competitive selection process. These operations plans

include the following: 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, boat), including other needed facilities such as caches and weather ports; 5) access points and mode(s) of transportation (e.g., airplanes, boats, snowmobiles, pack animals, and other nonmotorized 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/authorizations related to their guiding activities.

This compatibility determination addresses the full spectrum of uses associated with the overall activity of commercially guided hunting of big game, including all means of access, lodging and facilities, and other elements identified in the guides' operations plans. Authorized modes of access for all areas within Koyukuk/Nowitna Refuge include fixed-wing aircraft, motor boats, snowmobiles, non-motorized boats, dogsled, foot, snowshoe, and cross-country ski. 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 Koyukuk/Nowitna Refuge.

This is an existing activity that supports wildlife-dependent priority public uses. Activities would occur mainly on the Koyukuk and Nowitna rivers in the Nulato Hills during State regulated hunting seasons.

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.

Refuge staff participation includes the following. During the initial competitive process, the refuge manager spends approximately one month writing and reviewing the prospectus, conducting guide interviews and making a selection, writing decision documents, and potentially dealing with appeals that may result in litigation. The deputy refuge manager assists the refuge manager throughout the decision process. After initial selection, the refuge manager may spend about 10 days per year on oversight, permit compliance, and other guiding issues. The deputy refuge manager may spend one week issuing or renewing permits, administering use-day fee collections, monitoring permit compliance and conducting related activities. Non-refuge staff (e.g., law enforcement officers from other refuges or the zone officer for northern refuges) may be required to spend an average of one week per year monitoring permit and hunting regulation compliance. In summary, administrative staff time primarily involves reviewing applications, researching and writing decisions, responding to appeals, and conducting regional office briefings if appeals occur, issuing and renewing special use permits every five years; ensuring licenses and certificates are current; collecting client use-day fees; and reporting data on an annual basis. Field work associated with administering the program primarily involves patrolling during hunting seasons and monitoring permittees' compliance with permit conditions. An administrative fee is assessed when each permit is issued. In addition, client use-day fees are assessed for each day a guide has a client on the Refuge. Fees collected are returned to the Refuge to administer the program.

Anticipated Impacts of the Use:

Criteria in the competitive scoring and selection process used to select big-game guide permittees attempt to address minimizing impacts to refuge resources and to other visitors. These criteria include impacts on wildlife resources; other refuge resources such as water quality, soil and vegetation, and other refuge users, especially subsistence. The criteria address such factors as target species, number of clients, transportation modes, amount of aircraft use, fuel storage, garbage and human waste management, methods to protect wildlife and habitat, type and location of lodging, and location of access points. These selection criteria are used to rank or score applicants and provide a strong incentive to maintain a low impact guide service. Permit conditions and stipulations noted in the following sections also contribute to minimizing potential impacts.

Commercial big-game hunting is also regulated by the State, and new draft regulations (AS 08.54 and 12 AAC 75) are under review by the Big Game Commercial Services Board. Commercial big-game guiding operations may, in some cases, result in some competition or interference with subsistence users and/or other non-guided recreational hunters for the limited number of game animals in river corridors. Refuge staff members are aware of these potential conflicts and monitor use levels each hunting season. Should 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.

Impacts to refuge habitats would be minimal and transitory. Access to the Refuge during summer months would be primarily by landing float-equipped aircraft on lakes and rivers, or by motor boat, or by floating into the Refuge. Landings on vegetated lowland tundra and disturbance to vegetation would be limited 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 is not known to have occurred via this transmission method within Koyukuk/Nowitna Refuge to date, guides and refuge staff must be vigilant to prevent such occurrences. In addition, frequent motorboat or aircraft traffic could impact nesting, molting or staging birds (Bouffard 1982, Miller 1994, Ward et al. 1994). Winter access could be by dog sled, cross-country skis, snowmobile, or aircraft fitted with skis. Disturbance to vegetation would be limited by conditions within the special use permit. Temporary displacement and/or disturbance to wildlife can occur in response to low level overflights and during takeoffs and approaches to landings (Calef et al. 1976), but impacts would likely be short term and minimal.

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. The use of cabins in association with commercial guiding would be authorized in accordance with 50 Code of Federal Regulations 36.33.

Public Review and Comment:

Public comment was solicited concurrently with the revision of the Refuge's Comprehensive Conservation Plan.

Refuge Determination (check one below):

- Use is Not Compatible
 Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

A special use permit with stipulations is required for commercially guided recreational hunting services. Each 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 typical special use permit stipulations, some of which are necessary for compatibility. These stipulations will be updated to comply with the final revised Koyukuk/Nowitna National Wildlife Refuge Comprehensive Conservation Plan.

Continuing law enforcement and administrative monitoring of permittees will be carried out to ensure compliance with the terms of the special use permit.

Regional Standard 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 (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 Code of Federal Regulations 36.41.
- The permittee is responsible for ensuring that all employees, party members, aircraft pilots, and any other persons working for the permittee and conducting activities allowed by this permit are familiar with and adhere to the conditions of this permit.
- The permittee may not sublet any part of the authorized use area and is prohibited from subcontracting clients with any other guide. The permittee must also be personally present with each client in the Refuge designated use area at least once during each contracted hunt.
- 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.
- The permittee and permittee's clients do not have the exclusive use of the site(s) or lands covered by this permit, except for the authorized camp facilities.
- This permit may be canceled or revised at any time by the Refuge Manager in case of emergency (e.g., high fire danger, flooding, unusual resource problems, etc.).
- The permittee shall notify the Refuge Manager during Refuge working hours, in person or by telephone, before beginning and upon completion of annual activities allowed by this permit.
- Prior to beginning any activities allowed by this permit, the permittee 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 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.
- The permittee 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.

- 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.
- This permit authorizes use on State selected lands. If any of these lands are conveyed during the term of this permit, the permittee will no longer be authorized to use those lands until and unless permission is obtained from the Alaska Department of Natural Resources.
- This permit authorizes use only on the Native selected lands specifically identified in the description block of this permit. If any of these Native selected lands are conveyed during the term of this permit, the permittee will no longer be authorized to use those lands unless permission is obtained from the Native corporation to which land ownership has been conveyed.
- 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.
- Permittees shall maintain their use areas in 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 permittee must be removed from Refuge lands upon completion of permitted activities.
- The construction or clearing of landing strips or pads is prohibited. Incidental hand removal of rocks and other minor obstructions may be permitted.
- The use of off-road vehicles (except snowmobiles with adequate snow cover) is prohibited unless specifically authorized in writing in this permit.
- 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 take-off and landing, maintain a minimum altitude of 2,000 feet above ground level (AGL).
- All aircraft being used in commercial operations must have 12-inch identification numbers in contrasting colors which are readily visible.
- Motorboat operators must possess a U.S. Coast Guard (USCG) license for all passenger-carrying operations, if required by USCG regulations.
- Construction of cabins or other permanent structures is prohibited.
- The permittee's operation plan, as amended and accepted by the U.S. Fish and Wildlife Service, is hereby incorporated in its entirety as a special condition. All deviations from the operations plan must receive prior written approval by the Refuge Manager or his designee.
- Any action by a permittee or the permittee's employees that 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 landable area to restrict use by other aircraft or persons.

Refuge-Specific Special Conditions

- Base camp locations must be approved by the Refuge Manager. Base camps will be located on durable surfaces, or relocated at intervals adequate to prevent site impacts.
- All temporary accommodations will be constructed of materials that blend with the immediate surroundings. Campsites, shelters and equipment will be used and maintained in a manner consistent with the protection of area resources, including wilderness character.

- Provisions for human waste management and disposal must be approved by the Refuge Manager.
- Equipment caches may be located in approved areas. Contact the Refuge Manager for approval. The cache will be clearly marked with the permittee's name, will be designed to blend in with the surrounding environment, and will be bear-proof.
- Use of gasoline or similar fuel for heating and cooking is encouraged. However, driftwood, standing dead tress and brush may be used for firewood. Standing dead trees may not be cut within 200 feet of streams or lake shores.
- All garbage and trash will be secured in a manner that minimizes attraction to wildlife and must be removed from the field before vacating the site for the season.
- Fuel storage sites must be approved by the Refuge Manager. Preparations to prevent and respond to a fuel spill must be fully adequate at all sites for the amount of fuel stored on site. All containers must be properly stored and marked with the permittee's name, address and type of fuel.
- The permittee will take no intentional action that interferes with subsistence activities of rural users or restricts the reasonable access of subsistence users to Refuge lands. This may include but is not limited to disturbance of wildlife and their movements near subsistence hunters, and damage to cabins, trails, traditional campsites or caches used by subsistence users.
- To minimize the potential for conflicts with subsistence users, the permittee must review the Koyukuk/Nowitna Refuge land status maps (available from the Galena office) to ascertain the location of selected and conveyed lands within refuge boundaries.
- The permittee shall ensure that all employees and clients seek to minimize the effect of their activities on the wilderness character of the land, wildlife, and the unique experience available there.

Justification:

Recreational hunting has been found to be compatible with the purposes of Koyukuk/Nowitna Refuge and with the National Wildlife Refuge System Mission. Commercial big-game guiding and outfitting services are a form of traditional Alaskan activity that Congress intended to preserve with enactment of the Alaska National Interest Lands Conservation Act, which designated the Refuge. These services support not only hunting, but also other activities, including wildlife observation and photography; these are three of the priority public uses of National Wildlife Refuges. Most non-Alaska residents would not be able to hunt on Koyukuk/Nowitna Refuge if guiding were not allowed.

Requirements placed on commercial hunting guides by the Service through the original selection process and the terms of their special use permits and regulations of the State of Alaska ensure that these commercial operators provide safe, high-quality experiences for their clients. These operations can help the Refuge achieve its purposes of protecting fish and wildlife resources of the Refuge 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 is 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.

Compatibility Determination

Use: Commercial Recreational Fishing Guide Services

Primary Use: Fishing (guiding and outfitting)

Supporting Uses: Fixed-wing aircraft landings, boating (motorized and non-motorized), snowmobiling, environmental education and interpretation (not conducted by refuge staff or authorized agents), hunting, firewood cutting, natural resource gathering, camping, picnicking, hiking and backpacking, swimming and beach use, wildlife photography and videography, and wildlife observation.

Refuge Name: Koyukuk and Northern Unit of Innoko/Nowitna National Wildlife Refuge

Establishment and Acquisition Authority:

Koyukuk/Nowitna National Wildlife Refuge was established on December 2, 1980, when Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). It includes Koyukuk National Wildlife Refuge, Nowitna National Wildlife Refuge, and the Northern Unit of Innoko National Wildlife Refuge.

Refuge Purposes:

Section 302(5) (B) of ANILCA states purposes for which the Koyukuk Refuge was established and shall be managed include (purposes ii–iv are the same for all three refuges):

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl and other migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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 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.

[Koyukuk Wilderness] to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to administer for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as wilderness.

Section 302(3) (B) of ANILCA states purposes for which the Innoko 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 waterfowl, peregrine falcons, other migratory birds, black bears, moose, furbearers, and other mammals and salmon;

Section 302(6) (B) of ANILCA states purposes for which the Nowitna 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 trumpeter swans, white-fronted geese, canvasbacks and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free-flowing condition, its water quality, wildlife, geology, and primitive setting.

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 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 description of use includes a re-evaluation of the compatibility of use of federal lands within Koyukuk/Nowitna Refuge for commercially guided recreational fishing. The original compatibility determination for commercially guided recreational fishing was made in 1992, subject to reasonable regulation and special conditions provided with a special use permit. This compatibility determination addresses the full spectrum of uses associated with commercially guided recreational fishing. This includes all means of access, lodging and facilities, and other elements identified in the guides' operations plans. The compatibility of recreational fishing on Koyukuk/Nowitna Refuge is evaluated in a separate compatibility determination. Commercial fishing guides could target northern pike plus, two species of Pacific salmon, sheefish and whitefish that occur within Koyukuk/Nowitna Refuge. Commercially guided recreational fishing and related services could contribute to the fulfillment of refuge purposes and the National Wildlife Refuge System Mission by facilitating priority public use and management of healthy fish populations through managed fishing. Historically, there have been two commercial fishing guides operating on Koyukuk/Nowitna Refuge. Guided fishing also has taken place ancillary to guided hunting and commercially guided wildlife observation tours, and it is anticipated that this use may increase in the future.

Means of authorized access for commercially guided fishing could include fixed-wing airplanes, motorboats, non-motorized boats, and hiking. Guided recreational fishing occur spring through fall. Recreational fishing is managed under State of Alaska fishing regulations. Of the major rivers on the Refuge, all could be classified as having good recreational fishing opportunities, based on reasonable accessibility by floatplane or boat, and sustainable populations of anadromous and/or resident fish. Although all these drainages provide opportunities for day use and overnight primitive camping, cost of traveling to these areas for day use fishing is prohibitive for most visitors.

Recreational fishing guides under permit from the Refuge may operate from a temporary camp on a river or lake or from a floating base. Each guide would submit a year-end report to the Refuge identifying the number of clients guided, the location(s) of fishing activities, and the number of fish caught by species.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage commercially guided recreational fishing activities at current and projected levels. Administrative staff time

primarily involves issuing permits, ensuring that licenses and certifications are current, collecting client use-day fees, and recording activity data. Field work associated with administering the program primarily involves monitoring permittees' compliance with the terms of the permits and resource law enforcement patrols. Estimated staff time to annually administer and monitor these permits is two weeks. An administrative fee is assessed when each permit is issued. In addition, a client use fee is assessed for each day a guide has a client on the refuge. Fees collected are returned to the Refuge to manage the program.

Anticipated Impacts of the Use:

Both the Federal Subsistence Board and State Board of Fisheries regularly adopt regulations in response to fish population levels and to address issues of fishery allocation. Providing an opportunity for continued subsistence uses of fishery resources by local residents receives the highest priority from the Federal Subsistence Board. The Refuge's Fisheries Management Plans (USFWS 1991, USFWS 1993) warned that fish populations within the Refuge could decline without sufficient data to measure population trends. Based on guidance provided in the Fisheries Management Plans, the Refuge continues to work with the Fairbanks Fish and Wildlife Field Office to implement inventories and studies in the plans and to conduct other research aimed at understanding fish populations on the Refuge. Guided recreational harvests are monitored closely to protect fish, which are also an extremely important subsistence resource to people living near the Refuge.

According to the State of Alaska, "salmon stocks have displayed the normal variation of abundance expected in wild salmon, with some years having reduced returns and others displaying high productivity. In response to the variation of abundance, State and federal fishery management may be adjusted to allow increased or reduced harvest, as appropriate. Currently, there are no indications that recreational fishing is not sustainable (State of Alaska 2008)."

Impacts to refuge habitats would be minimal and transitory because access to the Refuge would be primarily by landing float-equipped aircraft on lakes and rivers or by boats on the same rivers. Landings on vegetated lowland tundra and disturbance to vegetation would be limited under the terms of the special use permit. The introduction of invasive species carried on aircraft floats and boat hulls could affect refuge resources, although it is not known to have occurred via this transmission method within the Refuge to date, and staff will be vigilant to prevent such occurrences. In addition, frequent aircraft traffic could impact nesting, molting or staging birds (Ward et al. 1994). Winter access would be by aircraft fitted with skis. Disturbance to vegetation would be limited by conditions within the special use permit. Temporary displacement and/or disturbance to wildlife can occur in response to low level overflights and during takeoffs and approaches to landings (Calef et al. 1976), but impacts would likely be short term and minimal.

Compliance with regulations and permit conditions will be routinely checked by officers. Refuge officers and State wildlife officers would routinely patrol the Refuge during hunting seasons. The use of cabins in association with commercial guiding would be authorized in accordance with 50 Code of Federal Regulations 36.33.

Public Review and Comment:

Public comment was solicited concurrently with revision of the Refuge's Comprehensive Conservation Plan.

Refuge Determination (check one below): Use is Not Compatible Use is Compatible with the Following Stipulations**Stipulations Necessary to Ensure Compatibility:**

A special use permit with stipulations is required for commercially guided recreational fishing services. Site-specific special use conditions related to maintenance of defensible space will be incorporated into permits on a case-by-case basis. Following are typical special use permit stipulations, some of which are necessary for compatibility. These stipulations will be updated to comply with the final revised Koyukuk/Nowitna National Wildlife Refuge Comprehensive Conservation Plan.

Continuing law enforcement and administrative monitoring of permittees will be carried out to ensure compliance with the terms of the special use permit.

Regional Standard 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 (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 Code of Federal Regulations 36.41.
- The permittee is responsible for ensuring that all employees, party members, contractors, aircraft pilots, and any other persons working for the permittee and conducting activities allowed by this permit are familiar with and adhere to the conditions of 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 the Alaska Department of Fish and Game, and animals taken must be salvaged in accordance with State regulations.
- This permit may be canceled or revised at any time by the Refuge Manager for noncompliance or in case of emergency (e.g., public safety, unusual resource problems).
- This permit does not grant the permittee and his/her clients exclusive use of the site(s) or lands covered by the permit.
- This permit may be canceled or revised at any time by the Refuge Manager in case of emergency (e.g. high fire danger, flooding, unusual resource problems, etc.).
- The permittee 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.
- Prior to beginning activities allowed by this permit, the permittee shall provide the Refuge Manager with: (1) the name and method of contact for the field party chief/supervisor, (2) the aircraft and other vehicle types to be used, including identification information, (3) names of assistant guides and helpers, and (4) any changes to information provided in the original permit application.
- The permittee shall maintain, throughout the use period specified on the permit, Comprehensive General Liability Insurance (\$300,000 each occurrence; \$500,000 annual aggregate) covering all ground or water based operations and (unless air transportation is already covered) Aviation Passenger Liability (\$150,000/seat plus \$100,000 property) covering all aircraft operations involving clients.

- The permittee shall provide the Refuge Manager with a report of the number and species of all fish taken, locations, numbers of clients, and number of client use days per trip. This report is within 30 days of permit expiration unless stated otherwise in the permit.
- 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.
- Permittees 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 permittee must be removed from refuge lands upon completion of permitted activities.
- The construction of landing strips or pads is prohibited. Incidental hand removal of rocks and other minor obstructions may be permitted.
- The use of off-road vehicles (except snowmobiles with adequate snow cover) is prohibited unless specifically authorized in writing in this permit.
- 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 take-off and landing, maintain a minimum altitude of 2,000 feet above ground.
- 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 permittee's name, address, local contact telephone number and type of fuel.
- Construction of cabins or other permanent structures is prohibited.
- All aircraft being used in commercial operations must have 12-inch identification numbers in contrasting colors, which are readily visible.
- This permit authorizes use on State selected lands. If any of these lands are conveyed during the term of this permit, the permittee will no longer be authorized to use those lands until and unless permission is obtained from the Alaska Department of Natural Resources.
- This permit authorizes use only on the Native selected lands specifically identified in the description block of this permit. If any of these Native selected lands are conveyed during the term of this permit, the permittee will no longer be authorized to use those lands unless permission is obtained from the Native corporation to which land ownership has been conveyed.
- 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. Examples of prohibited acts include, but are not limited to: 1) intentional low flights over camps or persons at less than 500 feet, except when necessary for take off and landing, 2) parking aircraft or placing other objects (rocks, tents, etc.) on any landable area so as to restrict use by other aircraft, 3) otherwise intentionally interfering in the activity of other refuge users, and 4) engaging in activity which is contrary to State and Federal laws.

Refuge-Specific Special Conditions

- All garbage and non-combustible debris will be removed from therefuge. Food, garbage, other materials will be stored so as not to attract bears and other wildlife.
- Motorboat operators must possess U.S. Coast Guard (USCG) licenses for all passenger-carrying operations, if required by USCG regulations.

- The permittee may not sublet any part of the authorized use and is prohibited from subcontracting clients with any other guide.
- The permittee will take no intentional action that interferes with subsistence activities of rural users or restricts the reasonable access of subsistence users to Refuge lands. This may include, but is not limited to, disturbance of wildlife and their movements near subsistence hunters, and damage to cabins, trails, traditional campsites or caches used by subsistence users. To minimize the potential for conflicts with subsistence users the permittee must review the Koyukuk/Nowitna National Wildlife Refuge land status maps (available from the Galena office) to ascertain the location of selected and conveyed lands within refuge boundaries.
- Provisions for human waste management and disposal must be approved by the Refuge Manager.
- A valid copy of the issued special use permit, signed by the Refuge Manager or designee, must be in the party leader's possession at all times while exercising the privileges of the permit.

Justification:

Commercially guided fishing services are a form of traditional activity that Congress intended to preserve with enactment of the Alaska National Interest Lands Conservation Act, which designated the Refuge. Guides support not only angling, but also other activities, including wildlife observation and photography, all of which the National Wildlife Refuge System Administration Act of 1966 (as amended by the Refuge Improvement Act of 1997) identifies as priority public uses. Guided recreational fishing operations on the Refuge would provide the public with quality, safe, and unique recreational fishing opportunities found few places in the world. These visitor services are a valuable benefit to a segment of the public that is either not physically able to participate, not comfortable with participating, or—for other reasons—chooses not to participate in unguided fishing trips within the Refuge.

Recreational fishing has been found compatible with Refuge purposes and is one of the priority public uses of National Wildlife Refuges. Guides help facilitate public participation in this activity. After fully considering the impacts of this activity, as described previously in the “Anticipated Impacts” section of this document, it is my determination that commercially guided recreational fishing services 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:

Alaska, State of 2008. Koyukuk-Nowitna-Northern Innoko Refuges. Internal Review Draft Compatibility Determinations. State of Alaska Comments – 08-14-08.

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.

U.S. Fish and Wildlife Service. 1987. Koyukuk and Nowitna Comprehensive Conservation Plans 1987, Wilderness Review, and Environmental Impact Statements. U.S. Fish and Wildlife Service, Anchorage, Alaska.

Compatibility Determination

Use: Commercial Recreational Guide Services

Primary Use: Environmental education and interpretation (not conducted by refuge staff or authorized agents), wildlife photography and videography, and wildlife observation.

Supporting Uses: Boating (motorized and non-motorized), fixed-wing aircraft landings, snowmobiling, dog sledding, cross-country skiing and skijoring, camping, picnicking, hiking and backpacking, wildlife photography and videography, snowshoeing, wildlife observation, natural resource gathering, pets, firewood cutting, swimming and beach use.

Refuge Name: Koyukuk and Northern Unit of Innoko/Nowitna National Wildlife Refuge

Establishment and Acquisition Authority:

Koyukuk/Nowitna National Wildlife Refuge was established on December 2, 1980, when Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). It includes Koyukuk National Wildlife Refuge, Nowitna National Wildlife Refuge, and the Northern Unit of Innoko National Wildlife Refuge.

Refuge Purposes:

Section 302(5) (B) of ANILCA states purposes for which the Koyukuk Refuge was established and shall be managed include (purposes ii–iv are the same for all three refuges):

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl and other migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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 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.

[Koyukuk Wilderness] to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to administer for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as wilderness.

Section 302(3) (B) of ANILCA states purposes for which the Innoko 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 waterfowl, peregrine falcons, other migratory birds, black bears, moose, furbearers, and other mammals and salmon;

Section 302(6) (B) of ANILCA states purposes for which the Nowitna 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 trumpeter swans, white-fronted geese, canvasbacks and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free-flowing condition, its water quality, wildlife, geology, and primitive setting.

National Wildlife Refuge System Mission:

The mission of the 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 description of use includes a re-evaluation of the compatibility of use of federal lands within Koyukuk/Nowitna Refuge for all types of guided recreation (except for hunting and fishing). The original compatibility determination for guided recreation was made in 1992, subject to reasonable regulation and special conditions provided with a special use permit. Historic activity in this use has been minimal. Since 1980, a limited number permits have been issued for commercial recreation guiding businesses, although there has been permits issued, and there were many years in which no permits were issued. It has been a number of years since the last commercially guided recreation tour services have operated on the Refuge, however, it is anticipated that these uses will occur in the future.

Commercially guided recreation tours are an activity that supports wildlife-dependent priority public uses. The objective of guided tour services in national wildlife refuges is to make available a variety of quality opportunities for the public to enjoy outdoor activities where such activities are compatible with the Refuge's purposes, resources, and management objectives. Furthermore 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."

Recreational guides provide a service that visitors often require in order to access the Refuge and gain an appreciation for its resources. In the past, guided recreational activities on Koyukuk/Nowitna Refuge have been conducted in summer as river float trips and during winter using dog sleds and snowmobiles. Guided recreational services considered here include activities occurring throughout the year. Guided recreational tour providers are required, as a condition of their permits, to provide information on the primary activity, location, length of stay, group size, and other related items. These reports can provide the most accurate and reliable information the Service has on refuge use by visitors. Guided recreational activities contribute to fulfillment of the National Wildlife Refuge System mission by providing access for non-local refuge visitors and therefore facilitate priority public uses and other uses found compatible in separate compatibility determinations.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage commercial guided recreational activities at existing and projected levels.

Administrative staff time primarily involves issuing permits, ensuring that licenses and certifications are current, collecting client use-day fees, and recording activity data. Field work associated with administering the program primarily involves monitoring permittees' compliance with the terms of the permits. Estimated staff time to annually administer and monitor these permits is one week.

Anticipated Impacts of the Use:

Impacts associated with guided tours on Koyukuk/Nowitna Refuge are addressed in the respective compatibility determinations for each activity. We anticipate minimal impacts to fish and wildlife resources, other refuge resources, or other refuge users. The Refuge's administrative oversight of the activity and comprehensive State and federal regulations continually evolve to respond to wildlife management needs. Law enforcement efforts of the State and refuge personnel will also help minimize direct impacts from tour guiding services.

Impacts to refuge habitats would be minimal and transitory because access to the Refuge would be primarily by landing float-equipped aircraft on lakes and rivers or by boats on the same rivers. Landings on vegetated lowland tundra and 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 it is not known to have occurred via this transmission method within the Refuge to date, and staff will be vigilant to prevent such occurrences. In addition, frequent aircraft traffic could impact nesting, molting or staging birds (Ward et al. 1994). Winter access would be by aircraft fitted with skis. Disturbance to vegetation would be limited by conditions within the special use permit. Temporary displacement and/or disturbance to wildlife can occur in response to low level overflights and during takeoffs and approaches to landings (Calef et al. 1976), but impacts would likely be short term and minimal.

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. The use of cabins in association with commercial guiding would be authorized in accordance with 50 Code of Federal Regulations 36.33.

Public Review and Comment:

Public comment was solicited concurrently with the revision of the Refuge's Comprehensive Conservation Plan.

Refuge Determination (check one below):

- Use is Not Compatible
 Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

A special use permit with stipulations is required for guided recreational activities. Site-specific special use conditions related to maintenance of defensible space will be incorporated into permits on a case-by-case basis. Following are typical special use permit stipulations, some of which are necessary for compatibility.

Continuing law enforcement and administrative monitoring of permittees will be carried out to ensure compliance with the following conditions that are incorporated into all permits in order to minimize impacts on refuge lands and resources. These stipulations will be updated to comply with the FONSI for the final revised Koyukuk/Nowitna National Wildlife Refuge Comprehensive Conservation Plan. Management direction for monitoring public use will be provided in the revision of the Comprehensive Conservation Plan.

Regional Standard 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 (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 Code of Federal Regulations 36.41.
- The permittee is responsible for ensuring that all employees, party members, contractors, aircraft pilots, and any other persons working for the permittee and conducting activities allowed by this permit are familiar with and adhere to the conditions of 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 the Alaska Department of Fish and Game, and animals taken must be salvaged in accordance with State regulations.
- This permit may be canceled or revised at any time by the Refuge Manager for noncompliance.
- This permit does not grant the permittee and his/her clients exclusive use of the site(s) or lands covered by the permit.
- This permit may be canceled or revised at any time by the Refuge Manager in case of emergency (e.g. high fire danger, flooding, unusual resource problems, etc.).
- The permittee 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.
- Prior to beginning activities allowed by this permit, the permittee shall provide the Refuge Manager with: (1) the name and method of contact for the field party chief/supervisor, (2) the aircraft or other vehicle types to be used, including identification information, (3) names of assistant guides and helpers, and (4) any changes to information provided in the original permit application.
- The permittee shall maintain, throughout the use period specified on the permit, Comprehensive General Liability Insurance (\$300,000 each occurrence; \$500,000 annual aggregate) covering all ground or water based operations and (unless air transportation is already covered) Aviation Passenger Liability (\$150,000/seat plus \$100,000 property) covering all aircraft operations involving clients.
- The permittee shall provide the Refuge Manager with a report of activities under this permit, including pick up/drop off locations, numbers of clients, and number of client use days per trip. This report is within 30 days of permit expiration unless stated otherwise in the permit.

- 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.
- Permittees 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 permittee must be removed from refuge lands upon completion of permitted activities.
- The construction of landing strips or pads is prohibited. Incidental hand removal of rocks and other minor obstructions may be permitted.
- The use of off-road vehicles (except snowmobiles with adequate snow cover) is prohibited unless specifically authorized in writing in this permit.
- The operation of aircraft at altitudes and in flight paths resulting in the herding, harassment, hazing, or driving of wildlife or wildlife is prohibited. It is recommended that all aircraft, except for take-off and landing, maintain a minimum altitude of 2,000 feet above ground.
- Fuel caches are allowed only in designated areas and must be approved by the Refuge Manager or his designate prior to caches being established. If caches are established, fuel containers must be clearly marked with the permittee's name, address, local contact telephone number and type of fuel.
- Construction of cabins or other permanent structures is prohibited.
- All aircraft being used in commercial operations must have 12-inch identification numbers in contrasting colors, which are readily visible.
- This permit authorizes use on State selected lands. If any of these lands are conveyed during the term of this permit, the permittee will no longer be authorized to use those lands until and unless permission is obtained from the Alaska Department of Natural Resources.
- This permit authorizes use only on the Native selected lands specifically identified in the description block of this permit. If any of these Native selected lands are conveyed during the term of this permit, the permittee will no longer be authorized to use those lands unless permission is obtained from the Native corporation to which land ownership has been conveyed.
- 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. Examples of prohibited acts include, but are not limited to: 1) intentional low flights over camps or persons at less than 500 feet, except when necessary for take off and landing, 2) parking aircraft or placing other objects (rocks, tents, etc.) on any landable area so as to restrict use by other aircraft, 3) otherwise intentionally interfering in the activity of other refuge users, and 4) engaging in activity which is contrary to State and Federal laws.

Refuge-Specific Special Conditions

- All garbage and non-combustible debris will be removed from the refuge. Food, garbage, and other materials will be stored so as not to attract bears and other wildlife.
- Motorboat operators must possess U.S. Coast Guard (USCG) licenses for all passenger-carrying operations, if required by USCG regulations.
- The permittee may not sublet any part of the authorized use and is prohibited from subcontracting clients with any other guide.

- The permittee will take no intentional action that interferes with subsistence activities of rural users or restricts the reasonable access of subsistence users to refuge lands. This may include, but is not limited to, disturbance of wildlife and their movements near subsistence hunters, and damage to cabins, trails, traditional campsites or caches used by subsistence users. To minimize the potential for conflicts with subsistence users the permittee must review the Koyukuk/Nowitna National Wildlife Refuge land status maps (available from the Galena office) to ascertain the location of selected and conveyed lands within refuge boundaries.
- Provisions for human waste management and disposal must be approved by the Refuge Manager.
- A valid copy of the issued special use permit, signed by the Refuge Manager or designee, must be in the party leader's possession at all times while exercising the privileges of the permit.

Justification:

Commercially guided recreational activities have been found to be compatible with the purposes of Koyukuk/Nowitna Refuge and with the National Wildlife Refuge System Mission. Commercial recreational guiding services provide the public with safe access to unique wildlife observation, wildlife photography, and environmental education opportunities found few places elsewhere in the world. These are all 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 personal or other means of access to the extremely remote environment of the Refuge.

Through required client use reports, guided recreational activities can provide an important source of information about use of the Refuge. After fully considering the impacts of this activity, as described previously in the "Anticipated Impacts" section of this document, it is my determination that guided recreational 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:

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.

U.S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement and Wilderness Review for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges. U. S. Fish and Wildlife Service, Anchorage, Alaska.

U.S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan for the Nowitna National Wildlife Refuge. U. S. Fish and Wildlife Service, Anchorage, Alaska.

U.S. Fish and Wildlife Service. 2008. Draft Revised Comprehensive Conservation Plan and Environmental Assessment for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges. U. S. Fish and Wildlife Service, Anchorage, Alaska.

Compatibility Determination

Use: Commercial Transporter Services

Primary Use: Transport of hunters, researchers, fisherman, and other refuge users.

Supporting and Incidental Uses: Boating (motorized and non motorized), fixed-wing aircraft landings, environmental education, interpretation, fishing (guided and 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: Koyukuk and Northern Unit of Innoko/Nowitna National Wildlife Refuge

Establishment and Acquisition Authority:

Koyukuk/Nowitna National Wildlife Refuge was established on December 2, 1980, when Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). It includes Koyukuk National Wildlife Refuge, Nowitna National Wildlife Refuge, and the Northern Unit of Innoko National Wildlife Refuge.

Refuge Purposes:

Section 302(5) (B) of ANILCA states purposes for which the Koyukuk Refuge was established and shall be managed include (purposes ii-iv are the same for all three refuges):

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl and other migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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 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.

[Koyukuk Wilderness] to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to administer for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as wilderness.

Section 302(3) (B) of ANILCA states purposes for which the Innoko 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 waterfowl, peregrine falcons, other migratory birds, black bears, moose, furbearers, and other mammals and salmon;

Section 302(6) (B) of ANILCA states purposes for which the Nowitna 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 trumpeter swans, white-fronted geese, canvasbacks and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free-flowing condition, its water quality, wildlife, geology, and primitive setting.

National Wildlife Refuge System Mission:

The mission of the 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 description of use includes a re-evaluation of the compatibility of use of federal lands within Koyukuk/Nowitna Refuge for commercial transporter services. These services allow the public to hunt, fish or enjoy other outdoor activities on the remote and largely inaccessible Koyukuk/Nowitna Refuge. Commercial transporter use was originally found to be compatible in 1987 during the development of the original Comprehensive Conservation Plans for Koyukuk and Nowitna refuges. Commercial transporter use was again determined to be compatible in 1992, subject to reasonable regulation. Since establishment, Koyukuk/Nowitna Refuge has issued 4-10 special use permits annually to commercial air taxi businesses desiring to provide transportation services within the refuge. In most recent years, there have usually been 8–10 commercial transporters permitted to operate on the refuge. These transporters have provided services to an average of 35–45 parties per year, primarily for hunting, fishing, or river floating. The lengths of typical trips made by commercially transported clients are usually in the range of 7–10 days, although shorter trips sometimes occur.

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 enjoy outdoor activities where such activities are compatible with the Refuge’s purposes, resources, and management objectives. Furthermore, 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.”

Most of Koyukuk/Nowitna Refuge is located within State of Alaska Game Management Unit (GMU) 21D, 21B, and 24D. Moose, some caribou, and black and brown bear are available, and wolves and wolverine may be taken incidentally within the Refuge. The Koyukuk Controlled Use Area (KCUA), which includes most of the Koyukuk Refuge, was established by the State of Alaska in 1979. The KCUA restricts aircraft access for the transport of moose hunters, gear, or moose parts. However, moose hunters, their gear, and/or moose parts may be transported by aircraft between publicly owned airports in the controlled use area or between a publicly owned airport within the area and points outside the area. State of Alaska hunting regulations (5AAC) describe State seasons, bag limits, and regulations pertaining to hunting, fishing and trapping.

Commercial transporters provide a service that most non-local visitors require to access the Refuge. Most commercial transporting activities on Koyukuk/Nowitna Refuge are conducted by air taxis with float-equipped aircraft. Transporters are required, as a condition of their permits, to provide information on the 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. Commercial transporter-related services contribute to fulfillment of refuge purposes and the National Wildlife Refuge System mission by providing access for refuge visitors unable to provide their own access, and therefore facilitate priority public uses such as recreational hunting, fishing, wildlife observation, and other uses found compatible in separate compatibility determinations. Many of these compatible public uses contribute directly to maintaining healthy fish and wildlife populations through managed use.

Operators are required to submit an annual report of client trips to refuge 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 Koyukuk/Nowitna Refuge. There is 30-day waiting period for all commercial transporters requesting a permit. This action prohibits an operator from accepting a number of clients at the last moment and just dropping clients off, producing an overcrowded situation and resulting in a poor quality experience for the client. This is an existing activity that supports wildlife-dependent priority public uses. Activities generally occur May through September since timing typically coincides with State fishing and hunting seasons.

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, and collecting client use fees. Field work associated with administering the program primarily involves patrolling during hunting and fishing seasons to monitor permittees' compliance with permit terms and to determine whether unpermitted operators are using the Refuge. It is anticipated that this use will require a total of 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 fee is assessed when each special use permit is issued. In addition, client 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 the Use:

Impacts associated with the activities that occur on Koyukuk/Nowitna Refuge as a result of commercial transporters providing the public access to the Refuge are addressed in the respective compatibility determinations for each activity. The Refuge is directly involved in review and implementation of the regulatory process and administrative oversight of the activity. Because of combined law enforcement efforts of State and refuge personnel, direct impacts from commercial transporter services under existing management should have minimal impacts to fish and wildlife resources within the Refuge, other resources, or other visitors.

Available moose hunting areas outside of the KCUA are concentrated in narrow river corridors along the major refuge river systems and hence do not afford compelling opportunities for users to hunt in isolation or with little competition. Commercially transported non-local big-game hunters may, in some cases, result in some competition or interference with subsistence users for the limited number of game animals in these corridors. Refuge staff is aware of these potential conflicts and monitor use levels each hunting season. Should conflicts arise, the Service will work

to address them through the Federal Subsistence Board and Alaska Board of Game. These Boards have established regulations aimed at managing populations of animals at sustainable levels and avoiding conflicts between user groups. The refuge staff was a very active cooperater in the completion of the State's Koyukuk River Moose Management Plan, which was designed to resolve some of these issues.

Impacts to refuge habitats would be minimal and transitory because access to the Refuge would be primarily by landing float-equipped aircraft on lakes and rivers or by boats on the same rivers. Landings on vegetated lowland tundra and 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 it is not known to have occurred via this transmission method within the Refuge to date, and staff will be vigilant to prevent such occurrences. In addition, frequent aircraft traffic could impact nesting, molting or staging birds (Ward et al. 1994). Winter access would be by aircraft fitted with skis. Disturbance to vegetation would be limited by conditions within the special use permit. Temporary displacement and/or disturbance to wildlife can occur in response to low level overflights and during takeoffs and approaches to landings (Calef et al. 1976), but impacts would likely be short term and minimal.

Public Review and Comment:

Public comment was solicited concurrently with the revision of the Refuge's Comprehensive Conservation Plan.

Refuge Determination (check one below):

- Use is Not Compatible
 Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

A special use permit with stipulations is required for commercial transporter services. Site-specific special use conditions related to maintenance of defensible space will be incorporated into permits on a case-by-case basis. Following are typical special use permit stipulations, some of which are necessary for compatibility.

Continuing law enforcement and administrative monitoring of permittees will be carried out to ensure compliance with the following conditions that are incorporated into all permits to minimize impacts on refuge lands and resources. These stipulations will be updated to comply with the FONSI for the final revised Koyukuk/Nowitna National Wildlife Refuge Comprehensive Conservation Plan.

Regional Standard 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 (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 Code of Federal Regulations 36.41.
- The permittee is responsible for ensuring that all employees, party members, contractors, aircraft pilots, and any other persons working for the permittee and conducting activities allowed by this permit are familiar with and adhere to the conditions of 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.
- This permit does not grant the permittee and his/her clients exclusive use of the site(s) or lands covered by the permit.
- This permit may be canceled or revised at any time by the Refuge Manager in case of emergency (e.g. high fire danger, flooding, unusual resource problems, etc.).
- The permittee 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.
- Prior to beginning activities allowed by this permit, the permittee shall provide the Refuge Manager with: (1) the name and method of contact for the field party chief/supervisor, (2) the aircraft and other vehicle types to be used, including identification information, (3) names of assistant guides and helpers, and (4) any changes to information provided in the original permit application.
- The permittee shall maintain, throughout the use period specified on this permit, insurance (Passenger Liability - \$150,000/seat plus \$100,000 property) covering his/her refuge air taxi/transporter operations. This insurance is required for all aircraft operations involving clients.
- The permittee shall provide the Refuge Manager with a report including the number and species of all animals transported, pick up/drop off locations, numbers of clients, and number of client use days per type of activity. This report is within 30 days of permit expiration unless stated otherwise in the permit. For law enforcement purposes, the permittee may be required to provide names and addresses of clients.
- 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.
- Permittees 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 permittee must be removed from refuge lands upon completion of permitted activities.
- The construction of landing strips or pads is prohibited. Incidental hand removal of rocks and other minor obstructions may be permitted.
- The use of off-road vehicles (except snowmobiles with adequate snow cover) is prohibited unless specifically authorized in writing in this permit.
- 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 take-off and landing, maintain a minimum altitude of 2,000 feet above ground level (AGL).
- 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 permittee's name, address, local contact telephone number and type of fuel.
- Construction of cabins or other permanent structures is prohibited.
- All aircraft being used in commercial operations must have 12-inch identification numbers in contrasting colors, which are readily visible.

- This permit authorizes use on State selected lands. If any of these lands are conveyed during the term of this permit, the permittee will no longer be authorized to use those lands until and unless permission is obtained from the Alaska Department of Natural Resources.
- This permit authorizes use only on the Native selected lands specifically identified in the description block of this permit. If any of these Native selected lands are conveyed during the term of this permit, the permittee will no longer be authorized to use those lands unless permission is obtained from the Native corporation to which land ownership has been conveyed.
- 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. Examples of prohibited acts include, but are not limited to: 1) intentional low flights over camps or persons at less than 500 feet, except when necessary for take off and landing, 2) parking aircraft or placing other objects (rocks, tents, etc.) on any landable area so as to restrict use by other aircraft, 3) otherwise intentionally interfering in the activity of other refuge users, and 4) engaging in activity which is contrary to State and Federal laws.

Refuge-Specific Special Conditions

- Motorboat operators must possess U.S. Coast Guard (USCG) licenses for all passenger-carrying operations, if required by USCG regulations and all boats will be operated safely in accordance with 50 CFR, subpart C, 27.32.
- The permittee may not sublet any part of the authorized use area and is prohibited from subcontracting clients with any other transporter.
- The permittee will take no intentional action that interferes with subsistence activities of rural users or restricts the reasonable access of subsistence users to refuge lands. This may include, but is not limited to, disturbance of wildlife and their movements near subsistence hunters, and damage to cabins, trails, traditional campsites or caches used by subsistence users. To minimize potential for conflicts with subsistence users, the permit holder must: a) review Koyukuk/Nowitna National Wildlife Refuge land status maps (available from the Galena office) to ascertain location of the Koyukuk Controlled Use Area (when transporting moose hunters) and the location of selected and conveyed lands within the refuge boundary and b) advise clients that campsites may not be located on conveyed lands without permission of land owners. A copy of this special use permit must be in the airplane at all times while exercising the privileges of the permit.

Justification:

Commercial transporting has been found to be compatible with the purposes of Koyukuk/Nowitna Refuge and with the National Wildlife Refuge System Mission. Commercial transporting services provide the public with safe access to unique hunting, fishing, wildlife observation, wildlife photography, and environmental education opportunities found few places elsewhere in the world. These are all 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 personal or other means of access to the extremely remote environment of the Refuge.

Commercial transporters are the Service's primary source of information about unguided use of the refuge. After fully considering the impacts of this activity, as described previously in the "Anticipated Impacts" 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.

U.S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement and Wilderness Review for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges. U. S. Fish and Wildlife Service, Anchorage, Alaska.

U.S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan for the Nowitna National Wildlife Refuge. U. S. Fish and Wildlife Service, Anchorage, Alaska.

U.S. Fish and Wildlife Service. 2008. Draft Revised Comprehensive Conservation Plan and Environmental Assessment for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges. U. S. Fish and Wildlife Service, Anchorage, Alaska.

Ward, D. H., R. A. Stehn, D. V. Derksen. 1994. Response of staging brant to disturbance at the Izembek Lagoon, Alaska. *Wildl. Soc. Bull.* 22: 220–228.

Refuge Determination:

Refuge Manager/
Project Leader Approval: _____ /signed/ Kenton Moos 4/17/2009
(Signature) (Date)

Concurrence:

Regional Chief
National Wildlife
Refuge System: _____ /signed/ Todd Logan 4/17/2009
(Signature) (Date)

Mandatory 10-year Re-evaluation Date (for allowed uses only): 2019

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: Helicopter Landings to Support Authorized Activities by Other Federal, Tribal, State, and Local Governments, Universities, etc.

Primary Use: Helicopter Landings

Supporting and Incidental Uses: Research, scientific collecting, surveying, rights-of-way (utility).

Refuge Name: Koyukuk and Northern Unit of Innoko/Nowitna National Wildlife Refuge

Establishment and Acquisition Authority:

Koyukuk/Nowitna National Wildlife Refuge was established on December 2, 1980, when Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). It includes Koyukuk National Wildlife Refuge, Nowitna National Wildlife Refuge, and the Northern Unit of Innoko National Wildlife Refuge.

Refuge Purposes:

Section 302(5) (B) of ANILCA states purposes for which the Koyukuk Refuge was established and shall be managed include (purposes ii–iv are the same for all three refuges):

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl and other migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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 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.

[Koyukuk Wilderness] to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to administer for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as wilderness.

Section 302(3) (B) of ANILCA states purposes for which the Innoko 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 waterfowl, peregrine falcons, other migratory birds, black bears, moose, furbearers, and other mammals and salmon;

Section 302(6) (B) of ANILCA states purposes for which the Nowitna 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 trumpeter swans, white-fronted geese, canvasbacks

and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free-flowing condition, its water quality, wildlife, geology, and primitive setting.

National Wildlife Refuge System Mission:

The mission of the 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 helicopter use to support authorized activities of local, State, tribal, other federal agencies, or universities. This use was originally found to be compatible in the refuge Comprehensive Conservation Plans (1987). One to four applications per year are normally received to allow helicopter landings as part of some other authorized use such as scientific research (geologic, fire ecology, archaeology, etc.), State of Alaska wildlife capture work, and fish or wildlife surveys. Permits could be issued at any time of the year but are most likely to be for activities during spring, summer, or fall. Routine State law enforcement use of helicopters would typically be limited to special cases and would normally be preceded by close coordination between the Alaska State Troopers and the refuge manager.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage helicopter use to support authorized activities at existing levels. Administrative staff time primarily involves phone conversations and written correspondence. Field work associated with administering the use primarily involves monitoring compliance with the terms of the permit. It is estimated that less than a week of staff time is required to manage this use on Koyukuk/Nowitna Refuge.

Anticipated Impacts of the Use:

Adverse impacts associated with helicopter landings on the Refuge would be associated with displacement of wildlife, particularly during ungulate calving and bird nesting seasons (Calef et al. 1976, Gunn et al. 1985, Miller 1994, Ward et al. 1994). The experience of refuge visitors could also be adversely affected by noise disturbance. Hunters would likely be especially vulnerable to disturbance by helicopters, both as a result of wildlife displacement and noise.

Public Review and Comment:

Public comment was solicited concurrently with the revision of the Refuge's Comprehensive Conservation Plan.

Refuge Determination (check one below):

- Use is Not Compatible
- Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

A special use permit with stipulations is required for most helicopter landings on the Refuge. Site-specific special use conditions related to maintenance of defensible space will be incorporated into permits on a case-by-case basis. Following are typical special use permit stipulations, some of which are necessary for compatibility. These stipulations will be updated to comply with the final revised Koyukuk/Nowitna National Wildlife Refuge Comprehensive Conservation Plan.

Monitoring of permittees will be carried out to ensure compliance with the terms of the special use permits. Project-specific stipulations may be included in individual permits.

Regional Standard 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 (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 Code of Federal Regulations 36.41.
- The permittee is responsible for ensuring that all employees, party members, contractors, aircraft pilots, and any other persons working for the permittee and conducting activities allowed by this permit are familiar with and adhere to the conditions of 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 the Alaska Department of Fish and Game, and animals taken must be salvaged in accordance with State regulations.
- This permit does not grant the permittee and his/her clients exclusive use of the site(s) or lands covered by the permit.
- This permit may be canceled or revised at any time by the Refuge Manager for noncompliance or in case of emergency (e.g., public safety, unusual resource problems).
- The permittee 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.
- Prior to beginning activities allowed by this permit, the permittee shall provide the Refuge Manager with: (1) the name and method of contact for the field party chief/supervisor, (2) the aircraft and other vehicle types to be used, including identification information, (3) names of assistant guides and helpers, and (4) any changes to information provided in the original permit application.
- The Refuge Manager upon request shall be afforded the opportunity and logistical support from the nearest commercial transportation site to accompany the permittee for the purpose of inspecting and monitoring permittee activities. A final inspection trip provided by the permittee of the areas of use may be required by the Refuge Manager to determine compliance with the terms of this permit.
- The permittee shall provide the Refuge Manager with a report of activities under this permit within 30 days of permit expiration unless stated otherwise in the permit.
- 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.
- Permittees 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 permittee must be removed from refuge lands upon completion of permitted activities.

- The construction of landing strips or pads is prohibited. Incidental hand removal of rocks and other minor obstructions may be permitted.
- The use of off-road vehicles (except snowmobiles with adequate snow cover) is prohibited unless specifically authorized in writing in this permit.
- 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 take-off and landing, maintain a minimum altitude of 2,000 feet above ground.
- 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 permittee's name, address, local contact telephone number and type of fuel.
- Construction of cabins or other permanent structures is prohibited.
- All aircraft being used in commercial operations must have 12-inch identification numbers in contrasting colors, which are readily visible.
- This permit authorizes use on State selected lands. If any of these lands are conveyed during the term of this permit, the permittee will no longer be authorized to use those lands until and unless permission is obtained from the Alaska Department of Natural Resources.
- This permit authorizes use only on the Native selected lands specifically identified in the description block of this permit. If any of these Native selected lands are conveyed during the term of this permit, the permittee will no longer be authorized to use those lands unless permission is obtained from the Native corporation to which land ownership has been conveyed.
- 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. Examples of prohibited acts include, but are not limited to: 1) intentional low flights over camps or persons at less than 500 feet, except when necessary for take off and landing, 2) parking aircraft or placing other objects (rocks, tents, etc.) on any landable area so as to restrict use by other aircraft, 3) otherwise intentionally interfering in the activity of other refuge users, and 4) engaging in activity which is contrary to State and Federal laws.

Refuge-Specific Special Conditions

- All garbage and non-combustible debris will be removed from the refuge. Food, garbage, other materials will be stored so as not to attract bears and other wildlife.
- The permittee will take no intentional action that interferes with subsistence activities of rural users or restricts the reasonable access of subsistence users to refuge lands. This may include, but is not limited to, disturbance of wildlife and their movements near subsistence hunters, and damage to cabins, trails, traditional campsites or caches used by subsistence users. To minimize the potential for conflicts with subsistence users the permittee must review the Koyukuk/Nowitna National Wildlife Refuge land status maps (available from the Galena office) to ascertain the location of selected and conveyed lands within refuge boundaries.

- Encourage that all aircraft transiting the refuge actively avoid large mammals (including moose caribou, grizzly bears, black bears, wolves, active bald eagle nests, and large flocks of waterfowl). “Active avoidance” includes making a vertical or lateral deviation from a flight path within flight safety parameters to minimize or prevent adverse impact on the animals.
- A valid copy of the issued special use permit, signed by the Refuge Manager or designee, must be in the party leader’s possession at all times while exercising the privileges of the permit.

Justification:

Under 43 CFR 36.11(4), helicopter use on national wildlife refuges requires a special use permit. The 1987 Comprehensive Conservation Plan (page 142, Access and Transportation) states, “The use of helicopters will be permitted on the refuge only with the issuance of a special use permit.” As only occasional and limited use of helicopters would be authorized, the potential for adverse effects to resources and visitors within the Refuge would be negligible. It is recommended that all aircraft fly 2,000 feet above ground level when possible. When weather conditions do not permit, aircraft should maintain an altitude of at least 800 feet above ground level if at all possible. Helicopter landings would only be authorized when other means of access are impractical or unsafe. After fully considering the impacts of these activities, as described previously in the “Anticipated Impacts” section of this document, it is my determination that under specific conditions, helicopter 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.

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.

Gunn, A., F.L. Miller, R. Glaholt & K. Jingfors. 1985. Behavioral responses of barren-ground caribou cows and calves to helicopters on the Beverly herd calving grounds, Northwest Territories. In *Proceedings of the First North American Caribou Workshop*, ed. Martell, A.M. and D.E. Russel. Whitehorse, Yukon, p10-14.

Miller, M. W. 1994. Route selection to minimize helicopter disturbance of molting Pacific black brant: a simulation. *Arctic* 47: 341–349.

U.S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement and Wilderness Review for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges. U. S. Fish and Wildlife Service, Anchorage, Alaska.

U.S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan for the Nowitna National Wildlife Refuge. U. S. Fish and Wildlife Service, Anchorage, Alaska.

U.S. Fish and Wildlife Service. 2008. Draft Revised Comprehensive Conservation Plan and Environmental Assessment for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges. U. S. Fish and Wildlife Service, Anchorage, Alaska.

Ward, D.H., R.A. Stehn, D.V. Derksen, 1994. Response of staging brant to disturbance at the Izembek Lagoon, Alaska. *Wildl. Soc. Bull.* 22:220-228.

Refuge Determination:

Refuge Manager/
Project Leader Approval:

_____ /signed/ Kenton Moos _____ 4/17/2009
(Signature) (Date)

Concurrence:

Regional Chief
National Wildlife
Refuge System:

_____ /signed/ Todd Logan _____ 4/17/2009
(Signature) (Date)

Mandatory 10-Year Re-Evaluation Date: 2019

NEPA Compliance for Refuge Use Decision:

- _____ Categorical Exclusion without Environmental Action Memorandum
- _____ Categorical Exclusions and Environmental Action Memorandum
- Environmental Assessment and Finding of No Significant Impact
- _____ Environmental Impact Statement and Record of Decision

Compatibility Determination

Use: Native allotment surveys

Primary Use: Uses (other) – BLM allotment surveys

Supporting Uses: Boating (motorized and non-motorized), fixed-wing aircraft landings, helicopter landings, snowmobiling, natural resource gathering, camping, cross-country skiing, hiking and backpacking, wildlife photography, videography, snowshoeing, surveys, and wildlife observation.

Refuge Name: Koyukuk and Northern Unit of Innoko/Nowitna National Wildlife Refuge

Establishment and Acquisition Authority:

Koyukuk/Nowitna National Wildlife Refuge was established on December 2, 1980, when Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). It includes Koyukuk National Wildlife Refuge, Nowitna National Wildlife Refuge, and the Northern Unit of Innoko National Wildlife Refuge.

Refuge Purposes:

Section 302(5) (B) of ANILCA states purposes for which the Koyukuk Refuge was established and shall be managed include (purposes ii–iv are the same for all three refuges):

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl and other migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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 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.

[Koyukuk Wilderness] to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to administer for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as wilderness.

Section 302(3) (B) of ANILCA states purposes for which the Innoko 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 waterfowl, peregrine falcons, other migratory birds, black bears, moose, furbearers, and other mammals and salmon;

Section 302(6) (B) of ANILCA states purposes for which the Nowitna 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 trumpeter swans, white-fronted geese, canvasbacks

and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free-flowing condition, its water quality, wildlife, geology, and primitive setting.

National Wildlife Refuge System Mission:

The mission of the 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 compatibility determination addresses routine survey activities conducted by the Bureau of Land Management that are not cooperative projects with the Service. Surveyors (either contractors or BLM staff) are transported to remote sites within Koyukuk/Nowitna Refuge by helicopter, floatplane, or boat. Land surveys are conducted, usually in less than one day. Special restrictions may apply to helicopter use and would be addressed in the conditions of the Special Use Permit.

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 10 staff days per year) primarily involves phone conversations, written correspondence, and personal interaction with BLM personnel regarding ongoing activities. Field work associated with administering the program primarily involves accompanying the BLM personnel during survey activities and assisting with logistical issues.

Anticipated Impacts of the Use:

Because BLM personnel are trained professionals and are required by law to conduct Native allotment determinations, the Service anticipates that little to no negative impacts on wildlife resources, on other resources within the Refuge (such as water quality, soil, and vegetation), or on visitors will occur. Access requests via helicopter will be considered on a case-by-case basis.

Public Review and Comment:

Public comment was solicited concurrently with the revision of the Refuge's Comprehensive Conservation Plan.

Refuge Determination (check one below):

- Use is Not Compatible
- Use is Compatible

Justification:

The Bureau of Land Management has been tasked by regulation with the conveyance on selected lands to individual Native allotments, local tribal corporations, as well as regional Native corporations. It is the policy of the Service to cooperate and assist with survey requests in a timely manner. If access via helicopters is requested, consideration is taken on a case by case

Compatibility Determination

Use: Non-Wildlife Dependent Recreational Activities

Primary Uses: Picnicking, boating (motorized and non-motorized), fixed-wing aircraft landings, natural resource gathering, camping, cross-country skiing, dog training, dog sledding and skijoring, snowmobiling, hiking and backpacking, pets, videography and audio recording, snorkeling and scuba diving, snowshoeing, swimming and beach use, and firewood cutting.

Supporting and Incidental Uses: None

Refuge Name: Koyukuk and Northern Unit of Innoko/Nowitna National Wildlife Refuge

Establishment and Acquisition Authority:

Koyukuk/Nowitna National Wildlife Refuge was established on December 2, 1980, when Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). It includes Koyukuk National Wildlife Refuge, Nowitna National Wildlife Refuge, and the Northern Unit of Innoko National Wildlife Refuge.

Refuge Purposes:

Section 302(5) (B) of ANILCA states purposes for which the Koyukuk Refuge was established and shall be managed include (purposes ii-iv are the same for all three refuges):

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl and other migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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 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.

[Koyukuk Wilderness] to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to administer for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as wilderness.

Section 302(3) (B) of ANILCA states purposes for which the Innoko 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 waterfowl, peregrine falcons, other migratory birds, black bears, moose, furbearers, and other mammals and salmon;

Section 302(6) (B) of ANILCA states purposes for which the Nowitna 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 trumpeter swans, white-fronted geese, canvasbacks

and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free-flowing condition, its water quality, wildlife, geology, and primitive setting.

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 evaluates general public uses not covered in other compatibility determinations, including camping, hiking, backpacking, firewood cutting for recreational purposes, boating (motorized and non-motorized), plant gathering (including berry picking), rock gathering, cross-country skiing, dog sledding, skijoring, snowmobiling, beach use, snowshoeing, and other general outdoor recreation when the uses are not associated with one of the other uses evaluated elsewhere for compatibility. Most of these uses could occur year-round. The uses probably occur infrequently when *not* in association with other uses. Most of these uses were originally found to be compatible during preparation of the Refuge Comprehensive Conservation Plans in 1987 and were again determined to be compatible, subject to reasonable regulation in 1992.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage these uses. Management consists of refuge staff contacting visitors on an opportunistic basis when in the field for other purposes.

Anticipated Impacts of the Uses:

These activities are anticipated to have negligible effects on refuge resources and other visitors, primarily because they occur so infrequently. For example, most berry picking occurs as a subsistence activity or by visitors engaged in another activity such as wildlife observation, hunting, or fishing.

Public Review and Comment:

Public comment was solicited concurrently with the revision of the Refuge's Comprehensive Conservation Plan.

Refuge Determination (check one below):

- Use is Not Compatible
 Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Visitors will be required to comply with any regulations in place, such as seasonal closures for resource protection.

Justification:

These uses, at the levels anticipated, are not likely to have any adverse effects on refuge resources or other visitors. The activities have been found compatible when conducted in relation to other refuge uses such as wildlife observation and photography, hunting, fishing, trapping, or subsistence activities. Because the Refuge is remote and only accessible by boat, airplane, snowmobile, dogsled, or arduous cross-country travel on foot, it is extremely unlikely that many visitors will travel to Koyukuk/Nowitna Refuge to engage solely in these non-priority public use activities. After fully considering the impacts of these activities, as described previously in the “Anticipated Impacts” section of this document, it is my determination that these non-priority public use 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. Final Comprehensive Conservation Plan, Environmental Impact Statement and Wilderness Review for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges. U. S. Fish and Wildlife Service, Anchorage, Alaska.

U.S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan for the Nowitna National Wildlife Refuge. U. S. Fish and Wildlife Service, Anchorage, Alaska.

U.S. Fish and Wildlife Service. 2008. Draft Revised Comprehensive Conservation Plan and Environmental Assessment for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges. U. S. Fish and Wildlife Service, Anchorage, Alaska.

Refuge Determination:

Refuge Manager/
Project Leader Approval: _____ /signed/ Kenton Moos 4/17/2009
(Signature) (Date)

Concurrence:

Regional Chief
National Wildlife
Refuge System: _____ /signed/ Todd Logan 4/17/2009
(Signature) (Date)

Mandatory 10-Year Re-evaluation Date (for allowed uses only): 2019

NEPA Compliance for Refuge Use Decision:

- _____ Categorical Exclusion without Environmental Action Memorandum
- _____ Categorical Exclusions and Environmental Action Memorandum
- X _____ Environmental Assessment and Finding of No Significant Impact
- _____ Environmental Impact Statement and Record of Decision

Compatibility Determination

Use: Reburial of Archaeological Human Remains per State and Federal Guidelines

Primary Use: Use (other)—Reburial of archaeological human remains

Supporting and Incidental Uses: Boating (human-powered), boating (motorized), camping, hiking and backpacking, photography, videography, audio recording (non wildlife-dependent, recreational—other), fixed-wing aircraft, and indigenous cemetery.

Refuge Name: Koyukuk and Northern Unit of Innoko/Nowitna National Wildlife Refuge

Establishment and Acquisition Authority:

Koyukuk/Nowitna National Wildlife Refuge was established on December 2, 1980, when Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). It includes Koyukuk National Wildlife Refuge, Nowitna National Wildlife Refuge, and the Northern Unit of Innoko National Wildlife Refuge.

Refuge Purposes:

Section 302(5) (B) of ANILCA states purposes for which the Koyukuk Refuge was established and shall be managed include (purposes ii–iv are the same for all three refuges):

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl and other migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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 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.

[Koyukuk Wilderness] to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to administer for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as wilderness.

Section 302(3) (B) of ANILCA states purposes for which the Innoko 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 waterfowl, peregrine falcons, other migratory birds, black bears, moose, furbearers, and other mammals and salmon;

Section 302(6) (B) of ANILCA states purposes for which the Nowitna 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 trumpeter swans, white-fronted geese, canvasbacks

and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free-flowing condition, its water quality, wildlife, geology, and primitive setting.

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:

The Refuge anticipates requests to rebury human remains eroding from recorded and unrecorded prehistoric sites and remains that have been removed from prehistoric sites. The inadvertent discovery section of the Native American Graves Protection and Repatriation Act of 1990 (Public Law 101-601) requires that the land-management agency identify and notify the closest Native group, and—if requested—provide for the repatriation of the remains. With this in mind, the Refuge has prepared this compatibility determination to cover anticipated burial requests over the next 10 years. Each proposed burial and its proposed reburial location would need to be approved by the Regional Historic Preservation Officer, who will ensure compliance with the National Historic Preservation Act, section 106, prior to issuance of a permit for this activity.

Reburial of repatriated human remains would take place near the place of discovery of such remains or near their original burial place. Each burial would involve a small excavation with hand tools. Impacts to refuge resources would be negligible and short term, with no foreseeable long-term effects, and would not affect subsistence use of the refuge. A copy of the Global Positioning System (GPS) coordinates and contents of the burial site will be filed at refuge headquarters and with the Regional Historic Preservation Officer. The remains should be buried with a modern object (e.g., coin, dated button) to indicate it is a historical reburial.

Availability of Resources:

Except for issuance of the permit, no refuge resources would be needed to administer use. All activities associated with use would be accomplished by the permittee.

Anticipated Impacts of the Use:

Reburials would result in minimal and short-term impacts to refuge resources, involving a few small-scale excavations with hand tools and then interment of the remains.

Public Review and Comment:

Public comment was solicited concurrently with the revision of the Refuge’s Comprehensive Conservation Plan.

Refuge Determination (check one below):

- Use is Not Compatible
- Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

A special use permit with stipulations is required for reburial of archaeological human remains. Site-specific special use conditions related to maintenance of defensible space will be incorporated into permits on a case-by-case basis. Following are typical special use permit stipulations, some of which are necessary for compatibility. Note that the following special conditions for a special use permit for Reburial of Archaeological Human Remains per State and Federal Guidelines may be updated to reflect changes, if any, in the final revised Comprehensive Conservation Plan and step-down plans completed in the future.

Regional conditions

- Failure to abide by any part of this special use permit; violation of any Refuge-related provision in Titles 43 or 50, Code of Federal Regulations; or violation of any pertinent State regulation (e.g., fish or game violation) will 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 or contractors). Appeals of decisions relative to permits are handled in accordance with 50 Code of Federal Regulations 36.41.
- The permittee is responsible for ensuring that all employees, party members, contractors, aircraft pilots, and any other persons working for the permittee and conducting activities allowed by this permit are familiar with and adhere to the conditions of this permit.
- Any problems with wildlife and/or animals taken in defense-of-life-or-property must be reported immediately to the Refuge Manager, the Alaska Department of Fish and Game, and the Alaska State Troopers. Animals taken must be salvaged in accordance with State regulations.
- The permittee and permittee's employees do not have the exclusive use of the site(s) or lands covered by the permit.
- This permit may be cancelled or revised at any time by the Refuge Manager for noncompliance or in case of emergency (e.g., public safety, unusual resource problems).
- The permittee 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.
- Prior to beginning any activities allowed by this permit, the permittee shall provide the Refuge Manager with: (1) name and method of contact for the field party chief/supervisor; aircraft and other vehicle types to be used, identification information for these vehicles; and names of crew members and (2) any changes in information provided in the original permit application.
- In accordance with the Archaeological Resources Protection Act (16 U.S.C. 470aa), the disturbance of archaeological or historical sites, and the removal of artifacts are prohibited. The excavation, disturbance, collection, or purchase of historical, ethnological, or archaeological specimens or artifacts is prohibited.
- Permittees shall maintain their use areas in a neat and sanitary condition. Latrines must be located at least 150 feet from springs, lakes, and streams. All property of the permittee except for cabins and tent frames is to be removed from Refuge lands upon completion of permitted activities.
- The construction of landing strips or pads is prohibited. Incidental hand removal of rocks and other minor obstructions may be permitted.

- The use of off-road vehicles (except snowmobiles with adequate snow cover) is prohibited unless specifically authorized in writing in this permit.
- 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.
- Unauthorized fuel caches are prohibited. Fuel storage, if any, will be in compliance with regional Service fuel storage policy.

Refuge Conditions

- Visitors will be required to comply with any temporary restrictions, emergency orders or other types of regulatory actions promulgated by the Refuge Manager to prevent resource problems or conflicts, in cases of emergency, public safety, or unusual resource problems.
- The use of Native or State lands that have been conveyed (patented) is not authorized by this permit.
- Use of Native or State lands that have been selected but not yet conveyed is prohibited unless a letter of concurrence from the State, village or Native corporation is submitted to the Refuge Manager prior to beginning any activities allowed by this permit.
- A copy of this special use permit must be in the party leader's possession at all times while exercising the privileges of the permit.
- Cabins on Refuge lands shall not be used by the permittee without the permission of the Refuge Manager except in cases of dire emergency for survival purposes.
- Food or garbage attractive to bears or other wildlife will be immediately disposed of. No attractive nuisance for bears or other wildlife shall be created by food storage, improper disposal of garbage (includes of burying of garbage), fish smoking, salting, drying, or other uses.
- Combustibles (paper, wood, etc.) may be burned, but all other debris, including cans, bottles, fuel containers, and any other noncombustible material shall be removed and disposed of off Refuge when departing camps.
- Reburial of repatriated human remains will take place near the place of discovery of such remains and/or near the place of their original burial.
- The permittee or permittees' representatives will make the smallest possible excavation, using only hand tools.
- The Global Positioning System (GPS) coordinates and a list of the contents of the burial site will be filed at Refuge headquarters and with the Regional Historic Preservation Officer within 30 days of burial.
- Remains shall be buried with a modern object (e.g., coin, button, etc.—with date) to indicate that it is a historical reburial.
- The discharge of firearms is prohibited, except in conjunction with authorized hunting seasons or for protection of life or property.

Justification:

The proposed use is limited and short term and thus will result in minimal impact to refuge resources. This use is necessary for the Refuge to comply with the Native American Graves Protection and Repatriation Act of 1990. It will not interfere with nor detract from the National Wildlife Refuge System mission or the purposes of the Refuge.

Supporting Documents:

U.S. Fish and Wildlife Service, 1994. Native American Policy. U.S. Fish and Wildlife Service National Policy Issuance #94-10 and appendix. Washington, D.C. 13 pages, available at http://policy.fws.gov/npi94_10.html.

U.S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement and Wilderness Review for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges. U. S. Fish and Wildlife Service, Anchorage, Alaska.

U.S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan for the Nowitna National Wildlife Refuge. U. S. Fish and Wildlife Service, Anchorage, Alaska.

U.S. Fish and Wildlife Service. 2008. Draft Revised Comprehensive Conservation Plan and Environmental Assessment for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges. U. S. Fish and Wildlife Service, Anchorage, Alaska.

Refuge Determination:

Refuge Manager/
Project Leader Approval: _____ /signed/ Kenton Moos 4/17/2009
(Signature) (Date)

Concurrence:

Regional Chief
National Wildlife
Refuge System: _____ /signed/ Todd Logan 4/17/2009
(Signature) (Date)

Mandatory 10-Year Re-evaluation Date: 2019

NEPA Compliance for Refuge Use Decision

- _____ Categorical Exclusion without Environmental Action Memorandum
- _____ Categorical Exclusions and Environmental Action Memorandum
- X _____ Environmental Assessment and Finding of No Significant Impact
- _____ Environmental Impact Statement and Record of Decision

Compatibility Determination

Use: Recreational Hunting

Primary Use: Hunting (big game, waterfowl, other migratory birds, and upland game)

Supporting and Incidental Uses: Boating (motorized and non-motorized), fixed-wing aircraft landings, fishing, trapping, natural resource gathering, camping, firewood cutting, dog training, snowmobiling, hiking and backpacking, pets, wildlife photography, videography and audio recording, swimming and beach use, and wildlife observation.

Refuge Name: Koyukuk and Northern Unit of Innoko/Nowitna National Wildlife Refuge

Establishment and Acquisition Authority:

Koyukuk/Nowitna National Wildlife Refuge was established on December 2, 1980, when Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). It includes Koyukuk National Wildlife Refuge, Nowitna National Wildlife Refuge, and the Northern Unit of Innoko National Wildlife Refuge.

Refuge Purposes:

Section 302(5) (B) of ANILCA states purposes for which the Koyukuk Refuge was established and shall be managed include (purposes ii–iv are the same for all three refuges):

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl and other migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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 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.

[Koyukuk Wilderness] to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to administer for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as wilderness.

Section 302(3) (B) of ANILCA states purposes for which the Innoko 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 waterfowl, peregrine falcons, other migratory birds, black bears, moose, furbearers, and other mammals and salmon;

Section 302(6) (B) of ANILCA states purposes for which the Nowitna 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 trumpeter swans, white-fronted geese, canvasbacks

and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free-flowing condition, its water quality, wildlife, geology, and primitive setting.

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:

Recreational hunting is re-evaluated in this determination. Recreational hunting was found to be compatible in the original refuge Comprehensive Conservation Plans (1987) and was again determined to be compatible in 1992. Associated activities such as camping, backpacking, hiking, and other incidental uses are considered part of recreational hunting. The majority of recreational hunting has been for moose, but hunting for black bear, grizzly bear, wolf, small game, and waterfowl also occurs on the Refuge, usually as part of a moose hunt, as allowed under State of Alaska hunting regulations (5 AAC). Small-game and waterfowl hunting often occurs in conjunction with big-game hunts and fall fishing excursions. Recreation settings on the Refuge are remote. The number of recreational use-days for small-game and waterfowl hunting on the Refuge is unknown but thought to be minimal. Current means of access to the Refuge include fixed-wing aircraft, motorboats, snowmobiles, and non-motorized means. Levels of recreational hunting are estimated primarily from direct observation by refuge staff, annual reports provided by air taxi operators who transport most recreational hunters to locations within the Refuge, and information from State harvest tickets. Permitted air taxi operators provide visitor information, including primary activity, location, length of stay, and group size.

Koyukuk/Nowitna Refuge is located within State of Alaska Game Management Units (GMU) 21 and 24. Moose, and black and brown bear, are the primary species sought after by hunters, but wolves and wolverine may be taken incidentally on the Refuge. The Koyukuk Controlled Use Area (KCUA), which includes most of the Koyukuk Refuge, was established by the State of Alaska in 1979. The KCUA restricts aircraft access for the transport of moose hunters, gear, or moose parts. (However, moose hunters, their gear, and/or moose parts may, be transported by aircraft between publicly owned airports in the controlled use area or between a publicly owned airport within the area and points outside the area.) State of Alaska hunting regulations (5AAC) describe State seasons, bag limits, and regulations pertaining to hunting, fishing and trapping.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage recreational hunting activities at existing and projected levels. Administrative staff time primarily involves phone conversations and written correspondence to answer questions from hunters, attendance at regulatory meetings, and engagement in the regulatory review process. Field work associated with administering the program primarily involves conducting law enforcement patrols to ensure recreational hunter compliance with State and federal refuge regulations. Refuge staff members opportunistically conduct outreach to hunters to increase their awareness of national wildlife refuge programs, the status of local wildlife populations, the relationship of regulations to

sustainable yield, and the importance of knowing land ownership and regulatory boundaries in locations where hunting activities are to take place.

Anticipated Impacts of the Use:

The Refuge is directly involved in review and implementation of the regulatory process and administrative oversight of the activity. Because of combined regulatory and law enforcement efforts of the State and refuge personnel, direct impacts from recreational hunting under existing management should have minimal impacts to fish and wildlife resources, other resources, or other refuge users.

Moose hunting locations outside of the KCUA are concentrated in narrow river corridors along the many rivers and sloughs within the refuge. Recreational hunters may, in some cases, compete with subsistence users for the limited number of game animals in these corridors. Air taxi operators are discouraged from dropping hunters in areas used by subsistence hunters. Most subsistence hunting occurs in areas of the Refuge where refuge and private lands are intermingled. Boundaries of private lands can be difficult to distinguish and inadvertent trespass could occur because non-local hunters would not be aware of the mixed ownership. Refuge staff members are aware of these potential conflicts and monitor use levels each hunting season. Should conflicts arise, the Service will work to address them through the Federal Subsistence Board and Alaska Board of Game. These Boards have established regulations aimed at managing populations of animals at sustainable levels and preventing conflicts between user groups.

Impacts to refuge habitats are considered minimal because access is primarily by boat or plane, with planes landing on lakes and rivers with floats. Disturbance to vegetation is minimal and short term and would likely be restricted to campsites that receive repetitive use. Temporary displacement and/or disturbance to wildlife can occur with any form of motorized transport (Bouffard 1982, Calef et al. 1976, Miller 1994, Ward et al. 1994). A large increase in recreational hunting on the Refuge could cause user conflicts, wildlife disturbance, and—in some cases—undermine the wild character of the Refuge. The introduction of invasive plant species carried on boats or aircraft floats could affect refuge resources, although limited or no known introductions have occurred on the Refuge to date, and staff will be vigilant to prevent such occurrences.

Public Review and Comment:

Public comment was solicited concurrently with the revision of the Refuge’s Comprehensive Conservation Plan.

Refuge Determination (check one below):

- Use is Not Compatible
- Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Visitors will be required to comply with any regulations in place, such as seasonal closures for resource protection.

Management direction provided in the revised refuge Comprehensive Conservation Plan would require adequate monitoring of visitor use, including recreational hunting. Findings from monitoring will be used to ensure that additional management actions, if any are needed, ensure that all hunting activities remain compatible with refuge purposes. To minimize impacts on lands and resources within the Refuge, law enforcement patrols will be routinely conducted in an effort to maximize compliance with the existing policies, rules, and regulations.

Justification:

All lands within the boundary of the Koyukuk/Nowitna Refuges, except private inholdings, are open to general public access. In the Koyukuk Controlled Use Area, use of aircraft in the support of moose hunting is not allowed. Aircraft access in support of moose hunting is allowed in all other areas of the Refuge. The National Wildlife Refuge System Administration Act of 1966 (as amended by the Refuge Improvement Act of 1997) identifies recreational hunting as one of six priority public uses of National Wildlife Refuge System lands. The law states that, “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 that priority public uses should receive enhanced consideration over other general public uses in refuge planning and management.” The law also states that the Service should 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.

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 the State of Alaska to address impacts and resolve compatibility concerns. Recreational hunting is an activity that Congress intended to preserve when the Refuge was established by ANILCA. As stated previously, recreational hunting on the Refuge provides the public with quality, safe, and unique hunting opportunities found few places elsewhere in the world. To ensure sustainability of harvest of wildlife resources and to provide the continued opportunity for subsistence uses of these species by local residents, 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 the Refuge’s wildlife resources, continued hunting opportunities, 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 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:

Alaska Department of Fish and Game. 2006. Alaska hunting regulations effective dates July 1, 2006–June 30, 2007, governing general, subsistence, and commercial uses of Alaska’s wildlife. Juneau, Alaska. Viewed December, 2006 at www.state.ak.us/adfg/wildlife/wildmain.htm.

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.

U.S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement and Wilderness Review for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges. U. S. Fish and Wildlife Service, Anchorage, Alaska.

U.S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan for the Nowitna National Wildlife Refuge. U. S. Fish and Wildlife Service, Anchorage, Alaska.

U.S. Fish and Wildlife Service. 2008. Draft Revised Comprehensive Conservation Plan and Environmental Assessment for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges. U. S. Fish and Wildlife Service, Anchorage, Alaska.

Ward, D. H., R. A. Stehn, D. V. Derksen. 1994. Response of staging brant to disturbance at the Izembek Lagoon, Alaska. *Wildl. Soc. Bull.* 22: 220–228.

Refuge Determination:

Refuge Manager/
Project Leader Approval: _____ /signed/ Kenton Moos 4/17/2009
(Signature) (Date)

Concurrence:

Regional Chief
National Wildlife
Refuge System: _____ /signed/ Todd Logan 4/17/2009
(Signature) (Date)

Mandatory 15-Year Re-evaluation Date (for priority public uses): 2024

NEPA Compliance for Refuge Use Decision:

- _____ Categorical Exclusion without Environmental Action Memorandum
- _____ Categorical Exclusions and Environmental Action Memorandum
- Environmental Assessment and Finding of No Significant Impact
- _____ Environmental Impact Statement and Record of Decision

Compatibility Determination

Use: Recreational Fishing

Primary Use: Fishing (general and other)

Supporting and Incidental Uses: Boating (motorized and non-motorized), fixed-wing aircraft landings, hunting, firewood cutting, trapping, camping, hiking and backpacking, picnicking, pets, natural resource gathering, wildlife photography and videography, swimming and beach use, wildlife observation, and snowmobiling.

Refuge Name: Koyukuk and Northern Unit of Innoko/Nowitna National Wildlife Refuge

Establishment and Acquisition Authority:

Koyukuk/Nowitna National Wildlife Refuge was established on December 2, 1980, when Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). It includes Koyukuk National Wildlife Refuge, Nowitna National Wildlife Refuge, and the Northern Unit of Innoko National Wildlife Refuge.

Refuge Purposes:

Section 302(5) (B) of ANILCA states purposes for which the Koyukuk Refuge was established and shall be managed include (purposes ii–iv are the same for all three refuges):

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl and other migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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 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.

[Koyukuk Wilderness] to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to administer for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as wilderness.

Section 302(3) (B) of ANILCA states purposes for which the Innoko 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 waterfowl, peregrine falcons, other migratory birds, black bears, moose, furbearers, and other mammals and salmon;

Section 302(6) (B) of ANILCA states purposes for which the Nowitna 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 trumpeter swans, white-fronted geese, canvasbacks

and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free-flowing condition, its water quality, wildlife, geology, and primitive setting.

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 evaluates the compatibility of recreational fishing as a use on Koyukuk/Nowitna Refuge. Recreational fishing was originally found to be compatible in the original refuge comprehensive conservation plans (1987) and was again determined to be compatible in 1994. Means of access for recreational fishing include fixed-wing airplanes (mainly floatplanes), motorboats, non-motorized boats, hiking, and snowmobiling. Recreational fishing occurs spring through winter and is managed under State of Alaska fishing regulations (5AAC). The major rivers on the Refuge have good recreational fishing opportunities, based on reasonable accessibility by floatplane or boat, and sustainable populations of anadromous and/or resident fish. Although all these drainages provide opportunities for day use and overnight primitive camping, distance and cost of traveling to these areas for day-use fishing is prohibitive for most visitors. All drainages provide opportunities for fishing; however, the Nowitna has significant northern pike and sheefish populations, in addition to salmon, that would attract recreational fishing. The Kaiyuh Flats (Northern Unit of Innoko) also boasts large pike and is a popular fishing area. Arctic grayling, whitefish, and Dolly Varden are available in waters within the Refuge. Recreational fishing patterns are estimated primarily through direct observation by refuge staff and reports from transporters and from local residents. Use is concentrated in the summer months on rivers when flows are amenable to river travel.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage recreational fishing at existing levels. Administrative staff time primarily involves phone conversations and written correspondence, and could involve engagement in regulatory review. Field work associated with administering the program primarily involves conducting law enforcement patrols to ensure recreational users' compliance with State fishing regulations and refuge regulations and to work with adjacent land owners to monitor public use on rivers flowing onto the Refuge. It is estimated that less than two weeks of staff time is required to manage this use on Koyukuk/Nowitna Refuge.

Anticipated Impacts of the Use:

Both the Federal Subsistence Board and State Board of Fisheries regularly adopt regulations in response to fish population levels and to address issues of fishery allocation. Providing an opportunity for continued subsistence uses of fishery resources by local residents receives the highest priority from the Federal Subsistence Board. [Recent, 1998 to present, Chinook salmon returns have been characterized as poor, and managers (State and federal) may restrict

recreational use of this resources. Chum salmon experienced a worrisome decline in the late 1990s, however, recent run strengths indicate that a recreational fishery on chum salmon currently is sustainable.]

Based on guidance provided in the Koyukuk and Nowitna Fisheries Management Plans (USFWS 1991, USFWS 1993), refuge staff members continue to work with the Fairbanks Fish and Wildlife Field Office and Alaska Department of Fish and Game to implement inventories and studies in the Plan and to conduct other research aimed at understanding fish populations and key habitats on Koyukuk/Nowitna Refuge. At current levels, recreational fishing harvests require little monitoring, and there are no anticipated deleterious effects on fish habitat. There are presently two sport fish guides utilizing the Koyukuk/Nowitna Refuge, targeting primarily pike. Should intensity of use increase, refuge staff would increase monitoring efforts. If necessary, refuge staff would review regulations and propose changes to protect fishery resources and subsistence fishing opportunities for people living near the Refuge.

Additional potential impacts or threats are associated with floatplane or motorboat access. The introduction of invasive plant species carried on boats or aircraft floats could affect refuge resources, although introductions are not known to have occurred via this mode of transportation on the Refuge to date.

Public Review and Comment:

Public comment was solicited concurrently with the revision of the Refuge's Comprehensive Conservation Plan.

Refuge Determination (check one below):

- Use is Not Compatible
 Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Visitors will be required to comply with any regulations in place, such as seasonal closures for resource protection.

The Fisheries Management Plans for Koyukuk and Nowitna Refuges (USFWS 1991, USFWS 1993) will be used to identify specific management actions to ensure that recreational fishing and related activities continue to remain compatible with refuge purposes.

Justification:

The National Wildlife Refuge System Administration Act (as amended by the Refuge Improvement Act of 1997) identifies compatible recreational fishing as one of six priority public uses of national wildlife refuges. The law states that when managed in accordance with principles of sound fish and wildlife management, administration of these uses has been, and is expected to continue to be, generally compatible and that priority public uses should receive enhanced consideration over other general public uses in refuge planning and management. The law also states that the Service should 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 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 in support of recreational fishing increase to levels where it interferes with refuge purposes, staff would work

NEPA Compliance for Refuge Use Decision:

- Categorical Exclusion without Environmental Action Memorandum
- Categorical Exclusions 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 Use: Research and surveys

Supporting and Incidental Uses: Fixed-wing aircraft landings, helicopter landings, 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, picnicking, cross-country skiing, hiking and backpacking, wildlife photography, videography and audio recording, snorkeling and scuba diving, snowshoeing, scientific collecting, and wildlife observation.

Refuge Name: Koyukuk and Northern Unit of Innoko/Nowitna National Wildlife Refuge

Establishment and Acquisition Authority:

Koyukuk/Nowitna National Wildlife Refuge was established on December 2, 1980, when Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). It includes Koyukuk National Wildlife Refuge, Nowitna National Wildlife Refuge, and the Northern Unit of Innoko National Wildlife Refuge.

Refuge Purposes:

Section 302(5) (B) of ANILCA states purposes for which the Koyukuk Refuge was established and shall be managed include (purposes ii–iv are the same for all three refuges):

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl and other migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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 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.

[Koyukuk Wilderness] to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to administer for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as wilderness.

Section 302(3) of ANILCA states purposes for which the Innoko 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 waterfowl, peregrine falcons, other migratory birds, black bears, moose, furbearers, and other mammals and salmon;

Section 302(6) (B) of ANILCA states purposes for which the Nowitna 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 trumpeter swans, white-fronted geese, canvasbacks and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free-flowing condition, its water quality, wildlife, geology, and primitive setting.

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 compatibility determination is a re-evaluation of an existing public use that was originally found to be compatible in 1992. Scientific research has been and would continue to be a common activity within Koyukuk/Nowitna Refuge. Research activities would occur at all times of the year but mostly in the spring, summer, and fall. A partial list of research categories includes biology, ecology, botany, entomology, geology, climatology, paleontology, archaeology, paleoecology, sociology, hydrology, and anthropology.

This compatibility determination addresses the full spectrum of uses associated with the scientific research and surveys of fish, wildlife, habitat, and other refuge resources. It includes all means of access, lodging and facilities, and other elements identified in the research proposal. Research proposals that substantially differ in scope and purpose from the activities covered by this compatibility determination will require a separate determination for compatibility. The scope of this determination includes research conducted by all agencies or entities other than the Service. Scientific research that is part of a collaborative effort or part of a cooperative effort with the U.S. Fish and Wildlife Service is not subject to a formal compatibility determination.

Most activities occur during spring, summer, and fall, but winter research and surveys are also possible. Since establishment, Koyukuk/Nowitna Refuge has issued numerous scientific research permits annually. Permits have been issued primarily to universities for academic research, to other federal agencies, such as U.S. Geological Survey and Bureau of Land Management, and to State agencies.

Scientific research may employ a wide spectrum of methods from many disciplines of science. Researchers would be required to submit investigation plans or proposals, annual activity reports, and copies of publications resulting from the research. Proposed research and investigation plans developed 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. Researchers would also be encouraged to communicate research activities and findings to refuge staff, communities near the Refuge and the public.

Researchers will be required to minimize impacts on refuge resources, minimize effects on other users of refuge lands, and minimize negative encounters with wildlife. When justified to collect important data not otherwise available, lethal sampling may be allowed; all applicable permits will

be acquired. Equipment for sampling may include both hand-powered and motorized instruments (tools). Logistical support for research activities may include base 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. 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.

Most scientific research would require a refuge special use permit; the permit would contain stipulations to ensure compatibility. When requested, the permittee would provide logistical support for site visits. Logistical support may include transportation from Galena or a community adjacent to the Refuge. An administrative fee is charged to private companies and for-profit organizations seeking to do research or data collection on the Refuge. This fee is waived for research associated with public agencies and educational institutions.

Specific authorized means of access for all areas on the Refuge will be described in each special use permit. Potential means of access include those authorized by ANILCA 1110(a), such as fixed-wing aircraft, motor boats, and snowmobiles (providing there is adequate snow cover), and non-motorized surface transportation such as canoeing, hiking, snowshoeing, and cross-country skiing. Requests for access by helicopter are anticipated and would be considered on a case-by-case basis with regard to refuge purposes. Helicopter use in the Koyukuk Wilderness will be required to meet the minimum tool requirement through the “Minimum Requirements Decision Guide” process.

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. 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 two weeks per year.

Anticipated Impacts of the Use:

The refuge manager will assist the applicant with obtaining appropriate collection permits for research involving fish and wildlife. Factors such as targeted research species, number of researchers, transportation modes, number of aircraft and amount of aircraft use, number of watercraft and frequency of use, fuel storage, garbage and human waste management, type and location of lodging, and location of access points will determine the extent of impacts on the Refuge. The introduction of invasive species carried on boats or aircraft floats could affect refuge resources, although limited or no known introductions have occurred on the Refuge to date, refuge staff will be vigilant to prevent such occurrences.

Frequency of this activity may rise in the next 10 years as interest in Arctic and subarctic ecosystems and global climate change increases. This could lead to more aircraft landings, natural resource collection, and conflicts with refuge visitors. However, special conditions imposed on scientific research and associated activities would ensure these activities would not have significant impacts on wildlife resources, water quality, soil, vegetation, and other refuge users—especially subsistence users. Anticipated impacts to natural resources and refuge visitors from this activity at present levels, as well as the levels expected to occur in the next 10 years, are minimal.

Public Review and Comment:

Public comment was solicited concurrently with the revision of the Refuge's Comprehensive Conservation Plan.

Refuge Determination (check one below):

Use is Not Compatible

Use is Compatible with the Following Stipulations

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. Unless access is specifically authorized as part of a cooperative research project with the Service, seasonal access limits may apply to research activities.

A special use permit with stipulations is required for most scientific research on Koyukuk/Nowitna Refuge. Site-specific special use conditions related to maintenance of defensible space will be incorporated into permits on a case-by-case basis. Following are typical special use permit stipulations, some of which are necessary for compatibility. These stipulations will be updated to comply with the final revised Koyukuk/Nowitna National Wildlife Refuge Comprehensive Conservation Plan.

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, as well as the following general conditions, to minimize impacts on lands and resources within the Refuge.

Regional Standard 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 (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 Code of Federal Regulations 36.41.
- The permittee is responsible for ensuring that all employees, party members, contractors, aircraft pilots, and any other persons working for the permittee and conducting activities allowed by this permit are familiar with and adhere to the conditions of 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 the Alaska Department of Fish and Game, and animals taken must be salvaged in accordance with State regulations.
- This permit may be canceled or revised at any time by the Refuge Manager for noncompliance or in case of emergency (e.g., public safety, unusual resource problems).
- This permit does not grant the permittee and his/her employees or coworkers exclusive use of the site(s) or lands covered by the permit.
- This permit may be canceled or revised at any time by the Refuge Manager in case of emergency (e.g. high fire danger, flooding, unusual resource problems, etc.).

- The permittee 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.
- Prior to beginning activities allowed by this permit, the permittee shall provide the refuge Manager with: (1) the name and method of contact for the field party chief/supervisor, (2) the aircraft and other vehicle types to be used, including identification information, (3) names of assistant guides and helpers, and (4) any changes to information provided in the original permit application.
- The Refuge Manager, upon request, shall be afforded the opportunity and logistical support from the nearest commercial transportation site to accompany the permittee for the purpose of inspection and monitoring permittee activities. A final inspection trip provided by the permittee of the areas of use may be required by the Refuge Manager to determine compliance with the terms of this permit.
- The permittee shall provide the Refuge Manager with a report of activities under this permit within 30 days of permit expiration.
- 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.
- Permittees 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 permittee must be removed from refuge lands upon completion of permitted activities.
- The construction of landing strips or pads is prohibited. Incidental hand removal of rocks and other minor obstructions may be permitted.
- The use of off-road vehicles (except snowmobiles with adequate snow cover) is prohibited unless specifically authorized in writing in this permit.
- 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 take-off and landing, maintain a minimum altitude of 2,000 feet above ground.
- The use of helicopters may be authorized, provided that landing is prohibited except for the direct support of the activity covered by this permit and emergencies (no recreational use of helicopters is permitted), and no clearing of vegetation for landing/takeoff is permitted.
- 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 permittee's name, address, local contact telephone number and type of fuel.
- Construction of cabins or other permanent structures is prohibited.
- This permit authorizes use on State selected lands. If any of these lands are conveyed during the term of this permit, the permittee will no longer be authorized to use those lands until and unless permission is obtained from the Alaska Department of Natural Resources.
- This permit authorizes use only on the Native selected lands specifically identified in the description block of this permit. If any of these Native selected lands are conveyed during the term of this permit, the permittee will no longer be authorized to use those lands unless permission is obtained from the Native corporation to which land ownership has been conveyed.

- 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. Examples of prohibited acts include, but are not limited to: 1) intentional low flights over camps or persons at less than 500 feet, except when necessary for take off and landing, 2) parking aircraft or placing other objects (rocks, tents, etc.) on any landable area so as to restrict use by other aircraft, 3) otherwise intentionally interfering in the activity of other refuge users, and 4) engaging in activity which is contrary to State and Federal laws.

Refuge Special Conditions:

- All information, reports, photos, data, collections and observations obtained as a result of this permit must be accessible from the permittee 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 researchers' privileged position regarding first publication. 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.
- Prior to implementing field work, the permittee 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.
- 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, within Wilderness, etc.

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.

Compatibility Determination

Use: Subsistence Activities

Primary Use: Fishing, natural resource gathering, hunting, trapping and subsistence (other)

Supporting and Incidental Uses: Boating (motorized and non-motorized), snowmobiling, snowshoeing, firewood cutting, house log cutting, natural resource gathering, camping, cross-country skiing, dog sledding and skijoring, hiking and backpacking, fixed-wing aircraft landings, and swimming.

Refuge Name: Koyukuk and Northern Unit of Innoko/Nowitna National Wildlife Refuge

Establishment and Acquisition Authority:

Koyukuk/Nowitna National Wildlife Refuge was established on December 2, 1980, when Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). It includes Koyukuk National Wildlife Refuge, Nowitna National Wildlife Refuge, and the Northern Unit of Innoko National Wildlife Refuge.

Refuge Purposes:

Section 302(5) (B) of ANILCA states purposes for which the Koyukuk Refuge was established and shall be managed include (purposes ii-iv are the same for all three refuges):

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl and other migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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 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.

[Koyukuk Wilderness] to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to administer for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as wilderness.

Section 302(3) (B) of ANILCA states purposes for which the Innoko 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 waterfowl, peregrine falcons, other migratory birds, black bears, moose, furbearers, and other mammals and salmon;

Section 302(6) (B) of ANILCA states purposes for which the Nowitna 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 trumpeter swans, white-fronted geese, canvasbacks

and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free-flowing condition, its water quality, wildlife, geology, and primitive setting.

National Wildlife Refuge System Mission:

The mission of the 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 is a re-evaluation of the compatibility of subsistence uses of federal lands within the Koyukuk/Nowitna Refuges. Subsistence was originally found to be a compatible use during the development of the refuge Comprehensive Conservation Plans in 1987. Subsistence was again determined to be compatible, subject to reasonable regulation, in 1994. Subsistence activities addressed in this determination include hunting, fishing, trapping, firewood gathering, house log cutting, 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 the eight villages located within or near the Refuge have lifestyles and economies that depend on subsistence resources, including resources within the Refuge. Subsistence activities are not just a way of obtaining food but an important mechanism for maintaining cultural values such as kinship, community, respect for elders, hospitality, sharing resources, and the passing of values to younger generations. In addition, many residents in the area simply prefer the taste of traditional wild foods to that of commercially purchased foods. Mainstay subsistence foods for residents in and around the Refuge are fish, moose, waterfowl and caribou. Black bear and small game, including grouse and snowshoe hare, beaver, and furbearers, are also important to local residents for food, fur, and traditional crafts. Berries, firewood, house logs, and other plant materials are also frequently gathered. A detailed description of subsistence uses and harvest can be found in chapter 3 of the Koyukuk/Nowitna Refuge Comprehensive Conservation Plan.

Trappers operate within the Refuge, harvesting marten, lynx, wolverine, fox, wolves, beaver, river otter, and other small furbearers. The sale of these furs provides supplemental income to residents depending on a subsistence lifestyle. The compatibility of trapping as a refuge use is considered elsewhere in this Plan under 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; surveys of public use and subsistence harvest in local communities; environmental education, such as steel shot clinics 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 when subsistence activities take place. Refuge staff members spend considerable time participating in and supporting the regulatory development process with the Federal Subsistence Board (FSB) and Alaska Boards of Fisheries and Game to ensure that harvest levels are sustainable. The Refuge currently allocates over 10 percent of its budget towards managing subsistence resources and subsistence activities because it constitutes the primary public use of the Koyukuk/Nowitna Refuge.

Anticipated Impacts of the Use:

Fish and wildlife harvested by subsistence users at current and projected levels—in accordance with established State and federal regulations pertaining to season, 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 of animals, environmental conditions, distribution, predation, and harvest pressure. Refuge staff will continue to monitor populations to avoid depletion of fish and wildlife resources by overharvesting.

Impacts to the resources from berry picking, firewood gathering, and other plant harvesting activities, at low intensity, are relatively insignificant. Impacts to habitat caused by aircraft, boats, and foot travel are generally minimal, but increased use could cause disturbance to wildlife and increased pressures on wildlife. Much of the access by subsistence users is by boat or snowmobile (in winter during adequate snow cover). Refuge staff members have observed that to date, these activities have caused very little impact to habitats. The introduction of invasive plant species, perhaps from seeds carried on boats, snowmobiles, or dog mushing equipment, could affect refuge resources. Although it is not known to have occurred via this method, there are a limited number of invasive species on the Refuges. The Service will be vigilant to prevent such introductions. Refuge staff will monitor subsistence use levels to determine if changes in conditions or intensity have the potential to impact refuge resources. Because of changes in off-road vehicle (ORV) use in recent years, additional ORV use may have to be addressed by restrictions to protect resources within the Refuge in the future. Refuge staff will monitor use levels to determine if intensity has the potential to impact refuge resources.

Public Review and Comment:

Public comment was solicited concurrently with the revision of the Refuge's Comprehensive Conservation Plan.

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.

Compatibility Determination

Use: Subsistence Cabins and Trapping Cabins

Primary Use: Subsistence cabins, trapping cabins, and temporary camps

Supporting and Incidental Uses: Trapping, boating (motorized and non-motorized), fixed-wing aircraft landings, hunting, natural resource gathering, snowmobiling, and firewood cutting.

Refuge Name: Koyukuk and Northern Unit of Innoko/Nowitna National Wildlife Refuge

Establishment and Acquisition Authority:

Koyukuk/Nowitna National Wildlife Refuge was established on December 2, 1980, when Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). It includes Koyukuk National Wildlife Refuge, Nowitna National Wildlife Refuge, and the Northern Unit of Innoko National Wildlife Refuge.

Refuge Purposes:

Section 302(5) (B) of ANILCA states purposes for which the Koyukuk Refuge was established and shall be managed include (purposes ii–iv are the same for all three refuges):

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl and other migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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 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.

[Koyukuk Wilderness] to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to administer for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as wilderness.

Section 302(3) (B) of ANILCA states purposes for which the Innoko 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 waterfowl, peregrine falcons, other migratory birds, black bears, moose, furbearers, and other mammals and salmon;

Section 302(6) (B) of ANILCA states purposes for which the Nowitna 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 trumpeter swans, white-fronted geese, canvasbacks and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free-flowing condition, its water quality, wildlife, geology, and primitive setting.

National Wildlife Refuge System Mission:

The mission of the 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 permits for 35 existing trapping and subsistence cabins and the potential for temporary camp permits. New trapping or subsistence cabin permits would require specific compatibility determinations. This use was originally found to be compatible in the Refuge Comprehensive Conservation Plan (1987). The refuge has issued special use permits to local resident for trapping/subsistence cabins. Many local rural residents conduct activities such as hunting, trapping, and fishing on refuge lands supported by cabins. Some of these cabins are located on private native allotments; others on Refuge lands.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage subsistence and trapping cabin permits at current and projected levels. Administrative staff time primarily involves phone conversations, written correspondence, and issuing permits. Field work associated with administering the program primarily involves monitoring permittees' compliance with the terms of the permits and evaluating potential damage caused by wildfires. Estimated staff time to annually administer and monitor these permits is less than one week.

Anticipated Impacts of the Use:

Special conditions attached to each special use permit are designed to minimize the chances of adverse effects to resources within the Refuge and to its visitors. There are two primary concerns: impacts to wildlife resources and habitat; and visual impacts. Most wildlife using the area near such permitted cabins is likely habituated to the presence of these structures and the activities that routinely occur in and near them. The structures provide relatively secure storage for food, trapping supplies and bait, and other materials that might attract bears.

Public Review and Comment:

Public comment was solicited concurrently with the revision of the Refuge's Comprehensive Conservation Plan.

Refuge Determination (check one below):

- Use is Not Compatible
- Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

A special use permit with stipulations is required. Site-specific special use conditions related to maintenance of defensible space will be incorporated into permits on a case-by-case basis. Following are typical special use permit stipulations, some of which are necessary for

compatibility. These stipulations will be updated to comply with the final revised Koyukuk/Nowitna National Wildlife Refuge Comprehensive Conservation Plan and if necessary, to comply with future step-down plans.

The management direction provided in the revised Comprehensive Conservation Plan for the Refuge will be implemented. Monitoring would be used to determine what additional management actions, if any, were needed to ensure compatibility. Continuing law enforcement and administrative monitoring of permits will be carried out to ensure compliance with the following permit conditions to minimize impacts on lands and resources within the Refuge.

Regional Standard 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 (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 Code of Federal Regulations 36.41.
- The permittee is responsible for ensuring that all employees, party members, contractors, aircraft pilots, and any other persons working for the permittee and conducting activities allowed by this permit are familiar with and adhere to the conditions of 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 the Alaska Department of Fish and Game, and animals taken must be salvaged in accordance with State regulations.
- 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.
- Permittees 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 permittee must be removed from refuge lands upon completion of permitted activities.
- The construction of landing strips or pads is prohibited. Incidental hand removal of rocks and other minor obstructions may be permitted.
- The use of off-road vehicles (except snowmobiles with adequate snow cover) is prohibited unless specifically authorized in writing in this permit.
- 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 take-off and landing, maintain a minimum altitude of 2,000 feet above ground.
- Fuel caches are allowed only in designated areas and must be approved by the Refuge Manager or his designate prior to caches being established. If caches are established, fuel containers must be clearly marked with the permittee's name, address, local contact telephone number and type of fuel.
- Any major exterior rehabilitation of or additions to existing structures must have the Refuge Manager's prior approval in writing. This does not include minor remodeling or routine maintenance.
- Subject to available suppression resources and taking into consideration specific site conditions (including human presence), permitted cabins, structures, and/or related

facilities may be protected from wildfire to the extent possible. Human safety will receive the highest priority consideration by land managers and fire suppression personnel.

- This permit authorizes use on State selected lands. If any of these lands are conveyed during the term of this permit, the permittee will no longer be authorized to use those lands until and unless permission is obtained from the Alaska Department of Natural Resources.
- This permit authorizes use only on the Native selected lands specifically identified in the description block of this permit. If any of these Native selected lands are conveyed during the term of this permit, the permittee will no longer be authorized to use those lands unless permission is obtained from the Native corporation to which land ownership has been conveyed.
- 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. Examples of prohibited acts include, but are not limited to: 1) intentional low flights over camps or persons at less than 500 feet, except when necessary for take off and landing, 2) parking aircraft or placing other objects (rocks, tents, etc.) on any landable area so as to restrict use by other aircraft, 3) otherwise intentionally interfering in the activity of other refuge users, and 4) engaging in activity which is contrary to State and Federal laws.

Refuge-Specific Special Conditions

- All garbage and non-combustible debris will be removed from the refuge. Food, garbage, other materials will be stored so as not to attract bears and other wildlife.
- Use of cabins is authorized for trapping or subsistence related activities only. Use of the cabin for any other purposes is prohibited and will result in revocation of the permit. The permittee must notify the Refuge Manager of any proposed or ongoing changes in use or in cabin users.
- This permit is not marketable or transferable and is subject to renewal five years from the date of issuance.
- The permittee acknowledges that he/she has no interest in the real property on which the cabin(s) and related structures are located. The granting of this permit in no way implies that the permittee has exclusive use of the site or lands covered by the permit, or of local resources.
- The permittee agrees to vacate the cabin(s) and related structures within one year of non-renewal or revocation of this permit, and will leave the surrounding grounds in a neat, clean and orderly condition. If the permittee fails to remove all such personal property within one year, the permittee will be liable for the cost of its removal and the restoration of the site.
- The permittee will take no intentional action that interferes with subsistence activities of rural users or restricts the reasonable access of subsistence users to refuge lands. This may include, but is not limited to, disturbance of wildlife and their movements near subsistence hunters, and damage to cabins, trails, traditional campsites or caches used by subsistence users. To minimize the potential for conflicts with subsistence users, the permittee must review the Koyukuk/Nowitna Refuge land status maps (available from the Galena office) to ascertain the location of selected and conveyed land within the Refuge boundaries.
- A valid copy of the issued special use permit, signed by the Refuge Manager or designee, must be in the permittee's possession at all times while exercising the privileges of the permit.

NEPA Compliance for Refuge Use Decision:

- Categorical Exclusion without Environmental Action Memorandum
- Categorical Exclusions and Environmental Action Memorandum
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

Compatibility Determination

Use: Subsistence Harvest of House Logs

Primary Use: Construction of homes or outlying cabins

Supporting and Incidental Uses: Boating (motorized and non-motorized), snowmobiling, camping, and firewood cutting.

Refuge Name: Koyukuk and Northern Unit of Innoko/Nowitna National Wildlife Refuge

Establishment and Acquisition Authority:

Koyukuk/Nowitna National Wildlife Refuge was established on December 2, 1980, when Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). It includes Koyukuk National Wildlife Refuge, Nowitna National Wildlife Refuge, and the Northern Unit of Innoko National Wildlife Refuge.

Refuge Purposes:

Section 302(5) (B) of ANILCA states purposes for which the Koyukuk Refuge was established and shall be managed include (purposes ii–iv are the same for all three refuges):

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl and other migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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 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.

[Koyukuk Wilderness] to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to administer for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as wilderness.

Section 302(3) (B) of ANILCA states purposes for which the Innoko 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 waterfowl, peregrine falcons, other migratory birds, black bears, moose, furbearers, and other mammals and salmon;

Section 302(6) (B) of ANILCA states purposes for which the Nowitna 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 trumpeter swans, white-fronted geese, canvasbacks and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free-flowing condition, its water quality, wildlife, geology, and primitive setting.

National Wildlife Refuge System Mission:

The mission of the 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 subsistence house log cutting as a use of Koyukuk/Nowitna Refuge. Subsistence log cutting was originally found to be compatible in the Refuge Comprehensive Conservation Plans (1987) and was again determined to be compatible in 1992. Associated uses include hunting, fishing, trapping, firewood gathering, berry picking, and gathering of other plant materials while harvesting trees for house building. These uses also include motorboat access and other means of surface transportation traditionally employed for such subsistence purposes, as allowed under ANILCA section 811. According to 50 CFR, 36.15, “Notwithstanding any other provision of this part, the noncommercial cutting of live standing timber by local rural residents for appropriate subsistence uses, such as firewood or house logs, may be permitted in Alaska National Wildlife Refuges as follows: For live standing timber greater than six inches diameter at breast height (4 ½ feet above ground level), the refuge manager may allow cutting in accordance with the specifications of a special use permit if such cutting is determined to be compatible with the purposes for which the refuge was established.”

Residents of the eight communities within or near the refuge boundary have lifestyles and economies that depend on subsistence resources. Subsistence activities described here focus primarily on cutting house logs greater than six inches diameter at breast height for local cabin construction, and firewood collecting that may be associated with the logging. The Refuge has some historical data on the number of house logs or intensity of harvest for subsistence prior to or shortly after refuge establishment. Permits issued early in the history of the Refuge did not assign specific cutting areas. Refuge staff members have issued house log cutting permits since the Refuge was established. Most of the permits were to cut logs for personal residences in Galena. A few permits were issued for logging on refuge lands near private Native allotments where the permittee intended to build a subsistence cabin. Most permits were for 40–100 logs. Occasionally, materials not suitable for house logs are salvaged for use as firewood. Each permit application is evaluated on its own merits prior to approval.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage subsistence house log harvest activities at existing and projected levels. Management primarily includes surveys conducted specifically for the management of house logs and firewood collecting. Surveys will be conducted from the air and from motor boats and will be used to determine where adequate stands of large white spruce occur and how many trees can be removed while allowing sustainability of riparian spruce stands. It is anticipated that management of these permits will require no longer than one week of staff time annually.

Anticipated Impacts of the Use:

White spruce is the favored timber species for logging. It occurs throughout central Alaska on well drained floodplain soils, uplands, and south facing slopes where seasonal thaw is deep. Most white spruce stands in floodplains and on uplands consist of trees 40–50 feet tall and 8–16 inches in diameter. Exceptional trees with diameters of 24–36 inches at breast height and 100 feet tall occur on floodplain islands that have not been burned for a long time. A study aimed at examining sustainability of white spruce logging was conducted on the Nowitna Refuge, where Lambrecht (2004) estimated a sustainable harvest of one house log per 2.5 acres per year in ideal riparian white spruce habitat on islands along the Yukon River. Current permits assign cutting areas, and staff conducts follow-up site visits to examine cutting intensity. If cutting intensity increases, refuge staff will make an effort to determine sustainable harvest levels and regeneration time for riparian white spruce.

Impacts to habitat caused by supporting boats, snowmobiles, and foot travel are generally believed to be minimal. Much of the access by subsistence users is by boat (spring and summer) or snowmobile (winter) during adequate snow cover. Impacts to the wild character of the Refuge will be minimized through special conditions limiting the number of trees that can be taken within 10 feet of river banks. The introduction of invasive plant species, perhaps from seeds carried on boats, snowmobiles, or dog sleds, could affect refuge resources, although it is not known to have occurred on the Koyukuk/Nowitna Refuge to date. Logging sites may be particularly vulnerable to establishment of non-native, noxious weeds if the ground is disturbed. Refuge staff will be vigilant to prevent such introductions.

Public Review and Comment:

Public comment was solicited concurrently with the revision of the Refuge's Comprehensive Conservation Plan.

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 some house log cutting. Site-specific special use conditions related to maintenance of defensible space will be incorporated into permits on a case-by-case basis. Following are typical special use permit stipulations, some of which are necessary for compatibility.

Continuing monitoring of permittees will be carried out to ensure compliance with the following conditions, which are incorporated into permits in order to minimize impacts on lands and resources within the Refuge. These stipulations will be updated to comply with the FONSI for the final revised Koyukuk/Nowitna National Wildlife Refuge Comprehensive Conservation Plan.

Regional Standard 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 (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 Code of Federal Regulations 36.41.
- The permittee is responsible for ensuring that all employees, party members, contractors, aircraft pilots, and any other persons working for the permittee and conducting activities allowed by this permit are familiar with and adhere to the conditions of 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.
- This permit does not grant the permittee and his/her employees exclusive use of the site(s) or lands covered by the permit.
- This permit may be canceled or revised at any time by the Refuge Manager in case of emergency (e.g. high fire danger, flooding, unusual resource problems, etc.).
- The permittee 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.
- The permittee shall provide the Refuge Manager with a report including the number of trees harvested, estimate of size (length & diameter) of logs and which area(s) logs were harvested from) under this permit within 30 days of permit expiration.
- 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.
- Permittees 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 permittee must be removed from refuge lands upon completion of permitted activities.
- The construction of landing strips or pads is prohibited. Incidental hand removal of rocks and other minor obstructions may be permitted.
- The use of off-road vehicles (except snowmobiles with adequate snow cover) is prohibited unless specifically authorized in writing in this permit.
- Fuel caches are allowed only in designated areas and must be approved by the Refuge Manager or his designate prior to caches being established. If caches are established, fuel containers must be clearly marked with the permittee's name, address, local contact telephone number and type of fuel.
- Construction of cabins or other permanent structures is prohibited.
- This permit authorizes use on State selected lands. If any of these lands are conveyed during the term of this permit, the permittee will no longer be authorized to use those lands until and unless permission is obtained from the Alaska Department of Natural Resources.

- This permit authorizes use only on the Native selected lands specifically identified in the description block of this permit. If any of these Native selected lands are conveyed during the term of this permit, the permittee will no longer be authorized to use those lands unless permission is obtained from the Native corporation to which land ownership has been conveyed.
- 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. Examples of prohibited acts include, but are not limited to: 1) intentional low flights over camps or persons at less than 500 feet, except when necessary for take off and landing, 2) parking aircraft or placing other objects (rocks, tents, etc.) on any landable area so as to restrict use by other aircraft, 3) otherwise intentionally interfering in the activity of other refuge users, and 4) engaging in activity which is contrary to State and Federal laws.

Refuge Special Conditions

- All garbage and non-combustible debris will be removed from the refuge. Food, garbage, other materials will be stored so as not to attract bears and other wildlife.
- Collection of logs is limited to permitted area.
- The permit authorizes the harvest of logs only for permittee's personal use for construction of subsistence cabins and houses. Harvest of logs for commercial use is prohibited.
- The permittee is not authorized to clear cut or group harvest an area, and is required to follow selective cutting procedures when harvesting trees (e.g. after harvesting one tree the next tree harvested must be a minimum of 100 feet away from a previously cut tree). This 100 feet restriction does not apply to trees that are ready to fall in the river ("leaners"). Trees should be cut no closer than 10 feet from the river banks, although "leaners" may be cut if desired.
- The permittee is required to lop and scatter all slash (i.e. all branches must be cut off the bole, with the remaining bole cut every four feet). Cut limbs may not be concentrated on the site – all tree harvest debris must be scattered to avoid fuel accumulations and eliminate potential spruce bark beetle habitat.
- The permittee is required to utilize as much of the harvested tree as possible.

Justification:

One of the purposes of Koyukuk/Nowitna Refuge is to provide for continued subsistence uses by local residents, consistent with the other refuge purposes of conserving fish and wildlife populations and habitats in their natural diversity and fulfilling international treaty obligations with respect to fish and wildlife. ANILCA recognized that the continued opportunity for subsistence uses of public lands is critical to the physical, economic, traditional, social, and cultural existence of rural residents of Alaska. 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. Previous studies on a nearby refuge estimated the allowable sustainable cut for house logs. Our management of log cutting permits on Koyukuk/Nowitna Refuge will strive to allow cutting at sustainable rates. Section 811 of ANILCA ensures that subsistence users can access public lands by snowmobile, motorboat, and other traditionally used means of transportation, subject to reasonable regulation. After fully considering the impacts of these activities, as described previously in the "Anticipated Impacts" section of this document, it is my determination that subsistence house-log gathering within the refuge does not materially interfere with or detract from the purposes of the Refuge or mission of the National Wildlife Refuge System.

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: Koyukuk and Northern Unit of Innoko/Nowitna National Wildlife Refuge

Establishment and Acquisition Authority:

Koyukuk/Nowitna National Wildlife Refuge was established on December 2, 1980, when Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). It includes Koyukuk National Wildlife Refuge, Nowitna National Wildlife Refuge, and the Northern Unit of Innoko National Wildlife Refuge.

Refuge Purposes:

Section 302(5) (B) of ANILCA states purposes for which the Koyukuk Refuge was established and shall be managed include (purposes ii–iv are the same for all three refuges):

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl and other migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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 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.

[Koyukuk Wilderness] to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to administer for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as wilderness.

Section 302(3) (B) of ANILCA states purposes for which the Innoko 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 waterfowl, peregrine falcons, other migratory birds, black bears, moose, furbearers, and other mammals and salmon;

Section 302(6) (B) of ANILCA states purposes for which the Nowitna 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 trumpeter swans, white-fronted geese, canvasbacks

and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free-flowing condition, its water quality, wildlife, geology, and primitive setting.

National Wildlife Refuge System Mission:

The mission of the 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 furbearer trapping as a use of Koyukuk/Nowitna Refuge. Trapping was originally found to be a compatible use during preparation of the refuge Comprehensive Conservation Plans in 1987. Trapping was again determined to be compatible, subject to reasonable regulation in 1992. Wolves, fox, beaver, marten, lynx, snowshoe hares, wolverine, ermine, and river otters are regularly trapped on Koyukuk/Nowitna Refuge. Trapping occurs during winter on the refuge in accordance with State of Alaska trapping regulations and seasons (5 AAC). Trapping activity on the Refuge has generally been decreasing since the 1980s. Access to trapping areas is primarily by snowmachine. Currently, only a small number of traplines are active. By tradition, each trapline tends to be used by a particular family or clan in a village; different traplines are usually separated by several miles and respected locally as exclusive trapping use areas. Most trapping activities can be characterized as an extension of subsistence because much of the fur harvest is used for clothing including hats, parka ruffs, and gloves. Income and products from trapping add to the self sufficiency of people living in remote regions of Alaska.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage trapping on Koyukuk/Nowitna Refuge. A few days of staff time are required annually to survey and map traplines, review harvest estimates, and consider the occasional application for related permits (e.g., trapping cabin permits).

Anticipated Impacts of the Use:

No long-term adverse impacts on wildlife populations or other refuge resources are likely to occur due to continuation of trapping on the Refuge. State trapping regulations are established to ensure healthy, sustainable furbearer populations. These regulations also provide potential for income from a renewable natural resource that supports local subsistence. Trapping can be an integral part of furbearer studies whenever biologists have sufficient funding to conduct trapper interviews and occasionally purchase large numbers of carcasses to determine population parameters such as productivity and reproductive history. Intensity of harvest and density of traplines on the Refuge is very low, and overall trapping pressure has declined since the 1980s. Therefore, except for the occasional harvest of non-targeted animals, trapping has little impact on the Refuge. Diminishing trapping activity seems to have been the result of low fur prices, high energy prices and increasing number of people leaving the village for seasonal jobs outside of the area. Refuge staff will monitor harvest to the extent possible and attempt to determine trends

through field observations and trapper interviews. If population concerns manifest, the Service will become engaged in review of the appropriate State of Alaska trapping regulations. The Refuge will also be engaged in field enforcement of trapping regulations.

Public Review and Comment:

Public comment was solicited concurrently with revision of the Refuge's Comprehensive Conservation Plan.

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 is a long-established use of the Refuge. The State of Alaska manages harvest of furbearers to ensure their long-term sustainability. Most trapping occurs at the time of year when there are few visitors on the Refuge. The majority of trapping effort on the Refuge may be characterized as an extension of local subsistence activities. The current level of trapping, or even an increase in trapping activities, would most likely have a negligible effect on the resources of Koyukuk/Nowitna Refuge. 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:

U.S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement and Wilderness Review for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges. U. S. Fish and Wildlife Service, Anchorage, Alaska.

U.S. Fish and Wildlife Service. 1987. Final Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan for the Nowitna National Wildlife Refuge. U. S. Fish and Wildlife Service, Anchorage, Alaska.

U.S. Fish and Wildlife Service. 2008. Draft Revised Comprehensive Conservation Plan and Environmental Assessment for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges. U. S. Fish and Wildlife Service, Anchorage, Alaska.

Refuge Determination:

Refuge Manager/
Project Leader Approval: _____ /signed/ Kenton Moos 4/17/2009
(Signature) (Date)

Concurrence:

Regional Chief
National Wildlife
Refuge System: _____ /signed/ Todd Logan 4/17/2009
(Signature) (Date)

Mandatory 10-year Re-Evaluation Date (for allowed uses only): 2019

NEPA Compliance for Refuge Use Decision:

- _____ Categorical Exclusion without Environmental Action Memorandum
- _____ Categorical Exclusions and Environmental Action Memorandum
- Environmental Assessment and Finding of No Significant Impact
- _____ Environmental Impact Statement and Record of Decision

Compatibility Determination

Use: Wildlife Observation, Wildlife Photography, Environmental Education, and Interpretation

Primary Uses: Environmental education (education of teachers, group leaders or students), interpretation, wildlife photography and videography, and wildlife observation

Supporting and Incidental Uses: Boating (motorized and non-motorized), fixed-wing aircraft landings, fishing, hunting, trapping, natural resource gathering, camping, cross-country skiing, dog sledding and skijoring, snowmobiling, hiking and backpacking, firewood cutting, picnicking, pets, snowshoeing, swimming, and beach use.

Refuge Name: Koyukuk and Northern Unit of Innoko/Nowitna National Wildlife Refuge

Establishment and Acquisition Authority:

Koyukuk/Nowitna National Wildlife Refuge was established on December 2, 1980, when Congress passed the Alaska National Interest Lands Conservation Act (ANILCA). It includes Koyukuk National Wildlife Refuge, Nowitna National Wildlife Refuge, and the Northern Unit of Innoko National Wildlife Refuge.

Refuge Purposes:

Section 302(5) (B) of ANILCA states purposes for which the Koyukuk Refuge was established and shall be managed include (purposes ii–iv are the same for all three refuges):

- (i) to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to waterfowl and other migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic caribou herd), furbearers, and salmon;
- (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 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.

[Koyukuk Wilderness] to secure an enduring resource of wilderness, to protect and preserve the wilderness character of the area as part of the National Wilderness Preservation System, and to administer for the use and enjoyment of the American people in a way that will leave it unimpaired for future use and enjoyment as wilderness.

Section 302(3) (B) of ANILCA states purposes for which the Innoko 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 waterfowl, peregrine falcons, other migratory birds, black bears, moose, furbearers, and other mammals and salmon;

Section 302(6) (B) of ANILCA states purposes for which the Nowitna 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 trumpeter swans, white-fronted geese, canvasbacks and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free-flowing condition, its water quality, wildlife, geology, and primitive setting.

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 wildlife-dependent activities: wildlife observation, wildlife photography and videography, environmental education, and interpretation. These uses were found to be compatible under the original Refuge Comprehensive Conservation Plans in 1987 and were again determined to be compatible in 1992. While some visitors come to the Refuge specifically to engage in one or more of these non-consumptive activities, many visitors also include these activities as part of a refuge hunting or fishing trip. Compatibility of hunting and fishing is evaluated separately. Associated activities such as camping, backpacking, hiking, boating, and other incidental uses are considered part of these wildlife-dependent activities for the purposes of this evaluation. Of these priority public uses, wildlife observation and photography are by far the most widespread.

Interpretive and educational efforts occur primarily in the eight communities located within or near the Refuge rather than on the Refuge because of the lack of developed visitor facilities and difficult access to the Refuge itself. Limited, informal interpretive and environmental education services are provided during contacts with visitors on the refuge by staff on routine patrol.

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. Recreational settings on the Refuge are remote. Typical forms of access for all areas of the Refuge include fixed-wing airplanes, motorboats, non-motorized boats, hiking, snowshoeing, snowmobiles, cross-country skiing, and other non-motorized means. However, most non-local visitors access the Refuge by commercial air taxis from Fairbanks and Galena. Private boats and airplanes are the most common means of access for local visitors or the relatively few visitors not using commercial transporters. 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 periods of several days and is often associated with hunting activities. Campers use tents ranging from small backpacking tents to larger multi-person tents.

People can visit the refuges year-round, but most come to hunt, fish or conduct subsistence activities during the warmer months. Use is concentrated in areas that are accessible to rivers or larger lakes. These areas generally provide reliable opportunities for wildlife observation, especially along major rivers including the Yukon, Koyukuk, Nowitna, and smaller tributaries of these rivers.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage these wildlife-dependent recreational activities. Administrative staff time primarily involves phone conversations, written correspondence, public use surveys, and interaction with visitors at the visitor center. Staff time will also be involved with any subsequent step-down planning (public use management) or for 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 to improve understanding of local residents' subsistence activities and awareness of private inholdings and property. Outreach efforts at local villages emphasize "leave no trace" camping and hiking practices.

For commercial videography, administrative staff time would primarily involve issuing permits and recording activity data. Field work associated with administering the program would primarily involve monitoring permittees' compliance with the terms of the permits. Estimated staff time to annually administer and monitor these permits is less than one week.

Anticipated Impacts of the Uses:

Adverse impacts to refuge wildlife and habitats associated with these priority public uses and associated uses are evaluated in the environmental assessment for the draft revised Koyukuk/Nowitna Refuge Comprehensive Conservation Plan. 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, on airplane floats, or in snowmobile sleds or dog sleds, could affect refuge resources, although limited or no known invasive species introductions are known to have occurred on the 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 comment was solicited concurrently with the revision of the Refuge's Comprehensive Conservation Plan.

Refuge Determination (check one below):

- Use is Not Compatible
 Use is Compatible with the Following Stipulations

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 fee may be required. News gathering organizations are exempt from fee, insurance, and bonding requirements but may require a special use permit to ensure compatibility with refuge purposes, public use, ongoing research, or to protect refuge resources.

Justification:

All refuge lands in the Koyukuk/Nowitna Refuge are open to public access unless specifically closed. The proposed uses represent four of the six priority public uses identified in the National

Appendix E

Predator Management

This document outlines the U.S. Fish and Wildlife Service - Alaska Region's current understanding of the policy and process required to undertake a predator management program on the Koyukuk and Northern Unit Innoko/Nowitna Refuge.

The U.S. Fish and Wildlife Service (Service) is responsible for managing national wildlife refuges. As the responsible land manager for these refuges, the Service acknowledges that wolves and bears can significantly affect prey population levels. The Service considers predator management a legitimate conservation tool when applied in a prudent and ecologically sound manner and when other alternatives are not practical. When predator management proposals or actions are in conformance with laws, regulations, and agency policies that govern management of national wildlife refuges, they would be considered by the Service. (See sections 1.8 and 2.4.11.7 for further discussion.)

The lower number of moose in some areas and relative abundance of wolves was raised as an issue (see section 1.8.1) in scoping meetings for the revision of this Comprehensive Conservation Plan. In response to this issue, we have decided to use this appendix to describe the process necessary to consider individual predator management proposals. This would most likely be conducted in a subsequent detailed step-down plan and environmental analysis. We would consider guidelines prescribed by the legal and biological context to describe how such a step-down plan and environmental analysis could analyze a predator management proposal and what questions would likely need to be answered prior to authorizing a predator management program on a national wildlife refuge.

The Alaska Department of Fish and Game (ADF&G) is recognized as the agency with the primary responsibility to manage fish and resident wildlife populations within the state of Alaska (State), including refuges, unless that management is superseded by federal law. ADF&G has developed specific processes regarding the implementation of predator management programs. Any proposals for a predator management program would be evaluated in cooperation with ADF&G to ensure that they are in substantial agreement with State wildlife management plans, unless they are formally determined to be incompatible with the purposes of the Refuge.

The Legal Context: The principal federal statutes affecting the management of predators and their prey on refuges are the Alaska National Interest Lands Conservation Act (ANILCA); the National Wildlife Refuge System Administration Act, as amended by the National Wildlife Refuge System Improvement Act of 1997, (Refuge Administration Act); and the National Environmental Policy Act (NEPA). The Service follows the regulations and policies which implement those laws. Key provisions of these laws that pertain to refuge decisions on predator management follow:

1. ANILCA established the Koyukuk and Northern Unit Innoko/Nowitna National Wildlife Refuge (Refuge) and set forth the primary purposes for which it was established. One purpose is “to conserve fish and wildlife populations and habitats in their natural diversity...” Another is to provide, “in a manner consistent with” the conservation of wildlife populations in their natural diversity, “the opportunity for continued subsistence uses by local residents.” These purposes are described in section 1.4.1.

2. Refuge Administration Act mandates that, in administering the National Wildlife Refuge System (System) and the purposes of each refuge, the Service shall “provide for the conservation of fish, wildlife, and plants, and their habitats” and “ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations of Americans.” Both the National Wildlife

Refuge System Improvement Act and ANILCA require refuge uses to be compatible with their purposes. The National Wildlife Refuge System Improvement Act does not diminish the authority, jurisdiction, or responsibility of the states to manage, control, or regulate fish and resident wildlife under state law.

In 2001, to implement provisions of the Refuge Administration Act, the Service established the Biological Integrity, Diversity, and Environmental Health Policy to describe the relationships among refuge purposes, the mission of the national wildlife refuge system (System), biological integrity, diversity and environmental health of refuge resources, and resolution of the conflicts among them. Biological integrity is defined as the biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities (601 FW 3.6B). The policy provides guidance on maintaining these elements of diversity and on restoring lost or degraded elements of integrity, diversity, and environmental health at the refuge scale and other appropriate landscape scales where it is feasible and supports the achievement of refuge purposes and the System mission (601 FW 3.7D). Under this policy, the Service favors management that restores or mimics natural ecosystem processes or functions to achieve refuge purposes (601 FW 3.7E).

Wildlife populations, including predators and prey, are to be managed for natural densities and levels of variation using historical conditions as the frame of reference. Information on historic sources may be historical, archaeological, oral histories, or other. Historical information can include the written and, in some cases, the pictographic accounts of Native Americans, explorers, surveyors, traders, and early settlers. Archaeological information comes from collections of cultural artifacts maintained by scientific institutions. We may obtain other data from a range of sources, including interviews, research, soil sediments, and tree rings (601 FW3.13 A).

The Biological Integrity, Diversity, and Environmental Health Policy requires that refuge managers:

- A) Identify the refuge's purpose(s), legislative responsibilities, and roles within the ecosystem and the System mission.
- B) Assess the current status of biological integrity, diversity, and environmental health on the refuge through baseline surveys and studies.
- C) Assess historic conditions and compare them to the current conditions. This will provide benchmarks to evaluate the relative intactness of ecosystem functions and processes. This assessment should include the opportunities and limitations to maintaining and restoring biological integrity, diversity, and environmental health.
- D) Consider the refuge's importance to refuge, ecosystem, national, and international landscape scales of biological integrity, diversity, and environmental health.
- E) Consider the relationships among refuge purposes and biological integrity, diversity, and environmental health, and resolve conflicts among them.
- F). Through the comprehensive conservation planning process, interim management planning, or compatibility reviews, determine the appropriate

management direction to maintain and, where appropriate, restore biological integrity, diversity, and environmental health, while achieving refuge purposes(s).

- G). Evaluate the effectiveness of our management by comparing results to desired outcomes. If the results of our management strategies are unsatisfactory, assess the causes of failure and adapt our strategies accordingly.

3. National Environmental Policy Act (NEPA)

Predator management of wolves and/or bears on national wildlife refuges is an action subject to National Environmental Policy Act (NEPA) requirements, which could require preparation of an environmental assessment (EA) or an environmental impact statement (EIS). As part of NEPA compliance, the Service would evaluate predator management in a legal context, such as conformity with the purposes of the Refuge, the Refuge Administration Act, and the Service's Biological Integrity, Diversity, and Environmental Health Policy. NEPA and other laws, regulations, and policies would require a comprehensive analysis and public involvement process prior to implementing any predator management program. Additionally, as part of the NEPA process and documentation, we would evaluate the effects of proposed predator management actions on subsistence uses and needs as required by section 810 of ANILCA.

The Biological Context: When considering a request/proposal for predator control on National Wildlife Refuges in Alaska, the following areas have to be addressed:

The refuge manager is the primary Service representative who determines whether a proposed predator management program is consistent with the refuge purposes and the Biological Integrity, Diversity, and Environmental Health Policy, and other laws, regulations and policies. As described in the following text, the refuge manager would need to assess the status of predator and prey populations and their habitats in relation to their historical abundance and fluctuations. A thorough evaluation must be given to substantiate the intended benefits of any predator management efforts. Alternatives to direct control must be evaluated as a practical means of achieving management objectives. Where there is insufficient predator, prey, or habitat information to make such an assessment, population surveys or other biological studies will be needed. The Refuge is presently conducting some of these studies. The need for additional studies and availability of funds for such work will be assessed by the refuge manager.

The Service favors management that relies on natural ecosystem processes or functions to achieve refuge purposes. If prey densities are determined to be significantly reduced below historical levels as a result of predation (not including human harvest), and reduction of predators would be reasonably expected to benefit prey abundance, active management may be authorized. The Refuge would need to evaluate whether habitat conditions have been or would be a limiting factor on prey populations before implementing any active management to reduce predator populations. The Refuge would coordinate with ADF&G to determine how a predator management program on the Refuge would affect current or future wildlife management plans in the region. The Refuge would also consider the following questions, among others, to analyze a predator management proposal:

- What roles do the subject predator and prey have in contributing to the natural diversity of the Refuge? Are human influences, including landscape level changes such as global warming, altering that diversity? Are there other Refuge purposes to consider?
- What are historical levels of predator and prey populations? Historic conditions are defined as the “composition, structure, and functioning of ecosystems resulting from natural processes that... were present prior to substantial human related changes to the landscape.” In many parts of Alaska, there is less than 100 years of information available for analysis of historical levels.
- What role will humans continue to play in a functioning landscape?
- Are habitat conditions significant in limiting prey abundance regardless of predator levels? Lack of cover, nutritional value of forage during key seasons, and abundance of trails favoring access by predators are examples of habitat conditions that could be significant for a season or a vulnerable prey age class. Assessing carrying capacity of a habitat is a daunting endeavor and may not be necessary. However, if a particular age and/or gender class of prey is considered most important to population recovery, habitat conditions affecting that age and/or gender class could be examined.
- Does the Refuge provide habitat of regional, national, or international significance for threatened, endangered, or other species of concern? Would predator management help in recovering these populations?

Requests received by the Service, from Regional Advisory Councils (RAC) and subsistence users, for predator management on refuges assert that predation has reduced prey populations to the extent that it is difficult for subsistence users to provide for the nutritional and cultural needs of themselves and their families. Some RAC contend that meaningful subsistence harvests of moose and caribou from refuge lands are not being provided, and therefore, the refuge purpose of providing for continued opportunities for subsistence uses justifies predator management. As previously stated, for a predator management program to be authorized on a refuge, it would need to provide in a manner consistent with purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents and be consistent with the conservation of predators and prey in their natural diversity. Predators will not intentionally be reduced below a level consistent with the low-end of natural population cycles. The Service would not reduce predator populations solely to provide larger populations of prey species for hunters. To assess the issue of human impact on prey populations, the Refuge will likely consider the following questions.

- How does harvest by humans affect the prey population? Have levels of harvest, and their effects on the prey population, changed over time? Does this target specific age and/or gender classes to the detriment of the population?
- Have reductions in harvest by humans been attempted? Did the prey population respond?
- Have there been significant changes in local harvest of predators?

Implementation: Once a determination and assessment is completed and a predator management program is initiated, associated actions and efforts would be monitored and evaluated by the Service and adjustments made as appropriate to meet program

objectives. If the Service were to authorize predator management programs on the Refuge, it would either conduct the effort itself or cooperate with the State or private citizens as their agent(s). In either case, the action would be considered a refuge management activity and not subject to a compatibility determination.

Appendix F
RS 2477 Rights-of-Way

RS 2477 Rights-of-Way identified by the State of Alaska

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 right-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 three routes on Koyukuk, Nowitna, and the Northern Unit of Innoko refuges it claims may be asserted as rights-of-way under RS 2477 (see descriptions below and Figures 3-1, 3-2, and 3-3 in chapter 3 for the location of these RS 2477 rights-of-way).

Koyukuk Refuge

RST #1888: "Hogatza Road" - The route originates at Hog River Landing on the north bank of the Koyukuk River; heads northeast, crossing Sixmile Pass; then west crossing First Creek and High Creek; then northeast, crossing Caribou, Moraine and Dry creeks; reaches Hogatza (on the south side of Bear Creek); continues northeast, crossing Wallick Creek; and terminates at a landing strip on Clear Creek. It was an early mining-access route. A mining camp was established at Hogatza in 1940; and in 1955, a mining company began constructing a corduroyed road from Hog River Landing to Hogatza. The route is approximately 28 miles long, only a small portion of which lies within the northern boundary of the Koyukuk.

Nowitna Refuge

RST #840: "Palisades Portage Trail" - The route originates on the south bank of the Yukon River across from Grant Creek; runs 4 miles south; then 15 miles west to meet the Yukon River near the Palisades. Documentation on files shows use of the route had occurred by 1952, and reservations along the route can be found in Public Land Order 4582. The route is approximately 19 miles long.

Near the Northern Boundary of the Nowitna Refuge lie:

RST #99: "Illinois Creek-Moran Creek Trail" (approximately 24 miles)

RST #287: "Ft. Gibbon-Kaltag Trail" (approximately 257 miles)

RST #837: "Grant Creek-Moran Dome Trail" (approximately 15 miles)

RST #1843: "Hudson Camp Trail" (approximately 13 miles)

RST #1844: "Little Melozitna Hot Springs Trail" (approximately 27 miles)

RST #1846: "Melozitna Hot Springs Trail" (approximately 16 miles)

RST #1849: "Horner Hot Springs Trail" (approximately 0.75 miles)

Northern Unit, Innoko Refuge

RST #161: "Nulato-Dishkaket Trail" - The route originates at Nulato; heads south paralleling the Yukon River until meeting the Kaltag-Dishkaket section of the Iditarod Trail; then heads east, following the Iditarod Trail to Dishkaket. This trail connects the Yukon River and the Iditarod Trail, and was also used as a mail trail connecting Nulato and Dishkaket. The route is approximately 90 miles long.

Appendix G
Trails and Easements for the Koyukuk and Northern Unit
Innoko/Nowitna National Wildlife Refuges

Easement ID # – Document in which it's reserved (Easement Quad)

Innoko National Wildlife Refuge Trails and Easements:

EIN:

20 C5 – no document number (Nulato B-5)

1aL – IC 716 (Nulato C-3)

14 C6 – (Nulato C-5)

Other Trails:

RST 161: Nulato-Dishkaket Trail – also known as DOT 97-152

Koyukuk National Wildlife Refuge Trails and Easements:

EIN:

8 C3, C5, D1 – 50-2006-0270 (Kateel River A-4)

10 C5 – 50-2006-0270 (Kateel River A-4)

7a C4 – 50-2001-0486 (Kateel River C-1)

14a C4 – 50-2001-0474 (Kateel River C-1)

14 C3, C4, C5, D9 – 50-2004-0486 (Kateel River C-1)

12 D9 – 50-2001-0486 (Kateel River C-1)

12a C4 – 50-2001-0486 (Kateel River C-1)

10a C4 – 50-2001-0486 (Kateel River C-2)

24a C4 – 50-2001-0486 (Kateel River C-2)

19a C4 – 50-2001-0486 (Kateel River D-1)

Other Trails:

DOT 108-108 (Kateel River C-1,2,3)

DOT 108-108A (Kateel River C-2)

Nowitna National Wildlife Refuge Trails and Easements:

EIN:

35 D1 – 50-2005-0047 (Ruby D-5)

8 L – IC 1346 (Melozitna A-2)

Other Trails:

DOT 98-219: Indian Winter Trail (Ruby A-3, B-4, C-3, 4, D-3)

RST 840: Palisades Portage Trail – also known as DOT 107-120A, 107-120, 106-120

Appendix H
Wildlife and Fish Species Found on the Refuge

H. Wildlife and Fish Species Found on the Refuge

Bird Species List

COMMON NAME	SCIENTIFIC NAME	BREED	NON-BREED MIGRANT-M Rare-R
Loons	<i>Gaviiformes</i>		
Pacific loon	<i>Gavia pacifica</i>	X	
Red-throated loon	<i>G. stellata</i>	X	
Common loon	<i>G. immer</i>	X	
Grebes	<i>Podicipediformes</i>		
Horned grebe	<i>Podiceps auritus</i>	X	
Red-necked grebe	<i>P. griseqena</i>	X	
Storm petrels	<i>Procellariiformes</i>		
Fork-tailed storm-petrel	<i>Oceanodroma furcata</i>		R
Waterfowl	<i>Anseriformes</i>		
Tundra swan	<i>Cygnus columbianus</i>	X	
Trumpeter swan	<i>Cygnus buccinator</i>		
Greater white-fronted goose	<i>Anser albifrons</i>	X	
Snow goose	<i>Chen caerulescens</i>		M
Brant	<i>Branta bernicla</i>		M
Canada goose	<i>B. canadensis taverneri</i>	X	
Green-winged teal	<i>Anas crecca</i>	X	
Mallard	<i>A. platyrhynchos</i>	X	
Northern pintail	<i>A. acuta</i>	X	
Blue-winged teal	<i>A. discors</i>		No records
Northern shoveler	<i>A. clypeata</i>	X	
Gadwall	<i>A. strepera</i>		No records
American wigeon	<i>A. americana</i>	X	
Canvasback	<i>Aythya valisineria</i>	X	
Redhead	<i>A. americana</i>	X	
Ring-necked duck	<i>A. collaris</i>	X	
Greater scaup	<i>A. marila</i>	X	
Lesser scaup	<i>A. affinis</i>	X	
Steller's eider	<i>Polysticta stelleri</i>		R
Harlequin duck	<i>Histrionicus histrionicus</i>	X	
Oldsquaw	<i>Histrionicus histrionicus</i>	X	
Black scoter	<i>Melanitta nigra</i>	X	
Surf scoter	<i>M. perspicillata</i>	X	
White-winged scoter	<i>M. fusca</i>	X	
Common goldeneye	<i>Bucephala clangula</i>	X	
Barrow's goldeneye	<i>B. islandica</i>	X	
Bufflehead	<i>B. albeola</i>	X	

Appendix H: Wildlife and Fish Species Found on the Refuge

COMMON NAME	SCIENTIFIC NAME	BREED	NON-BREED MIGRANT-M Rare-R
Common merganser	<i>Merqus merganser</i>		No breeding record
Red-breasted merganser	<i>M. serrator</i>	X	
Eagles, hawks, and falcons	Falconiformes		
Osprey	<i>Pandion haliaetus</i>	X	
Bald eagle	<i>Haliaeetus leucocephalus</i>	X	
Northern harrier	<i>Circus cyaneus</i>	X	
Sharp-shinned hawk	<i>Accipter striatus</i>	X	
Northern goshawk	<i>A. gentilis</i>	X	
Red-tailed hawk	<i>Buteo jamaicensis</i>	X	
Rough-legged hawk	<i>B. lagopus</i>		M
Golden eagle	<i>Aquila chrysaetos</i>	X	
Merlin	<i>F. columbarius</i>	X	
Peregrine falcon	<i>F. peregrinus</i>	X	
Gyrfalcon	<i>F. rusticolus</i>		M
Gallinaceous birds	Galliformes		
Spruce grouse	<i>Dendragapus canadensis</i>	X	
Willow ptarmigan	<i>Lagopus lagopus</i>	X	
Rock ptarmigan	<i>L. mutus</i>	X	
Ruffed grouse	<i>Bonasa umbellus</i>	X	
Sharp-tailed grouse	<i>Tympanuchus phasianellus</i>		R
Cranes	Gruiformes		
Sandhill crane	<i>Grus Canadensis</i>	X	
Shorebirds, Gulls	Charadriiformes		
Black-bellied plover	<i>Pluvialis squatarola</i>		M
Lesser golden plover	<i>P. dominica</i>	X	
Semipalmated plover	<i>Charadrius semipalmatus</i>	X	
Greater yellowlegs	<i>Tringa melanoleuce</i>	X	
Lesser yellowlegs	<i>T. flavipes</i>	X	
Solitary sandpiper	<i>T. solitaria</i>	X	
Wandering tattler	<i>Heteroscelus incanua</i>		M
Spotted sandpiper	<i>Actitis macularia</i>	X	
Upland sandpiper	<i>Bartramia longicauda</i>		M
Whimbrel	<i>Numenius phaeopus</i>	X	
Hudsonian godwit	<i>Limosa haemastica</i>	X	
Ruddy turnstone	<i>Arenaria interpres</i>		M
Black turnstone	<i>A. melanocephala</i>		R
Surfbird	<i>Aphriza vigrata</i>		No records ¹
Sanderling	<i>Calidris alba</i>		No records ¹
Semipalmated sandpiper	<i>C. pusilla</i>		M
Western sandpiper	<i>C mauri</i>		R

COMMON NAME	SCIENTIFIC NAME	BREED	NON-BREED MIGRANT-M Rare-R
Least sandpiper	<i>C minutilla</i>	X	
Baird's sandpiper	<i>C bairdii</i>		M
Pectoral sandpiper	<i>C. melanotos</i>		M
Buff-breasted sandpiper	<i>Tryngites subruficollis</i>		M
Long-billed dowitcher	<i>Limnodromus scolopaceus</i>		M
Common snipe	<i>Gallinago gallinago</i>	X	
Red-necked phalarope	<i>Phalaropus lobatus</i>	X	
Pomarine jaeger	<i>Stercorarius pomarinus</i>		R
Parasitic jaeger	<i>S parasiticus</i>		M
Long-tailed jaeger	<i>S longicaudus</i>	X	
Bonaparte's gull	<i>Larus philadelphia</i>	X	
Mew gull	<i>L. canus</i>	X	
Herring gull	<i>L. argentatus</i>	X	
Glaucous gull	<i>L. hyperboreus</i>	X	
Black-legged kittiwake	<i>Rissa tridactyla</i>		R
Ross' gull	<i>Rhodostethia rosea</i>		R
Sabine's gull	<i>Xema sabini</i>		M
Arctic tern	<i>Sterna paradisaea</i>	X	
Owls	Strigiformes		
Great horned owl	<i>Bubo virginianus</i>	X	
Snowy owl	<i>Nyctea scandiaca</i>		M
Northern hawk owl	<i>Surnia ulula</i>	X	
Great gray owl	<i>Strix nebulosa</i>	X	
Short-eared owl	<i>Asio flammeus</i>	X	
Boreal owl	<i>Aegolius funereus</i>	X	
Kingfishers	Coraciiformes		
Belted kingfisher	<i>Ceryle alcyon</i>	X	
Woodpeckers	Piciformes		
Downy woodpecker	<i>Picoides pubescens</i>	X	
Hairy woodpecker	<i>P. villosus</i>	X	
Three-toed woodpecker	<i>P tridactylus</i>	X	
Northern flicker	<i>Colaptes auratus</i>	X	
Passerine birds	Passeriformes		
Olive-sided flycatcher	<i>Contopus borealis</i>	X	
Western wood-pewee	<i>C sordidulus</i>		No records
Alder flycatcher	<i>Empidonax alnorum</i>	X	
Hammond's flycatcher	<i>E. hammondi</i>	X	
Say's phoebe	<i>Sayornis saya</i>		M
Horned lark	<i>Eremophila alpestris</i>	X	
Tree swallow	<i>Tachycineta bicolor</i>	X	

Appendix H: Wildlife and Fish Species Found on the Refuge

COMMON NAME	SCIENTIFIC NAME	BREED	NON-BREED MIGRANT-M Rare-R
Violet-green swallow	<i>T. thalassina</i>	X	
Bank swallow	<i>Riparia riparia</i>	X	
Cliff swallow	<i>Hirundo pyrrhonota</i>	X	
Barn swallow	<i>H rustica</i>		R
Gray jay	<i>Perisoreus canadensis</i>	X	
Common raven	<i>Corvus corax</i>	X	
Black-capped chickadee	<i>Parus atricapillus</i>	X	
Siberian tit	<i>P cinctus</i>		No breeding records
Boreal chickadee	<i>P hudsonicus</i>	X	
American dipper	<i>Cinclus mexicanus</i>		No records ¹
Arctic warbler	<i>Phylloscopus borealis</i>		No records ¹
Ruby-crowned kinglet	<i>Regulus calendula</i>	X	
Northern wheatear	<i>Oenanthe oenanthe</i>		M
Mountain bluebird	<i>Sialia currocoides</i>		R
Townsend's solitaire	<i>Myadestes townsendi</i>		No breeding records
Gray-cheeked thrush	<i>Catharus minimus</i>		
Swainson's thrush	<i>C ustulatus</i>	X	
American robin	<i>Turdus migratorius</i>	X	
Varied thrush	<i>Ixoreus naevius</i>	X	
Yellow wagtail	<i>Motacilla flava</i>		No records
American pipit	<i>anthus rubescens</i>	X	
Bohemian waxwing	<i>Bombycilla qarrulus</i>		No breeding record
Northern shrike	<i>Lanius excubitor</i>	X	
Orange-crowned warbler	<i>Vermivora celata</i>		
Yellow warbler	<i>Dendroica petechia</i>	X	
Yellow-rumped warbler	<i>D. coronata</i>	X	
Blackpol warbler	<i>D. striata</i>	X	
Northern waterthrush	<i>Seiurus noveboracensis</i>	X	
Wilson's warbler	<i>Wilsonia Pusilla</i>	X	
American tree sparrow	<i>Spizella arborea</i>	X	
Savannah sparrow	<i>Passerculus Sandwichensis</i>	X	
Fox sparrow	<i>Passerella iliaca</i>	X	
Lincoln's sparrow	<i>Melospiza lincolni</i>	X	
Golden-crowned sparrow	<i>Zonotrichia atricapilla</i>	X	
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	X	
Dark-eyed junco	<i>Junco hyemalis</i>	X	
Lapland longspur	<i>Calcarius lapponicus</i>		M

COMMON NAME	SCIENTIFIC NAME	BREED	NON-BREED MIGRANT-M Rare-R
Snow bunting	<i>Plectrophenax nivalis</i>		No breeding record
Rusty blackbird	<i>Euphagas carolinus</i>	X	
Pine grosbeak	<i>Pinicola enucleator</i>	X	
White-winged crossbill	<i>Loxia leucoptera</i>	X	
Common redpoll	<i>Carduelis flammea</i>	X	
Hoary redpoll	<i>C. hornemanni</i>	X	

¹Never sighted but thought to occur in or near the refuge

R = rare

M = Migrant

INSECTIVORA Soricidae	Arctic shrew <i>Sorex arcticus</i> Common/masked shrew <i>Sorex cinereus</i> Pygmy shrew <i>Sorex hoyi</i> Dusky shrew <i>Sorex monticolus</i> Tiny shrew <i>Sorex yukonicus</i>
CARNIVORA Canidae	Coyote <i>Canis latrans</i> Wolf <i>Canis lupus</i> Red fox <i>Vulpes vulpes</i>
Felidae	Lynx <i>Lynx canadensis</i>
Mustelidae	River otter <i>Lontra canadensis</i> Wolverine <i>Gulo gulo</i> Marten <i>Martes americana</i> Ermine/short-tailed weasel <i>Mustela erminea</i> Least weasel <i>Mustela nivalis</i> Mink <i>Mustela vison</i>
Ursidae	Black bear <i>Ursus americanus</i> Brown bear <i>Ursus arctos</i>
ARTIODACTLYA Cervidae	Moose <i>Alces alces</i> Caribou <i>Rangifer tarandus</i>
Bovidae	Muskox <i>Ovibos moschatus</i>
RODENTIA Sciuridae	Red squirrel <i>Tamiasciurus hudsonicus</i> Northern flying squirrel <i>Glaucomys sabrinus</i> Arctic ground squirrel <i>Spermophilus parryii</i> Alaska marmot <i>Mormota broweri</i>
Castoridae	Beaver <i>Castor canadensis</i>
Dipodidae	Meadow jumping mouse <i>Zapus hudsonius</i>

Appendix H: Wildlife and Fish Species Found on the Refuge

Muridae	Northern red-backed vole <i>Clethrionomys rutilus</i> Singing vole <i>Microtus miurus</i> Tundra vole <i>Microtus oeconomus</i> Meadow vole <i>Microtus pennsylvanicus</i> Yellow-cheek vole <i>Microtus xanthognathus</i> Muskrat <i>Ondatra zibethicus</i> Northern bog lemming <i>Synaptomys borealis</i> Brown lemming <i>Lemmus trimucronatus</i>
Erithizontidae	Porcupine <i>Erethizon dorsatum</i>
LAGOMORPHA	Snowshoe hare <i>Lepus americanus</i>
Leporidae	

PETROMYZONTIDAE	Arctic Lamprey <i>Lampetra japonica</i>
SALMONIDAE	Chum salmon <i>Oncorhynchus keta</i> Coho salmon <i>Oncorhynchus kisutch</i> Chinook salmon <i>Oncorhynchus tshawytscha</i> Sockeye salmon <i>Oncorhynchus nerka</i> Pink salmon <i>Oncorhynchus gorbuscha</i> Dolly Varden char <i>Salvelinus malma</i> Arctic grayling <i>Thymallus arcticus</i> Least cisco <i>Coregonus sardinella</i> Broad whitefish <i>Coregonus nasus</i> Humpback whitefish <i>Coregonus pidschian</i> Bering cisco <i>Coregonus lauretta</i> Round whitefish <i>Prosopium cylindraceum</i> Inconnu (sheefish) <i>Stenodus leucichthys</i>
OSMERIDAE	Pond smelt <i>Hypomesus olidus</i>
UMBRIDAE	Alaska blackfish <i>Dallia pectoralis</i>
ESOCIDAE	Northern pike <i>Esox lucius</i>
CYPRINIDAE	Lake chub <i>Couesius plumbeus</i>
CATASTOMIDAE	Longnose sucker <i>Catostomus catostomus</i>
PERSOPSIDAE	Trout-perch <i>Percopsis omiscomaycus</i>
GADIDAE	Burbot <i>Lota lota</i>
COTTIDAE	Slimy sculpin <i>Cottus cognatus</i>
GASTEROSTEIDAE	Ninespine stickleback <i>Pungitius pungitius</i>

Appendix I
Major Events in the History of the Refuge

I. Major Events in the History of the Refuge

Date	Events
1837	First European contact with the Koyukon people in their own area (Glazunov)
1838–1839	Smallpox epidemic kills many in Alaska, including most residents of the Nulato area
1839	Trading post established at Nulato (Malakhov)
1843	Yukon River explored as far as mouth of the Nowitna, and Koyukuk River as far as Kateel (Zagoskin)
1851	Nulato massacre
1865–1867	Western Union Telegraph parties explore this region of Yukon River
1867	U.S. purchase of Alaska from Russia; telegraph station built at Koyukuk
1868–1869	Fort Adams (American) trading post established at Tanana
1869	Nulato trading post reestablished by Americans but not continuously manned; Hakorcins (Kokrines) opens trading post at Fourteen Mile; first paddle wheelers on the Yukon River
1870–1873	Father Petitot and other Roman Catholic missionaries explore the Yukon River and baptize Indians at Nulato
1880	Trading posts established at Koyukuk and near Tanana
1883	Yukon River further explored (Schwatka); epidemic kills many Koyukon
1884–1885	Gold prospecting begins near Hughes and becomes intense in Upper Yukon Koyukon territory
1887	Intensive development of missions and education begin: Roman Catholic mission established at Nulato, Episcopal school and hospital begun in Tanana
1897	U.S. Post Office opened at Nulato; first steamboat ascends the Koyukuk River
1897–1906	Gold rushes bring several thousand prospectors to Koyukon territory; mineral interests continue to the present
1898	Koyukuk Post Office first operated
1899	U.S. Army post, Fort Gibbon, established near Tanana
1900	Steamboat traffic on the Koyukuk peaks with 46 boats in operation; measles epidemic at Nulato kills between 58 and 67 persons; epidemic survivors from the Kaltag area settle at Kaltag
1901	Washington-Alaska Military Cable and Telegraph (WAMCATS) construction begins (becomes operational in 1903)
1903	Kaltag Post Office open sporadically until permanent establishment in 1933
1907	First gold strike at Ruby
ca. 1910	Fish wheels are introduced and become popular on the Yukon River but not extensively used on the Koyukuk

Appendix I: Major Events in the History of the Refuge

Date	Events
1910	Hughes formally founded, serving as a supply port for nearby Indian River gold mines
1911	Gold strike south of Ruby begins a "gold rush" in the region
1912	Ruby Post Office established
1913	Ruby incorporated as a city
1918	Spanish flu pandemic strikes Alaska, killing thousands
1919	Lead prospectors arrive near Galena
1920s	Cutoff Trading Post established 4 miles overland from Huslia; school opens in Galena, and residents of Louden begin moving there
1922	Wireless radio transmitters installed along the Yukon River
1923	Fort Gibbon (at Tanana) closed
1925	Kaltag's first school opens
1929	Ruby fire burns 23 buildings on Front Street, destroying most of the Gold Rush waterfront district
1931	Ruby flood removes most remaining waterfront structures
1932	Post Office opens in Galena
1933	US Signal Corp Telegraph System replaced by commercial telegraph and radio
1939	Koyukuk school is established, and families begin living in the village year round
1941	Runway and hangar construction begin U.S. Air Force presence in Galena
1942	Hughes Post Office opens
1945	Major flood in Galena
1949	New hospital facilities built in Tanana; villagers move from Cutoff to higher ground at Huslia with school establishment the following year
1950s	Development of military facilities in and around Galena spur economic growth; Hughes airstrip built
1952	Huslia Post Office, airport, and roads are constructed
1956	Hughes school is built
1958	A 7.3 magnitude earthquake hits the Huslia region, creating pressure ridges, craters, cracks in ice and ground, and some structure damage
1959	Alaska enters statehood
1960s	Airport and clinic built at Kaltag
1960	Huslia clinic built
1963	Nulato incorporated as a city; hand-pumped water wells installed in Huslia
1968	Hughes clinic built
1969	Huslia, Kaltag incorporated as a cities

Date	Events
1970s	Nulato, Ruby receive clinic, water supply, new school
1971	Severe flood in Galena prompts development of "New Site" on higher ground away from the river; ANSCA establishes Native Corporations and land ownership
1973	Ruby, Hughes, Koyukuk incorporated as cities
1974	Local roads built in Hughes; running water and local plumbing brought to Huslia
1976	Settlement of "Molly Hootch" case brings secondary schools to each village
1980	Passage of ANILCA sets aside over 80 million acres in federal conservation units, including National Wildlife Refuges
1981	Community-wide electricity system developed in Hughes; new townsite/housing development begun in Nulato
1993	Galena Air Force Base enters "caretaker" status
1994	September flood on the Koyukuk River destroys many homes, community buildings, and food caches in Hughes; severe erosion at Koyukuk destroys several homes
2000	New airstrip constructed in Huslia
2006	Spring flood at Koyukuk damages 6 homes; construction to raise Koyukuk airstrip above flood plain completed
2008	Galena Air Force Base decommissioned

Appendix J
Step-Down Plans for the Koyukuk and Northern Unit
Innoko/Nowitna National Wildlife Refuges

J. Step-Down Plans for the Koyukuk and Northern Unit Innoko/Nowitna National Wildlife Refuges

Plan	Completion Date/Update
Inventory and Monitoring Plan (I&M)	Completed June 2008; updated every 5 years
Fisheries Management Plan	Completed 1993; updated 2008
Cultural Resource Management Guide	Completed 1995; updated 2008
Fire Management Plan	Completed 2005; updated every 5 years
(Fire) Media and Community Relations Guide	Completed 2006; updated as needed
Land Protection Plan	To be completed 2012
Station Safety Plan Occupant Emergency Evacuation Plan	Completed 2004; reviewed annually
Water Resources Inventory and Assessment: Plan of Study	To be completed 2012
Spill Prevention Control and Countermeasure Plan	No set date
Visitor Services Plan	To be completed when necessary
Wilderness Stewardship Plan	To be completed within one year of release of national wilderness guidelines
Wild River Management Plan	To be completed when necessary

**Appendix K
River Values**

K. River Values

Refuge	River name	Scenic	Recreation	Wildness	Geologic	Fish	Wildlife	Cultural	Historic	Prehistoric	Other	Qualifies
Koyukuk	Billy Hawk Creek			X		X	X		X			Yes
Koyukuk	Cottonwood Creek								Seasonal settlement			No
Koyukuk	Dakli River	X						Traditional hunting area for Huslia/Cutoff people				Yes
Koyukuk	Dulbi River	X			X		Major waterfowl breeding & molting, high moose density in lower section	Waterfowl hunting, moose hunting, & trapping	Trading post site at mouth, village sites, underground houses, graves			Yes
Koyukuk	Dulbi Slough						Major waterfowl breeding & molting		Former settlements			No
Koyukuk	Gisasa River	X				Chum & king spawning		Traditionally used as sinter trapping & hunting area by Koyukuk Village	Old village site at mouth			Yes
Koyukuk	Hogatza River	X	X	X		X	X		Hog River landing, historic buildings			Yes

Appendix K: River Values

Refuge	River name	Scenic	Recreation	Wildness	Geologic	Fish	Wildlife	Cultural	Historic	Prehistoric	Other	Qualifies
Koyukuk	Holtnakatna Creek								Trading site/settlement			No
Koyukuk	Huslia R. (N & S Fork, Billy Hawk Creek)											No
Koyukuk	Indian River											No
Koyukuk	Kateel River	X				Chum & king spawning			Old village site at mouth			Yes
Koyukuk	Koyukuk River	X		X		Habitat	Habitat		Several village sites, underground houses, graves	X		Yes
Koyukuk	Little Indian River								Trading place	Batza Tena		Yes
Koyukuk	Natlaratlin											No
Koyukuk	Nayuka River						Major waterfowl breeding & molting					No
Koyukuk	Nulitna	Drains Dunes		X								Yes
Northern Innoko	Bishop Creek		X			X	X			X		Yes

Refuge	River name	Scenic	Recreation	Wildness	Geologic	Fish	Wildlife	Cultural	Historic	Prehistoric	Other	Qualifies
Northern Innoko	Bonanza Creek								Former settlements, underground houses, graves			No
Northern Innoko	Eddy Creek											No
Northern Innoko	Gorton Creek								X			No
Northern Innoko	Green Water Creek											No
Northern Innoko	Kaiyuh Slough		X			X	Lots of beaver		Former settlements, underground houses, graves	X		Yes
Northern Innoko	Khotol River					Fish			Former settlements, underground houses, graves			Yes
Northern Innoko	North Creek											No
Northern Innoko	Soonkakat River								Former settlements, underground houses, graves			No
Northern Innoko	Squirrel Creek						Dense moose area	Traditional hunting, winter trapping area for Koyukuk Village				No

Appendix K: River Values

Refuge	River name	Scenic	Recreation	Wildness	Geologic	Fish	Wildlife	Cultural	Historic	Prehistoric	Other	Qualifies
Northern Innoko	Tsurotlurna Slough						High density of breeding ducks & geese		Former settlements, underground houses, graves			No
Northern Innoko	Wounded Cub Creek								X			No
Northern Innoko	Yukon Creek											No
Nowitna	Bering Creek											No
Nowitna	Big Creek											No
Nowitna	Big Mud River											No
Nowitna	Blind River											No
Nowitna	Deer Creek								Seasonal settlements			No
Nowitna	Grand Creek											No
Nowitna	Junekaket Creek								Seasonal settlements			No
Nowitna	Klatsuta River											No
Nowitna	Little Mud River											No
Nowitna	Our Creek											No
Nowitna	Sethkokna River	X				King spawning						Yes

Refuge	River name	Scenic	Recreation	Wildness	Geologic	Fish	Wildlife	Cultural	Historic	Prehistoric	Other	Qualifies
Nowitna	Sulatna River			X		Whitefish spawning						Yes
Nowitna	Sulukna River					Whitefish & sheefish spawning						Yes
Nowitna	Susulatna River											No
Nowitna	Titna River		Good float hunt									No
Nowitna	Yukon River	X	X	X	X	X	X		X	Palisades	Commercial transportation	Yes

Appendix L
Literature Cited

L. Literature Cited

- Adams, J. and T. McLain. 2007. Abundance and run timing of adult salmon in the Gisasa River, Koyukuk National Wildlife Refuge, Alaska, 2006. U.S. Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, Alaska Fisheries Data Series No. 2007-1. Fairbanks, AK.
- Alaska Department of Commerce, Community, and Economic Development. 2008. Yukon Koyukuk Census Area Profile [Internet]. [cited 2007 May]. Available from <http://almis.labor.state.ak.us/>
- Alaska Department of Fish and Game. 2006. Our wealth maintained: a strategy for conserving Alaska's diverse wildlife and fish resources. Juneau (AK): Alaska Department of Fish and Game. Juneau, Alaska.
- Alaska Department of Fish and Game. 2008. Moose harvest Data. Unpublished data obtained from Glenn Stout. Galena, Alaska.
- Alaska Interagency Wildland Fire Management Plan, Amended October 1998. Accessed at <http://forestry.alaska.gov/pdfs/98AIFMP.pdf>
- Alt, K.T. 1978. A life history and study of sheefish and whitefish in Alaska. Alaska Department of Fish and Game, Division of Sport Fish, Annual Performance Report, 1977-1978, Project F-9-10, Vol. 19, R-II, Juneau.
- Alt, K.T. 1983. Inventory and cataloging of sport fish and sport fish waters of western Alaska. Alaska Department of Fish and Game, Federal Aid in Fish Restoration Project F-9-15, Study G-1, Volume 24. Juneau, AK.
- Alt, K.T. 1985. Inventory and cataloging of sport fish and sport fish waters of western Alaska. Alaska Department of Fish and Game, Federal Aid in Fish Restoration Annual Report of Progress 1984-85, Project F-9-17, Study G-1, Volume 26. Juneau, AK.
- Andersen, D.B. and C.L. Fleener. 2001. Whitefish and beaver ecology of the Yukon Flats, Alaska. Alaska Department of Fish and Game, Division of Subsistence, Final Report No. FIS00-06. Fairbanks, Alaska. 74 pp.
- Andersen, D.B., C.L. Brown, R.J. Walker, and K. Elkin. 2004. Traditional ecological knowledge and contemporary subsistence harvest of non-salmon fish in the Koyukuk River drainage, Alaska. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 282. Fairbanks, AK

- Andersen, D.B. 2007. Local and traditional knowledge of whitefish in the upper Koyukuk River, Alaska. U.S. Fish and Wildlife Service, Office of Subsistence Management, Final Project Report No. FIS-04-269. Anchorage, AK.
- Banfield, A.W.F. 1974. The mammals of Canada. University of Toronto Press. Toronto, Ontario, Canada.
- Barnes, D.F. 1976. Bouger gravity map of Alaska: 1:2,500,00 scale. U.S. Geological Survey, Open-file Report 76-70.
- Barton, L.H. 1984. A catalog of Yukon River salmon spawning escapement survey. Alaska Department of Fish and Game, Commercial Fisheries Division, Technical Data Report 121. Juneau, AK.
- Bayha, K., S. Lyons, and M.L. Harle. 1997. "Strategic Plan for Water Resources Branch." WRB-97-1. Anchorage, Alaska: U.S. Department of the Interior, Fish & Wildlife Service, Division of Realty. 25 pp.
- Becker E.F., M.A. Spindler, and T.O. Osborne. 1998. A population estimator based on network sampling of tracks in the snow. *Journal of Wildlife Management* 62(3): 968-977.
- Boreal Partners in Flight. 2006. Conservation of Landbirds in Alaska: Priority Species for Conservation. http://www.absc.usgs.gov/research/bpif/priority_spp.html
- Boutin, S., C.J. Krebs, R. Boonstra, M.R.T. Dak, S.J. Hannon, K. Martin, A.R.E. Sinclair, J.N.M. Smith, R. Turkington, M. Blower, A. Byron, F.I. Doyle, C. Doyle, D. Hik, L. Hofer, T. Karels, D. L. Murray, V. Nams, M. O'Donohue, C. Rohner, and S. Schwieger. 1995. Population changes of the vertebrate community during a snowshoe hare cycle in Canada's boreal forest. *Oikos* 74:69-80.
- Brand, C.J., and L.B. Keith. 1979. Lynx demography during a snowshoe hare decline in Alberta. *Journal of Wildlife Management* 43:827-849.
- Brown, C., R. Walker, S. B. Vaneck. 2004. The 2002-2003 Harvest of Moose, Caribou, and Bear in Middle Yukon and Koyukuk River Communities, Alaska. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper Series No. 280.
- Brown, R.J. 2000. Migratory patterns of Yukon River inconnu as determined with otolith microchemistry and radio telemetry [dissertation]. Fairbanks (AK): University of Alaska.

- Brown, R.J. and C. Fleener. 2001. Beaver dam influence on fish distribution in lentic and lotic habitats in the Black River drainage, Alaska. Unpublished USFWS report, Fairbanks, Alaska. 42 pp.
- Brown, R.J., N. Bickford, and K. Severin. 2007. Otolith trace element chemistry as an indicator of anadromy in Yukon River drainage Coregonine fishes. *Transactions of the American Fisheries Society* 136:678-690.
- Brown, R. 2008. Conversation between Randy Brown, Biologist, Fairbanks Fish and Wildlife Service Field Office and Robert Lambrecht, Koyukuk NWR Natural Resource Planner about sheefish spawning areas on the Koyukuk River.
- Bryant, J.M, Scotton BD, Hans MR. 2007. Sympatric nesting range of trumpeter and tundra swans on the Koyukuk National Wildlife Refuge in northwest interior Alaska. Galena (AK): U.S. Fish and Wildlife Service. Progress Report FY-08-02.
- Buklis, L.S. and L.H. Barton. 1984. Yukon River fall chum salmon biology and stock status. Alaska Department of Fish and Game, Commercial Fisheries Division, Technical Report. Anchorage, AK.
- Busher, W.H. and T. Hamazaki. 2005. Subsistence and personal use salmon harvest in the Alaska portion of the Yukon River drainage, 2003. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A04-33. Anchorage, AK
- Busher, William H., Toshihide Hamazaki, and Amy M. March. 2008. Subsistence and Personal Use Salmon Harvests in the Alaska Portion of the Yukon River Drainage, 2004. Divisions of Sport Fish and Commercial Fisheries, Alaska Department of Fish and Game, Juneau, Fishery Data Series No. 08-08.
- Chapman, R.M. 1963. Coal deposits along the Yukon River between Ruby and Anvik, Alaska. Page 18-29 in U.S.Geological Survey. Contributions to Economic geology of Alaska. USGS Bulletin 1155. Washington, D.C.
- Cheney, W.L. 1971. Life history investigations of northern pike in the Tanana River drainage. Alaska Department of Fish and Game, Federal Aid in Fish Restoration, Annual Progress Report, 1970-71, Project F-9-3, Study R-11, volume 12. Juneau, AK.
- City of Galena. 2007. Overview of the Seismic Information Relating to a 4S Nuclear Reactor Based Power Generation Facility in Galena, Alaska, Rev. 01. Project Technical White Paper Publications. Galena, Alaska.

- Clark, Donald W. 1977. Hahanudan Lake: An Ipiutak-Related Occupation of Western Interior Alaska. National Museum of Man Mercury Series, Archaeological Survey of Canada Paper No. 71. National Museums of Canada. Ottawa, Canada. 153 pp.
- Clark, Donald W. 1981. Prehistory of the Western Subarctic, Pages 107-129 in June Helm, ed., Handbook of North American Indians, Volume 6, Subarctic. The Smithsonian Institution. Washington, DC.
- Clark, Donald W., and A. McFayden Clark. 1993. Batza Tena, Trail to Obsidian: Archaeology at and Alaskan Obsidian Source. Archaeological Survey of Canada, Mercury Series Paper 147. Canadian Museum of Civilization, Hull, Quebec.
- Clark, Donald. 2001. Microblade Culture Systematics in Far Northwestern Canada. 33rd Annual Meeting of the Canadian Archaeological Association.
- De Laguna, Frederica. 2000. Travels among the Dena: Exploring Alaska's Yukon Valley. University of Washington Press, Seattle, WA.
- Diedrich, J. and C. Thomas. 1999. The Wild and Scenic River Study Process. Technical Report Prepared for the Interagency Wild and Scenic Rivers Coordinating Council.
- Ducks Unlimited. 1998a. Alaska Land Cover Mapping Project Koyukuk NWR. (USFWS, completed 1988).
- Ducks Unlimited. 1998b. Alaska Land Cover Mapping Project Nowitna NWR. (USFWS, completed 1988).
- Dumond, Don E. 2001. The Archaeology of Eastern Beringia: Some Contrasts and Connection. Arctic Anthropology 38(2):196-205.
- Eakin, H.M. 1918. The Cosna-Nowitna Region, Alaska. U.S. Geological Survey, Bulletin 667. 53 p.
- Eiler, J.H., T.R. Spencer, J.J. Pella, M.M. Masuda, and R.R. Holder. 2004. Distribution and movement patterns of Chinook salmon returning to the Yukon River basin in 2000-2002. National Marine Fisheries Service. NOAA Technical Memorandum NMFS-AFSC-148. Juneau, AK.
- Eiler, J.H., T.R. Spencer, J.J. Pella, and M.M. Masuda. 2006a. Stock composition, run timing, and movement patterns of Chinook salmon returning to the Yukon River basin in 2004. National Marine Fisheries Service. NOAA Technical Memorandum NMFS-AFSC-165. Juneau, AK.

- Eiler, J.H., T.R. Spencer, J.J. Pella, and M.M. Masuda. 2006b. Stock composition, run timing, and movement patterns of Chinook salmon returning to the Yukon River basin in 2003. National Marine Fisheries Service. NOAA Technical Memorandum NMFS-AFSC-163. Juneau, AK.
- Fagerstone, K.A. 1987. Black-footed ferret, long-tailed weasel, short-tailed weasel, and least weasel. Pages 549-573 in M. Novak, J.A. Baker, M.E. Obbard, and B. Malloch, editors. Wild furbearer management and conservation in North America. Ministry of Natural Resources. Toronto, Ontario, Canada.
- Flora, B.K. 2002. Spatial comparison of interior Alaska snowshoe hare populations and assessment of the hare pellet: hare density relationship in Alaska. Unpublished M.S. thesis, University of Alaska Fairbanks, 94 pp.
- Ford, J., and Bedford, B.L. 1987. The hydrology of Alaskan wetlands, U.S.A.: a review. *Arctic and Alpine Research* 19: 209–229.
- Gallant, A.L.; Binnian, E.F.; Omernik, J.M.; and Shasby, M.B. 1995. Ecoregions of Alaska. U.S. Geological Survey Professional Paper 1567, 73p.
- Gardner C.L. 2001. Unit 20B, 20C, 20D, 20E, 25C, and adjacent Yukon, Canada. Herd: Fortymile. Pages 139-167 in C. Healy, editor. Caribou Management report of survey and inventory activities 1 July 1988- 30 June 2000. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Grants W-27-2, W-27-3. Proj 3.0. Juneau, Alaska.
- Gerken, J.D. and R.R. Holder. 2005. Yukon River inseason salmon harvest interviews, 2003. U.S. Fish and Wildlife Service, Alaska Fisheries Data Series No. 2005-14. Fairbanks, AK
- Gerken, J.D. 2006. Yukon River inseason salmon harvest interviews, 2005. U.S. Fish and Wildlife Service, Alaska Fisheries Data Series No. 2006-11. Fairbanks, AK.
- Gerken, J.D. 2008. Yukon River inseason salmon harvest interviews, 2006. U.S. Fish and Wildlife Service, Alaska Fisheries Data Series No. 2008-08. Fairbanks, AK.
- Goldsmith, Scott. 1986. Long-Term Economic and Demographic Projections for Alaska. ISER-MAP Economic Model Control Projection Report. Institute of Social and Economic Research, University of Alaska, Anchorage. 150 pp.
- Harle, M.L. 1994. "Water resources threats analysis." Unpublished report. Anchorage, Alaska: U.S. Department of the Interior, Fish & Wildlife Service, Water Resources Branch. 30 pp. plus appendices.

- Hart, Betsy. 1981. The History of Ruby, Alaska “The Gem of the Yukon.” National Bilingual Materials Development Center, Rural Education, University of Alaska, Anchorage.
- Healey, M.C. 1991. Life history of Chinook salmon. Pages 311-394 in C. Groot and L. Margolis, editors. Pacific Salmon Life Histories. UBC Press, Vancouver, B.C. Canada.
- Hinzman, L.D., N.D. Bettez, W.R. Bolton, F.S. Chapin, M.B. Dyurgerov, C.L. Fastie, B. Griffith, R.D. Hollister, A. Hope, H.P. Huntington, A.M. Jensen, G.J. Jia, T. Jorgenson, D.L. Kane, D.R. Klein, G. Kofinas, A.H. Lynch, A.H. Lloyd, D. McGuire, F.E. Nelson, W.C. Oechel, T.E. Osterkamp, C.H. Racine, V.E. Romanovsky, R.S. Stone, D.A. Stow, M. Sturm, C.E. Tweedie, G.L. Vourlitis, M.D. Walker, D.A. Walker, P.J. Webber, J.M. Welker, K.S. Winker, and K. Yoshikawa. 2005. Evidence and Implications of Recent Climate Change in Northern Alaska and Other Arctic Regions. *Climate Change* 72: 251-298.
- Hodges, K.E. 2000. The ecology of snowshoe hares in northern boreal forests. Pages 117-161. In L.F. Ruggiero, K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires, editors. Ecology and conservation of lynx in the United States. University Press of Colorado, Denver, Colorado, USA.
- Holmes. 2001. Tanana River Valley Archaeology Circa 14,000- 9,000 BP. *Arctic Anthropology* 38(2): 154-170.
- Holsten, E., P. Hennon, L. Trummer, and M. Schultz. 2001. Insects and diseases of Alaskan forests. Technical Publication R10-TP-87. USDA Forest Service, Juneau, Alaska.
- Johnson, W.N., T.F. Paragi, and D.D. Katnik. 1995. The relationship of wildland fire to lynx and marten population and habitat in interior Alaska. Final Report. U.S. Fish and Wildlife Service. Galena, Alaska.
- Jorgenson, M.T., Racine, C.H., Walters, J.C., and Osterkamp, T.E. 2001. Permafrost degradation and ecological changes associated with a warming climate in Central Alaska. *Climatic Change* 48: 551-579.
- Keith, L.B. 1963. Wildlife’s ten-year cycle. University Wisconsin Press, Madison, Wisconsin, USA.
- Keith, L.B., A.W. Todd, C.J. Brand, R.S. Adamcik, and D.H. Rusch. 1977. An analysis of predation during a cyclic fluctuation of snowshoe hares. *International Congress of Game Biology* 13:151-175.

- Keith, L.B. 1990. Dynamics of snowshoe hare populations. Pages 119-195 in H. H. Genoways, editor. *Current Mammalogy*. Plenum Press, New York, New York, USA.
- Klein, E., Berg, E.E., and Dial, R. 2005. Wetland drying and succession across the Kenai Peninsula Lowlands, south-central Alaska. *Can. J. For. Res.* 35: 1931–1941.
- Krebs, C.J., B.S. Gilbert, S. Boutin, A.R.E. Sinclair, and J.N.M. Smith. 1986. Population biology of snowshoe hares: Demography of food-supplemented populations in the southern Yukon, 1976-1984. *Journal of Animal Ecology* 55:963-982.
- Krebs, C.J. 2001. General introduction. Pages 4-8 in C.J. Krebs, S. Boutin, and R. Boonstra, editors. *Ecosystem dynamics of the boreal forest. The Kluane region*. Oxford University Press.
- Landres, P., S. Boutcher, L. Merigliano, C. Barnes, D. Davis, T. Hall, S. Henry, B. Hunter, P. Janiga, M. Laker, A. McPherson, D. Powell, M. Rowan, S. Slater. 2005. Monitoring selected conditions related to wilderness character: A national framework. General Technical Report-RMRS_GTR-151. USDA Forest Service, Rocky Mountain Research Station. Fort Collins, CO. 38 pp.
- Lane, L.S. 1992. Kaltag fault, northern Yukon, Canada: Constraints on evolution of Arctic Alaska. *Geology*: Vol 20, No. 7, pp. 653-656.
- Lehmkuhl, K.L. 2001. Microhabitat selection by yellow-cheeked voles (*Microtus xanthognathus*) in post-fire seres of interior Alaska. Master's thesis, University of Alaska Fairbanks, Fairbanks, Alaska.
- MacDonald, S.O. 2003. The amphibians and reptiles of Alaska: a field handbook. Alaska Natural Heritage Program. <http://aknhp.uaa.alaska.edu/herps>
- Marcotte, J.R. and T.L. Haynes. 1985. Contemporary resource use patterns in the upper Koyukuk Region, Alaska. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 93. Fairbanks, AK.
- Mark Anthony, L. and A.T. Tunley. 1976. *Introductory Geography and Geology of Alaska*. Polar Publishing. Anchorage, Alaska. 273 pp.
- Matheus, P., J. Begét, O. Mason, and C. Gelvin-Reymiller. 2003. Late Pliocene to late Pleistocene environments preserved at the Palisades Site, central Yukon River, Alaska: *Quaternary Research*, v. 60, p. 33-43.
- McInville, W.B., Jr., and L.B. Keith. 1974. Ecology of red-tailed hawk and great-horned owl, Alberta. *Canadian Field Naturalist* 88: 1-20.

- McIntyre, C.L. 1995. Nesting ecology of migratory golden eagles (*Aquila chrysaetos*) in Denali National Park, Alaska. Thesis. University of Alaska, Fairbanks, Alaska.
- Mertie, J.B., Jr. and G.L. Harrington. 1924. The Ruby-Kuskokwim region, Alaska. U.S. Geological Survey. Ecological Survey Bulletin 754. 192 pp.
- Miller, D.J., T.G. Payne and C. Gryc. 1959. Geology of possible petroleum provinces in Alaska. Bulletin No. 1094. U.S. Geological Survey.
- Miller, T.P., and O.J. Ferrians Jr. 1968. Suggested areas for prospecting in the central Koyukuk River region. U.S. Geological Survey Circular 570. 12 pp.
- Mueller, K., E. Snyder-Conn, and M. Bertram. 1996. Water quality and metal and metalloid contaminants in sediments and fish of Koyukuk, Nowitna and the Northern Unit of Innoko National Wildlife refuges, Alaska, 1991. Ecological services, U.S. Fish and Wildlife Service, NAES-TR-96-03. 79 pp. (pdf)
- Murphy K. and E. Witten. 2006. DRAFT Fire Regime Condition Class (FRCC) Interagency Guidebook Reference Conditions – Black Spruce Interior and Tussock Tundra 1. [Internet]. [cited November 7, 2008]. Available from: <http://www.frcc.gov/>
- Nowacki, Gregory and T. Brock. 1995. Ecoregions and Subregions of Alaska, EcoMap Version 2.0 (map). USDA Forest Service, Alaska Region, Juneau, AK, scale 1:5,000,000.
- Odess, Daniel and J.T. Rasic. 2007. Toolkit Composition and Assemblage Variability: The Implications of Nogahabara I, Northern Alaska. *American Antiquity* 72(4):691-717.
- Osborne, T.O., T.F. Paragi, J.L. Bodkin, A.J. Loranger, and W.N. Johnson. 1991. Extent, cause, and timing of moose calf mortality in western interior Alaska. *Alces* 27:24-30.
- Osterkamp, T.E., and V.E. Romanovsky. 1999. Evidence for warming and thawing of discontinuous permafrost in Alaska. *Permafrost and Periglacial Processes* 10: 17-37.
- Palin, S, C. Bishop, B. Keith, J. Gregory Williams, Eddie Hunsinger. 2007. Alaska Population Projections 2007 – 2030. Prepared by the Alaska Department of Labor and Workforce Development, Research and Analysis Section, Juneau.

- Parson, E.A., L. Carter, P. Anderson, B. Wang, and G. Weller. 2001. Potential consequences of climate variability and change for Alaska. Pages 283-312 in National Assessment Synthesis Team Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change, report for the US Global Change Research Program, Cambridge University Press, Cambridge UK, 620pp.
- Patton, W.W., Jr. 1966. Regional geology of the Kateel River quadrangle, Alaska. U.S. Geological investigations map 1-437. Washington, D.C.
- Patton, W.W., Jr. and J.M. Hoare. 1968. The Kaltag fault, west-central Alaska. Paper D147-D153 in U.S. Geological Survey Research 1968. U.S. Geological Survey, Professional Paper 600-D.
- Patton, W.W. 1973. Reconnaissance geology of the northern Yukon-Koyukuk province, Alaska. U.S. Geological Survey Professional Paper 774-A. 17 pp.
- Patton, W.W. Jr., and E.J. Moll-Stalcup. 2000. Geologic Map of the Nulato Quadrangle, West-Central Alaska. U.S. Geological Survey. Geologic Investigations Series I-2677. Online version 1.0
- Peterson, R.O. 1977. Wolf Ecology and Prey Relationships on Isle Royale. National Park Service Scientific Monograph Series, No. 11 U.S. National Park Service, Washington, D.C. 210 pp.
- Rexstad, E. 2003. Small mammal community dynamics investigation for Mouse Lake, Kanuti National Wildlife Refuge 1993-2002. Kanuti NWR progress report FY 03-03, Fairbanks, Alaska. 29 pp.
- Rieger, S., D.B. Schoephorster, and C.E. Furbush. 1979. Exploratory soil survey of Alaska. U.S. Department of Agriculture
- Rouse, W.R., Douglas, M.S.V., Hecky, R.E., Hershey, A.E., Kling, G.W., Lesack, L., Marsh, P., McDonald, M., Nicholson, B.J., Roulet, N.T., and Smol, J.P. 1997. Effects of climate change on the freshwaters of arctic and subarctic North America. *Hydrol. Processes* 11: 873–902.
- Rozell, Ned. 2007. Alaska tamaracks still hanging on after attack. Alaska Science Forum no. 1851, Geophysical Institute, University of Alaska Fairbanks.
- Rupp S. 2008. Preliminary Report Projected Vegetation and Fire Regime Response to Future Climate Change in Alaska. Prepared for the U.S. Fish and Wildlife Service National Wildlife Refuge System. May 1, 2008.

- Rupp S. and A. Springsteen. 2008. Summary Report for Koyukuk, Northern Unit Innoko, and Nowitna National Wildlife Refuges. Prepared for U.S. Fish and Wildlife Service National Wildlife Refuge System. October 21, 2008.
- Salo, E.O. 1991. Life history of chum salmon. Pages 231-310 in C. Groot and L. Margolis, editors. Pacific Salmon Life Histories. UBC Press, Vancouver, B.C. Canada.
- Sanderecock, F.K. 1991. Life history of coho salmon. Pages 395-446 in C. Groot and L. Margolis, editors. Pacific Salmon Life Histories. UBC Press, Vancouver, B.C. Canada.
- Saperstein, L. 1996. A summary of ten years of duck production surveys, Nowitna National Wildlife Refuge, Alaska, 1983-1992. Progress REport FY 96-06.
- Saperstein, L. 1997. A summary of duck production surveys on the Koyukuk and Northern Innoko National Wildlife Refuges, Alaska, 1983-1993. Prog. Report FY 97-02, USFWS Galena, Alaska. 148 pp.
- Schmutz, J. 2008. Conversation between J. Schmutz and Jenny Bryant, Refuge Biologist about white-fronted geese.
- Scotton, B.D. and J. Bryant. 2004. Wolf Population Estimate for GMU 21B and the Northern Portion of the Nowitna National Wildlife Refuge, Unpublished report, FY 04-01.
- Simeone, William E. 1982. A History of Alaskan Athapaskans, Including a Description of Athapaskan Culture and a Historical Narrative, 1785-1971. Anchorage: Alaska Pacific University Press.
- Smith, L.C., Y. Sheng, G.M. MacDonald, and L.D. Hinzman. 2005. Disappearing Arctic lakes. *Science* 308: 1429.
- Snodgrass, J.W. and G.K. Meffe. 1999. Habitat use and temporal dynamics of blackwater stream fishes in and adjacent to beaver ponds. *Copeia* 3:628-639.
- Snyder-Conn, E., Patton, T., Bertram, M., Scannell, P., and Anthony, C. 1992. Contaminant Baseline Data for Water, Sediments, and Fish of the Nowitna National Wildlife Refuge, 1985-1988. U.S. Fish and Wildlife Service, Northern Alaska Ecological Services. Technical Report NAES-TR-92-02. 69 pp., plus Appendix. (pdf)
- Spindler, M. A. and M. R. Hans. 2005. Nesting biology and local movements of female greater white-fronted geese in west-central Alaska. Unpublished USFWS report. U.S. Fish and Wildlife Service, PO Box 287, Galena, AK 99741 USA, 50pp.

- Stevens, C.E., C.A. Paszkowski, and G.J. Scrimgeour. 2006. Older is better: beaver ponds on boreal streams as breeding habitats for the wood frog. *Journal of Wildlife Management*. 70(5):1360-1371.
- Stout, G.W. 2004. Unit 21 furbearer management report. Pages 293-303 in C. Brown, editor *Furbearer management report of survey and inventory activities 1 July 2000 - 30 June 2003*. Alaska Department of Fish and Game. Project 7.0. Juneau, Alaska.
- Taube, T.T. and B. Lubinski. 1996. Seasonal migrations of northern pike in the Kaiyuh Flats, Innoko National Wildlife Refuge. Alaska Department of Fish and Game, Division of Sport Fish, Fishery Manuscript No. 96-4. Fairbanks, AK.
- Todd, A.W., L.B. Keith, and C.A. Fischer. 1981. Population ecology of coyotes during a fluctuation of snowshoe hares. *Journal of Wildlife Management* 45:629-640.
- Turck, Thomas J., and D.L. Turck. 1992. Trading Posts along the Yukon River: Noochuloghoyet Trading Post in Historical Context. *Arctic* Vol. 45(1) pp. 51-61.
- U.S. Congress. 1968. "The Wild and Scenic Rivers Act." Public Law 90-542; 16 USC 1271-1287.
- U.S. Government. 1996-2003. "Code of Federal Regulations." Accessed August 3, 2005. At <http://www.gpoaccess.gov/cfr/index.html> on the World Wide Web, produced by Office of the Federal Register, National Archives and Records Administration. Source last updated March 10, 2005.
- U.S. Department of the Interior, U.S. Department of Agriculture. 1982. "National Wild and Scenic Rivers system; Final Revised Guidelines for Eligibility, Classification and Management of River Areas." *Federal Register* 47:173 (7 September 1982). P. 39454-39461.
- U.S. Fish and Wildlife Service. *Administrative Manual*. U.S. Fish and Wildlife Service. Washington D.C.
- U.S. Fish and Wildlife Service. *Refuge Manual*. U.S. Fish and Wildlife Service. Washington D.C.
- U.S. Fish and Wildlife Service. 1973. "The Endangered Species Act of 1973." Accessed October 4, 2004. At <http://endangered.fws.gov/esa.html> on the World Wide Web, produced by U.S. Fish & Wildlife Service. Source last updated March 20, 2001.
- U.S. Fish and Wildlife Service. 1987a. *Koyukuk National Wildlife Refuge Northern Unit of Innoko National Wildlife Refuge Comprehensive Conservation Plan, Environmental Impact Statement, and Wilderness Review*. Anchorage (AK): U.S. Fish and Wildlife Service.

- U.S. Fish and Wildlife Service. 1987b. Nowitna National Wildlife Refuge Comprehensive Conservation Plan, Wild River Plan, Wilderness Review, and Environmental Impact Statement. Anchorage (AK): U.S. Fish and Wildlife Service.
- U.S. Fish and Wildlife Service. 1987c. Record of Decision Koyukuk and Northern Unit of Innoko National Wildlife Refuges Comprehensive Conservation Plan, Environmental Impact Statement, and Wilderness Review. Anchorage (AK): U.S. Fish and Wildlife Service.
- U.S. Fish and Wildlife Service. 1987d. Record of Decision Nowitna National Wildlife Refuge Comprehensive Conservation Plan, Environmental Impact Statement, Wilderness Review, and Wild River Plan. Anchorage (AK): U.S. Fish and Wildlife Service.
- U.S. Fish and Wildlife Service. 1991. Fishery Management Plan – Nowitna National Wildlife Refuge. U.S. Fish and Wildlife Service, Nowitna National Wildlife Refuge, Galena, AK and Fishery Assistance Office, Fairbanks, AK.
- U.S. Fish and Wildlife Service. 1992. “Cultural Resources Management Handbook.” Accessed October 4, 2004. At <http://policy.fws.gov/614fw1.html> on the World Wide Web, produced by U.S. Fish & Wildlife Service. Source last updated November 1992.
- U.S. Fish and Wildlife Service. 1993. Fishery Management Plan – Koyukuk National Wildlife Refuge. U.S. Fish and Wildlife Service, Koyukuk National Wildlife Refuge, Galena, AK and Fishery Assistance Office, Fairbanks, AK.
- U.S. Fish and Wildlife Service. 1994. “Native American Policy.” National Policy Issuance #94-10. Washington, D.C: U.S. Fish & Wildlife Service. 11 pp. (Policy signed on June 28, 1994; issued as national policy on August 24, 1994).
- U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1998. Endangered Species Act Consultation Handbook. Procedures for conducting Section 7 consultations and conferences. Washington, DC.
- U.S. Fish and Wildlife Service. 2002. Birds of Conservation concern 2002. Division of Migratory Bird Management, Arlington, Virginia.
- U.S. Fish and Wildlife Service. Service Manual. Accessed October 4, 2004. At <http://policy.fws.gov/manual.html> on the World Wide Web, produced by U.S. Fish & Wildlife Service.
- U.S. Fish and Wildlife Service. 2005. Koyukuk Fire Management Plan. Unpublished. Koyukuk/Nowitna NWR. Galena, Alaska.

- U.S. Fish and Wildlife Service. 2006. Nowitna Fire Management Plan. Unpublished. Koyukuk/Nowitna NWR. Galena, Alaska.
- Van Cleve, K., C.T. Dyrness, L.A. Viereck, J. Fox, F.S. Chapin, III, and W. Oechel. 1983. Taiga ecosystems in interior Alaska. *BioScience* 33:39-44.
- Viereck, L.A., C.T. Dyrness, A.R. Batten and K.J. Wenzlick. 1992. The Alaska Vegetation Classification. Gen. Tech. Rep. PNW-GTR_286. 278 pp.
- Warner, J.D. 1985. Critical and Strategic mineral in Alaska - tin, tantalum, and columbium. U.S. Bureau of Mines, Information Circular 9037. 19 pp.
- Windisch-Cole, B. 2001. The Yukon-Koyukuk Census Area: A profile of rural Interior Alaska. *Alaska Economic Trends*, 21(2).
- Wiswar, D.W. 1994a. Salmon surveys on the Koyukuk and Nowitna National Wildlife Refuges, Alaska, 1993. U.S. Fish and Wildlife Service, Fairbanks Fishery Resources Office, Fishery Data Series No. 94-1. Fairbanks, AK.
- Wiswar, D.W. 1994b. Fish surveys in the Honhosa River, North Fork Huslia River, and Billy Hawk Creek, Koyukuk National Wildlife Refuge, Alaska, 1993. U.S. Fish and Wildlife Service, Fairbanks Fishery Resources Office, Fishery Data Series No. 94-2. Fairbanks, AK.
- Wolff, J.O. 1980. The role of habitat patchiness in the population dynamics of snowshoe hares. *Ecological Monograph* 50:111-130.
- Young, S.B. and J.C. Walters. 1982. Proposed geological and ecological natural landmarks in interior and western Alaska. The Center for Northern Studies, Wolcott, Vermont.

Appendix M
Preparers

M. Preparers

Refuge Staff

Name/Title	Expertise/Function	Degree(s)	Experience (Years)
Kenton Moos, Refuge Manager	Refuge Management, Core Team Member	BS Wildlife Biology	Fish and Wildlife Management (18)
Ryan Mollnow, Deputy Refuge Manager	Refuge Management, Core Team Member	BS Wildlife Biology BS Fisheries	Fish and Wildlife Management (11)
Bradley Scotton, Supervisory Biologist/Pilot	Wildlife Biology, Core Team Member	BS Wildlife Biology MS Wildlife Biology	Fisheries (4), Wildlife Management (15)
Jenny Bryant, Wildlife Biologist	Wildlife Biology, Core Team Member	BS Wildlife Biology	Wildlife Management (19)
Melanie Hans, Habitat Biologist/GIS Specialist	GIS, Extended Team Member	BS Zoology	Wildlife Management/GIS (8)
Karin Lehmkuhl Bodony, Park Ranger/Supervisory Education Specialist	Public Outreach/ Education, Wilderness and Wild River Management, Cultural Resources, Core Team Member	BS Biology MS Wildlife Biology	Wildlife Management (15)
Kevin Whitworth, Refuge Operations Specialist	Subsistence, Core Team Member	BS Wildlife Biology	Fish and Wildlife Management (5)
Grace Sommer, Administrative Support Assistant	Record Management, Extended Team Member		Administration ()
Dara Whitworth, Refuge Clerk	Editing, Extended Team Member	BS Wildlife Biology	Wildlife Management (5)
Robert Lambrecht, Natural Resource Planner/Fire Management Officer	Planning Team Leader (2007-2008), Fire Management	BS Industrial Technology MS Forestry	Forest Management (24), Fire Management (7), Planning (1)

Region 7 Staff

Helen Clough, Chief, Division of Conservation Planning and Policy	NEPA, Policy Compliance, ANILCA	BA Anthropology	Refuge Planning (15), Public Land Management (19)
Mikel Haase, Natural Resource Planner	Planning Team Leader (2009)	BA Environmental Design MS Forest Resources	30 Natural Resource Planning
Jeff Brooks, Social Scientist	Social Sciences, Extended Team Member	BS Biology MS Conservation Ecology and Sustainable Development PhD Natural Resource Recreation	International development and health education (3), Wildlife biology (4), Research in human dimensions, outdoor recreation, and visitor experience (8)
Rob Siciliano, Cartographer	Map production and land status information	BA Environmental Science	GIS (9)

State of Alaska

Sara Taylor, Alaska Dept. of Natural Resources Natural Resource Specialist	Liaison with State of Alaska, Core Team Member	BS Environmental Sciences	Wildlife Biology (8), Biometry (2), Resource Management (3)
Brad Palach, Alaska Dept. of Fish and Game Natural Resource Specialist	Liaison with State of Alaska, Core Team Member	BA Justice	Fish and Wildlife Management (22)

Appendix N
Cabin Regulations

N. Cabin Regulations

50 CFR 36.33 What do I need to know about using cabins and related structures on Alaska National Wildlife Refuges?

(a) **Definitions.** As used in this section, the term:

Administrative cabin shall mean any cabin only used by refuge or other authorized personnel for the administration of the refuge.

Cabin shall mean a small, usually single-story, three or more sided structure that is permanently and completely enclosed with a roof and walls. The roof and walls are not fabric, cannot be easily disassembled, and are not removed seasonally.

Commercial cabin shall mean any cabin which is used in association with a commercial operation including but not limited to commercial fishing activities and recreational guiding services.

Existing cabin shall mean any cabin situated on Federal lands before December 2, 1980. A cabin legally situated on land that subsequently become refuge will also be considered an “existing” cabin providing the applicant meets the appropriate application deadlines.

Family shall include the spouse (including what is known as a common-law relationship), children by birth or adoption, and other blood relatives within the second degree of kindred.

Guest shall mean a person who occasionally visits the permittee in the cabin. This term does not include clients using commercial cabins.

Immediate family shall include the spouse and children, either by birth or adoption, of the claimant residing in the cabin or structure.

New cabin shall mean any permitted cabin constructed on refuge lands after December 2, 1980. This may also include a cabin whose claimant failed to meet the application deadline for existing cabins but is otherwise a permitted cabin.

Other related structures shall mean those structures or devices essential to the activities for which the cabin special use permit is issued. This includes but is not limited to outdoor toilets, food caches, storage sheds, and fish drying racks.

Private recreational use shall mean a use associated with leisure activities, not including bona fide subsistence uses or authorized commercial uses.

Public use cabin shall mean a cabin owned and administered by the Fish and Wildlife Service and available for use by the public.

(b) **All cabins.** The regulations in this paragraph (b) shall apply to all cabins, claimants, occupants, and guests. The regulations in this paragraph (b) do not apply to temporary

facilities: any structure or man-made improvement which can readily be completely dismantled and removed from the site when the period of authorized use is terminated.

- (1) A special use permit is required to construct, use and or occupy a cabin on Fish and Wildlife Service lands within the refuge. The permit may also authorize the use of related structures and other necessary appurtenances.
 - (2) After adequate public notice has been given, unclaimed cabins become the property of the Federal Government. Adequate public notice shall include: Posting notices of trespass on unclaimed cabins; publication of notices of trespass in Anchorage and Fairbanks newspapers and in at least one local newspaper if available; and posting notices of trespass at appropriate community post offices. A Government-owned cabin may be used for refuge administration, used for emergency purposes by the public, permitted to another applicant, designated a public use cabin, or destroyed. Disposal of excess cabins and structures will be according to regulations pursuant to title 41, chapter 114 of the Code of Federal Regulations.
 - (3) Willful noncompliance with the conditions and stipulations of a special use permit shall be considered grounds to invoke the administrative process leading to notice and hearing, and possible revocation of the permit. The refuge manager will attempt to resolve problems of noncompliance with the permittee as soon as possible after the situation becomes known. If this effort fails, the refuge manager shall provide written notice to the permittee within 30 days of that date, informing the permittee of noncompliance, giving specific instructions for compliance and providing appropriate time for the permittee to comply.
 - (4) No special use permit will be issued for the construction of a cabin for private recreational use or for the private recreational use of an existing cabin.
 - (5) Guests are allowed to occupy a cabin only during the activity period identified on the special use permit. Guests occupying a cabin during the absence of the permittee shall obtain a letter of authorization from the permittee. The guest must have a copy of the letter in his/her possession. In commercial cabins, the permittee or another person listed on the permit must be present when the cabin is occupied by guests or clients.
 - (6) A person whose permit application (new or renewal) for a cabin has been denied or whose cabin permit has been revoked by the refuge manager may appeal to the Regional Director as described in section 36.41 (b).
- (c) **Existing cabins.** In addition to paragraph (b) of this section, the regulations in this paragraph (c) shall apply to all existing cabins, claimants, occupants, and guests.
- (1) Where a valid cabin permit or lease was in effect on December 2, 1980, or at the time the land was subsequently added to the refuge, the refuge manager shall provide for the continuation of the permit or lease under the same conditions. The new permit shall be nontransferable and renewable every five years unless the continuation would directly threaten or significantly impair the purposes for which the refuge was established. The cabin and related structures are the personal property of the claimant and can be removed by him/her upon non-renewal or revocation. The owner of a cabin may sell his/her interest in the cabin to another person; however, the new owner does not automatically qualify for a permit and must apply for a new one.
 - (2) To obtain a special use permit for a cabin that was not under permit or lease before December 2, 1980, or at the time the land was subsequently added to the refuge, a

claimant should submit to the refuge manager an application that includes the following:

- (i) Reasonable proof of possessory interest or right to occupy the cabin as shown by affidavit, bill of sale, or other document.
 - (ii) Date of construction or acquisition.
 - (iii) A sketch or photograph that accurately depicts the cabin and related structures.
 - (iv) The dimensions of the cabin and related structures.
 - (v) A U.S. Geological Survey topographic map that shows the geographic location of the cabin and related structures.
 - (vi) The claimant's agreement to vacate and remove all personal property from the cabin and related structures within one year from receipt of a non-renewal or revocation notice.
 - (vii) The claimant's acknowledgment that he/she has no legal interest in the real property on which the cabin and related structures are located.
 - (viii) A list of family members residing with the claimant in the cabin being applied for. It need only include those immediate family members who may be eligible to renew a permit for continued use and occupancy upon the original claimant's death (this is not applicable to cabins used for commercial purposes).
- (3) Applications for permits for existing cabins, which are not currently under valid permits, will only be accepted for a period of one year following the effective date of these regulations. However, cabins that were legally located on lands that subsequently become refuge will also be considered "existing" cabins. The owners will have two years following the date the lands become refuge to apply for a permit. Following those dates, all applications for cabins will be for "new" cabins only, no matter when the cabin was built or first used. If ownership is not established within three years after the land becomes refuge, the cabin may be considered abandoned, and it will become Federal property in accordance with Federal regulations.
- (4) The occupancy of a noncommercial cabin is limited to the permittee and his/her family, bona fide partners, and guests.
- (5) Major modifications or rehabilitation of an existing cabin must be approved by the refuge manager before construction begins. The modifications will be done by the permittee or designated agent and will remain the property of the permittee. Major additions (e.g., larger than the original cabin) may fall under the ownership provisions for new cabins. Although cabins destroyed by accidents, vandalism or natural causes may be reconstructed, they must be approved by the refuge manager before construction and must meet the construction guidelines for new cabins, even though remaining the property of the claimant.
- (d) **New cabins.** In addition to paragraph (b) of this section, the regulations in this paragraph (d) shall apply to all new cabins, claimants, occupants, and guests.
- (1) A nontransferable, five year special use permit shall only be issued upon a determination that the proposed construction, use and maintenance of the cabin is compatible with refuge purposes and that the cabin use is either directly related to refuge administration or is needed for continuation of an ongoing activity or use

- otherwise allowed within the refuge where the applicant lacks a reasonable off-refuge site. In addition, these activities must have historically been supported by the construction and use of cabins in the geographic area. In general, new cabin permits will be given only to local residents to pursue a legitimate subsistence activity. In determining whether to permit the construction, use, and occupancy of cabins or other structures, the refuge manager shall be guided by factor such as other public uses, public health and safety, environmental and resource protection, research activities, protection of historic or scientific values, subsistence uses, endangered or threatened species conservation and other management considerations necessary to ensure that the activities authorized pursuant to t permit are compatible with the purposes for which the refuge was established.
- (2) To obtain a special use permit for a new cabin, an applicant should submit to the refuge manager an application that includes the following:
- (i) A sketch that accurately depicts the proposed cabin and related structures.
 - (ii) The dimensions of the proposed cabin and related structures.
 - (iii) A U.S. Geological Survey topographic map that shows the geographic location of the proposed cabin and relate structures.
 - (iv) The applicant's agreement to vacate and remove all personal property from the cabin and related structures within one year from receipt of a non-renewal or revocation notice.
 - (v) The applicant's acknowledgment that he/she has no legal interest in the cabin and related structures or in the real property on which the cabin and relates structures are located.
 - (vi) A list of family members residing with the applicant in the cabin being applied for. It need only include those immediate family members who may be eligible to renew a permit for continued use and occupancy upon the original claimant's death.
- (3) The permitting instrument shall be a nontransferable renewable five year special use permit. It shall be renewed every fire years (upon request) until the death of the original claimant's last immediate family member unless the special use permit has been revoked or the cabin has been abandoned.
- (4) No new cabins will be constructed in designated wilderness areas unless they are built specifically for the administration of the area, for public safety, or for trapping where trapping has been a traditional and customary use.
- (5) New trapping cabins in wilderness will be available for public use to ensure public health and safety.
- (6) The occupancy of a noncommercial cabin is limited to the permittee, and his/her family, bona fide partners, and guests.
- (e) **Commercial cabins.** In additions to paragraph (b) of this section, the regulations in this paragraph (e) shall apply to all commercial cabins, permittees, clients, guests, and occupants.
- (1) A special use permit is required for all cabins used for commercial purposes. Refuge managers may also issue special use permits that authorize additional commercial use of an existing cabin used for guiding, etc. The use of a new cabin

shall be limited to the type of use specified in the original permit. The refuge manager may permit the use of an existing cabin on non-wilderness refuge lands for the exercise of valid commercial fishing rights. Such a permit may be denied if, after conducting a public hearing in the affected locality, it is found that the use is inconsistent with refuge purposes and is a significant expansion of commercial fishing activities within the unit beyond 1979 levels.

- (2) When the commercial fishing or guiding rights associated with a permittee's existing cabin are acquired by a new party, the privilege of using the cabin cannot be sold and the new party does not necessarily qualify for a cabin permit. He/she must apply for a permit and meet the criteria described in this paragraph (e) before issuance of a special use permit by the refuge manager. He/she may not occupy the cabin before issuance of a permit.
- (3) No new commercial cabins will be permitted in wilderness areas.
- (4) Commercial cabins may be occupied only by persons legitimately involved in the commercial enterprise, assistants, employees, their families, guests and clients and only during the time that the authorized activity is occurring. The names of those individuals, excluding guests and clients, will be issued on the permit. The permittee or another individual listed on the permit must be present when the cabin is occupied.
- (5) Special use permits for commercial cabins may be renewed annually in conjunction with the special use permit renewal for the commercial activity itself. The cabin permit may be issued for periods of up to five years and is a separate permit from one issued for the commercial activity.

(f) ***Administrative and government-owned public use cabins.*** In addition to paragraph (a) of this section, the regulations in this paragraph (f) apply to all administrative and government-owned cabins.

- (1) The refuge manager can designate those cabins not under permit as administrative cabins to be used for official government business. Administrative cabins may be used by the public during life-threatening emergencies. On a case-by-case basis, they may also be designated as public use cabins when not needed for government purposes. In such cases, the refuge manager must inform the public and post dates or seasons when the cabins are available.
- (2) The refuge manager may designate government-owned cabins as public use cabins. They are only intended for short-term public recreational use and occupancy. The refuge manager may develop an allocation system for managing public use cabins for short-term recreational use. No existing public use cabins shall be removed or new public use cabins constructed within wilderness areas designated by the Alaska National Interest Lands Conservation Act of 1980 or subsequently designated wilderness areas until the Secretary of the Interior notifies the House Committee on Interior and Insular Affairs and the Senate Committee on Energy and Natural Resources.

[59 FR 38314, July 27, 1994, as amended at 64 FR 14151, Mar. 24, 1999]

Appendix 0
Glossary

Adequate snow cover	Snow cover of a sufficient depth to protect underlying vegetation and soil (50 CFR 36.2).
Air-taxi operator/transporter	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. They must have a special use permit to operate on a national wildlife refuge.
allowed	Activity, use, or facility is allowed under existing National Environmental Policy Act (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.
<i>not allowed</i>	Activity, use, or facility is not allowed.
alternatives	Different ways to resolve issues, achieve refuge purposes, meet refuge goals, and contribute to the National Wildlife Refuge System (Refuge System) mission. Alternatives provide different options to respond to major issues identified during the planning process.
<i>No-Action Alternative</i>	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.
<i>Preferred Alternative</i>	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 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. Materials that are capable of providing an understanding of past human behavior, cultural adaptation, and related topics through the application of scholarly or scientific techniques.

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authorized	Activity, use, or facility allowed upon issuance of a special use permit or other authorization.
big-game 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. They 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. The outfitter does not accompany nor provide an assistant to the hunter in the field. They 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 Service Manual, 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 Service Manual, 602 FW 1.6).
campsite hardening	Actions undertaken to increase the durability of a campsite through manipulation, such as placing gravel on a place to pitch a tent or trails within the campsite. Does not include facilities normally associated with campgrounds, including outhouses, picnic tables, etc.
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 System or the purposes of the refuge (USFWS Service Manual, 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 Service Manual, 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, or removal of mineral or other specimens).
cultural resources	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 Service Manual, 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 functioning together with its 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 (FONSI). It also aids an agency's compliance with NEPA when no EIS is necessary (40 CFR 1508.9).
environmental health	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 Service Manual, 602 FW 1.6).
environmental impact statement	A detailed written statement required by section 102(2)(C) of the National Environmental Policy Act (NEPA) that analyzes 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).
goal	A descriptive, open-ended, and often broad statement of desired future conditions that conveys purposes but does not define measurable units (USFWS Service Manual, 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.
helicopter use for recreation access	Use of helicopters for other than official government management activities, search and rescue, or other authorized activities.
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 is participating. An incidental use may or may not support a primary use.
issue	Any unsettled matter that requires a management decision (e.g., a Service initiative, opportunity, resource management problem, threat to the resources of the unit, conflict in uses, public concern, or the presence of an undesirable resource condition) (USFWS 602 FW 1.6).
“leave no trace” principles	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 (http://www.Int.org , accessed May 11, 2004).
national wildlife refuge	A designated area of land or water, or an interest in land or water, within the National Wildlife Refuge System; does not include coordination areas. Find a complete listing of all units of the Refuge System in the current Annual Report of Lands Under Control of the U.S. Fish and Wildlife Service (USFWS 2004).
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 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 decision making (from 40 CFR 1500). The law also established the Council on Environmental Quality to implement the law and to monitor compliance with the law.
nonconsumptive uses	Recreational activities (e.g., hiking, photography, and wildlife observation) that do not involve the taking or catching of fish, wildlife, or other natural resources.

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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 Service Manual, 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]).
prospectus	The document that the Service uses in soliciting competition to award permits for commercial visitor services on a refuge.
purposes of the refuge	The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit (USFWS Service Manual, 602 FW 1.6).
quality recreation program	A refuge quality recreation program promotes safety of participants, other visitors, and facilities; reliable and reasonable opportunities for the public to experience wildlife; refuge goals and objectives; resource stewardship and conservation; public understanding and increased public appreciation of America's natural resources, and the Service's role in managing and protecting these resources; compliance with applicable laws and regulations and responsible behavior; accessibility and availability to a broad spectrum of the American people; facilities that blend into the natural setting; and the use of feedback from visitors to

	help define and evaluate programs (USFWS Service Manual, 605 FW 1.6).
recreation guide	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.
recreational fishing	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.
recreational hunting	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.
recreational fishing or hunting guide	A commercial operator who accompanies recreational fishing or hunting clients on the refuge for day or overnight trips. Must have a special use permit to operate on the refuge.
scoping	An early and open process with the public for determining the range of issues and the significant issues related to a proposed action (40 CFR 1501.7).
special use permit	A U.S. Fish and Wildlife Service authorization required for all commercial uses of refuge lands and waters.
step-down management plan	A plan that provides specific guidance on management subjects (e.g., habitat, 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	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 Alaska National Interest Lands Conservation Act).
unguided visitor	A visitor who arranges, organizes, and conducts his or her own trip without the assistance of a guide.

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use day	A period of one calendar day (24 hours), or portion thereof, for each entity using a resource. When employed as a measure of human use, it is called a visitor, visitor use day, or client use day.
visitor contact station	A staffed or unstaffed facility where the public can learn about the refuge and its resources.
vision statement	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 Service Manual, 602 FW 1.6).
wilderness	An area essentially undisturbed by human activity, together with its natural ecosystem.
wildlife-dependent recreation	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 National Wildlife 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.

Appendix P
Response to Comments

Response to Comments

The Draft Revised Comprehensive Conservation Plan and Environmental Assessment for the Koyukuk, Northern Unit Innoko, and Nowitna National Wildlife Refuges was released for public review on October 6, 2008 with a Notice of Availability published in the *Federal Register* (73 FR 23526). The comment period closed on December 15, 2008.

Public meetings were held in Galena, Hughes, Huslia, Kaltag, Koyukuk, Nulato, Ruby, and Tanana. These villages are located near or within the three refuges. Village residents are the most frequent users of refuge land. Attendance at these meetings ranged from 1 to 25 individuals. There were no comments specific to the draft plan received during the village meetings. The majority of comments made regarded the current population of moose, wolf, and salmon or wildlife observations made over the years.

Written comments were received from three individuals, the state of Alaska, The Wilderness Society, the Nulato Tribal Council, and Born Free USA, and one comment was received via e-mail.

One individual asked “how about making these refuges into a wilderness area?” Another individual commented “that my priorities for our NWRs are making them places where animals and nature are prioritized, NOT humans and all their ‘recreational’ needs.” The third individual said that “global warming is a great concern.”

The individual who commented via e-mail felt we should use the word “protection” instead of “conservation”; hunting was not a compatible use; we are not meeting the needs of the public; there should be no prescribed fires; and old data was used for the analysis.

The State of Alaska made several helpful suggestions that clarified various parts of the plan. The Wilderness Society was concerned about the Wilderness review process, wilderness stewardship and management, motorized and mechanized activities in wilderness, the Wild and Scenic River review process, and climate change. The Nulato Tribal Council was concerned about maintaining subsistence activities, an expired Land Bank Agreement, and the regulation of commercial guides, ATVs, and commercial timber harvest. Born Free USA was concerned about a comprehensive, biological inventory, management of trapping, the impacts of trapping and hunting, the use of leg-hold traps, and alternative trapping methods.

Specific comments from individual letters and our responses appear in the next section of this document. In subsequent pages, the State of Alaska, Wilderness Society, Born Free USA, and Nulato Tribal Council letters appear in full text along with our responses to the specific comments inserted at appropriate locations.

Comments and responses from individual comments:

Comment: I think your Alternative B is the best as what we need is more protection of land not despoiled yet by so called development. Easy access only brings those that will destroy anything that is natural so how about making these refuges into a wilderness area?

Response: *Goal 8 (section 2.1.8) specifies maintaining the “wild character of the Refuge.” Any type of proposed development would be closely scrutinized under the compatibility determination process to ensure that the “wild character of the refuge” would not be lost. Access to the Refuge is addressed by Goal 7 (section 2.1.7) Objective 7. No formal recommendations for wilderness designation will be made in this plan (see the following first response to The Wilderness Society comments for more detail).*

Comment: No matter which plan you adopt please know that my priorities for our NWRs are making them places where animals and nature are prioritized, NOT humans and all their “recreational needs”. Goal: fewer roads, structures, machinery and humans in the NWRs.

Response: *The first purpose for each of the refuges states “to conserve fish and wildlife populations and habitats in their natural diversity...” (ANILCA Sections 302(5) (B) (i), 302(3) (B) (i), and 302(6) (B) (i)). Goals 1, 2, 3, and 4 (sections 2.1.1 through 2.1.4) specifically addresses the conservation of fish and wildlife and their habitats, providing for ecosystem health and ensuring those natural processes which support ecosystem health are maintained. Humans have occupied interior Alaska for a long time and will continue to use the Refuge. The number of humans has always been relatively low and is expected to remain so. There are no roads on the Refuge. The only structures found on the Refuge are a very few administrative and trapping cabins. There is no (heavy) machinery use on the refuge.*

Comment: Global warming is a great concern... .

Response: *Global warming and climate change are also a concern of the Service and the Refuge. The Service is addressing climate change on national, regional, and local levels. While the plan addresses climate change at the refuge level, the refuge staff is also involved in some national and regional initiatives. Climate change was identified as an important issue to be addressed in the plan (see section 1.9.4). Climate change is explicitly and implicitly related to many of the objectives identified for the refuge. It is specifically addressed in Goal 1 (section 2.1.1) Objective 4 and indirectly in Objective 1 through the monitoring of wildlife populations and habitat. Please refer to our responses to The Wilderness Society comments on climate change for additional information.*

Comment: Change the word ‘conservation’ to the word ‘protection’.

Response: *The word “conservation” will remain in the plan because the first principle of the Refuge Administration Act 1997 states: Conservation of fish, wildlife, and plants, and their habitats within the Refuge System.*

Comment: Hunting use must be diminished... . Hunting is in no way compatible with any safety for the general public which likes to hike, bike, etc.

Response: *Refuge purposes are presented in section 1.4.1 of the plan. One of these purposes is to provide the opportunity for continued subsistence uses by local residents. This includes subsistence use of wildlife and fish. ANILCA sections 302(1) and (2) specify that these activities will be allowed as long as they are consistent with the other refuge purposes of conserving fish and wildlife populations and habitats in their natural diversity and with meeting international treaty obligations.*

The National Wildlife Refuge System Administration Act identified six priority public uses to be facilitated on refuges when they are compatible with refuge purposes (plan sections 1.2.3 and 2.4.6). These priority public uses include hunting, fishing, wildlife viewing and photography, and environmental education and interpretation. Recreational hunting, trapping, commercial big-game hunting guide services, and subsistence activities have been determined to be compatible with refuge purposes (see compatibility determinations, Appendix D).

Comment: No consult with Alaska Fish & Game... .

Response: *It is in the best interest of wildlife conservation and management that the Service continues to work with the Alaska Department of Fish & Game because of our shared*

responsibilities for managing Alaska's fish, wildlife, and habitat resources. How we work together is spelled out in our Master Memorandum of Understanding (see Appendix B).

Comment: No prescribed fires... .

Response: *Prescribed fire would be used on a very limited basis and for very specific purposes (i.e., to improve wildlife habitat or reduce hazardous fuel concentrations). The use of prescribed fire is specified in the Refuge Fire Management Plans.*

Comment: Very old data and does not support anything... .

Response: *The literature cited is the most current available.*

Comments and responses to the State of Alaska, The Wilderness Society, Nulato Tribal Council, and Born Free USA:

STATE OF ALASKA

ANILCA IMPLEMENTATION PROGRAM
Office of Project Management and Permitting

SARAH PALIN, Governor

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PH: (907) 269-7529 / FAX: (907) 334-2509
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December 15, 2008

Kenton Moos, Refuge Manager
U.S. Fish & Wildlife Service
P.O. Box 287
Galena, AK 99741

Dear Mr. Moos:

The State of Alaska reviewed the Draft Revised Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges. This letter represents the consolidated views of the State's resource agencies. We appreciate the overall level of coordination that occurred during this planning process. As a result, our comments on the Draft Revised CCP primarily request inclusion of additional information or clarification in the final plan or decision notice.

Subsistence Use of Off-Road Vehicles

We support the objective (Objective 7, page 2-8) to monitor and assess the use of off-road vehicles on the refuge. We request the historic review and subsequent development of threshold levels be done in cooperation with the State. State agencies also have an interest in the habitat values of state lands within the refuge, as well as maintaining traditional access for subsistence purposes per Section 811 of the Alaska National Interest Lands Conservation Act (ANILCA).

Response: *No change was made to the objective. The State and others will be invited to participate in the review of historical use of off-road vehicles. The objective does not address threshold levels.*

Compatibility Conditions

We appreciate the intent of the introductory statement in the “*Stipulations Necessary to Ensure Compatibility*” section of certain Compatibility Determinations (CDs) to clarify that some of the conditions listed are “typical” and not all are necessary for compatibility. However, further clarification would help the public and government agencies understand that individual conditions may be modified or removed based on a specific proposal under certain circumstances. In some situations, the result may involve adding, deleting, or modifying specific conditions; or perhaps creating a whole new compatibility determination for the specific proposed activity. These options are not apparent in the current introductory language (noted below). We are concerned that certain conditions, while identified generally as “typical,” may discourage the public from attempting to seek approval.

A special use permit with stipulations is required for most [name activity] on the Refuge. The permit includes details of the specific project. Below are typical special use permit stipulations, 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.

Below are two examples that illustrate this concern:

- Page D-40, Helicopter Landings, 6th Bullet: This condition, which prohibits the “*herding, harassment, hazing or driving wildlife*” would potentially prevent the State from conducting standard collaring operations or other types of close aerial observations that cannot generally be done without being out of compliance. While we are pleased the Description of Use includes “*State of Alaska wildlife capture work, and fish or wildlife surveys*” (See page D-38), it is not clear that such conditions could be removed for these types of approved activities.

Response: *The requested change was not made. The specifics of any helicopter landing special use permit will be addressed on the face of the permit and in the special conditions attached to the permit. We further clarified this under the stipulations section of the compatibility determination.*

- Page D-53, Reburial of Archaeological Human Remains, 6th bullet: This condition prohibits the use of helicopters for this activity. As a result of recent discussions, we understand that should the Refuge receive a proposal that involved the use of helicopters, it could not be approved under this compatibility determination; however, the request could be considered under a separate, customized compatibility determination.

We therefore request clarification of available options. An unrelated clarification relative to “*maintenance of defensible space*” is also included. If for some reason the suggested language (below) is problematic, we request an opportunity to work with the Service to suitably clarify the intent.

A special use permit with stipulations is required for [name activity]. The permit includes details of the specific project. Below are typical special use permit stipulations, some of which are necessary for compatibility. Site-specific special use conditions related to maintenance of defensible space for fire management purposes will be incorporated into permits on a case-by-case basis. ~~Other~~ Project-specific stipulations ~~may be~~ included in individual permits may vary from those listed below. In some circumstances, the proposed removal or modification of a stipulation may require a new compatibility determination.

Response: *As previously indicated, we would not allow helicopters for access for reburial of human remains as we do not believe helicopters are necessary for this activity. As for use of helicopters for authorizer cooperative work by the Alaska Department of Fish and Game, we believe they are adequately covered in our previous remarks and the compatibility determinations for scientific research and Alaska Department of Fish and Game Management and Public Safety Wildlife Enforcement Activities..*

Page Specific Comments

Summary Table, Page 12, Off-Road Vehicles: Alternative B indicates “*Not allowed, with very few exceptions.*” If a summary of the final plan is released to the public, we recommend referencing Section 2.4.13.2 in the plan, which identifies the potential exceptions.

Response: *This section of the summary was specific to the draft plan and will not be included in a summary of the Final plan.*

Page 2-59, Table 2-1, Off-Road Vehicles: The section references under Wilderness, Wild Rivers and Minimal Management are not consistent with those referenced in the General Management Guidelines. Since this is the public access section of the table, the appropriate reference is *Off-Road Vehicles, Section 2.4.13.2*.

Response: *The requested change was made.*

Page 2-73, Section 2.9.2, Minimal Management: It is unclear why the description of minimal management includes a comparison to resource and wilderness values found in designated Wilderness. Linking minimal management to designated Wilderness in this manner is potentially misleading. Noting the description of minimal management on page 2-14 does not include such a comparison or reference, we request the first sentence be revised as follows:

Lands in this category would be managed to maintain the condition of those areas that have high fish and wildlife and wilderness values. Public uses...

Response: *This section does not appear in the Final Plan. It related to language in the original plans from 1987 and reflects the language of those original plans.*

Page 3-1, Section 3.1.1, first paragraph: We recommend adding the Alaska Statehood Act (PL-85-508) as an additional Act of Congress influencing land ownership within Koyukuk, Northern

Unit Innoko, and Nowitna Refuges. To state that only two acts of Congress, the Alaska Native Claims Settlement Act (ANCSA) and ANILCA, determined land ownership patterns of the Refuges is inaccurate. ANCSA, ANILCA, the Alaska Statehood Act, equal footing, public trust doctrine, federal law, and the Alaska Constitution determined land ownership and management responsibilities for the beds of navigable and other State waters in the Refuges.

We therefore request the first sentence be revised as follows:

~~Two~~ Three acts of Congress, the Alaska Statehood Act, the Alaska Native Claims Settlement Act of 1971 (ANCSA), and the Alaska National Interest Lands Conservation Act of 1980 (ANILCA), determined the current land ownership patterns of the Refuges.

Response: *The requested change was made.*

Page 3-3, Table 3-4, footnote “a”: Although it is presumed that the State of Alaska received title to the beds of rivers of 198 feet or more in width and lakes of 50-acres or more, the State of Alaska received title to the beds of all navigable waters at statehood, including rivers less than 198 feet in width and lakes smaller than 50-acres that meet navigability criteria. Navigability, for purposes of establishing land title ownership (as defined by federal case law criteria), determines who owns the submerged lands beneath water bodies on the Koyukuk, Northern Unit Innoko, and Nowitna National Wildlife Refuges. If navigable, the State owns the submerged lands. If non-navigable the adjacent upland owner owns the submerged lands. Ownership of the majority of submerged lands within the boundaries of the Koyukuk, Northern Unit Innoko, and Nowitna National Wildlife Refuge is unresolved. To clarify that navigability status is not limited by the criteria established for the acreage calculations used in these tables, we request the following changes:

Acreage figures do not include submerged beds of meanderable ~~ing~~ 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.

Response: *The requested change was made.*

Page 3-56, 3.3.3.4. Concerns Regarding Fish, Wildlife and their Habitats.

Alteration of Wild Salmon Stocks Caused by Artificial Enhancement: We understand there is some concern regarding the variability in abundance among some stocks of salmon in the Yukon Drainage; however, variation is normal in wild salmon stocks. While a limited mitigation program exists to supplement Chinook salmon production lost to the Whitehorse Dam in Canada, there are no enhancement programs presently contemplated elsewhere in the Yukon. While not contemplated at this time, we appreciate that enhancement remains an available management tool. Should enhancement programs be proposed and evaluated, the Alaska Department of Fish and Game (ADF&G) has highly developed processes to ensure the genetic viability and maintenance of all affected fish stocks. We therefore request insertion of the following sentence before the last sentence in the paragraph:

However, rigorous policies and guidelines of the Alaska Department of Fish and Game (ADF&G) help mitigate concerns about the potential for inadequate escapement, loss of genetic diversity, or an unsustainable harvest.

We also request the following cross reference at the end of the discussion: (See page 2-2, 2.1.1, Objective 2.).

In addition, the term “*artificial*” is not defined in Service policy or regulation, whereas “*enhancement*” is defined. The two terms also appear duplicative so it is potentially confusing to combine them in this context. We therefore request deleting “*artificial*” in both the heading and body of this discussion.

Response: *The requested changes were made.*

Page 3-72, Section 3.4.3, Huslia, fourth paragraph, first sentence: We request that trapping not be specifically characterized as a subsistence activity. Trapping is conducted for a variety of reasons, including for personal use for food and clothing, for the creation of crafts for sale and for the direct sale of the fur. In addition, the State categorizes and manages trapping as a distinct type of regulated take. We therefore request the following revision to the first sentence:

Trapping is a major subsistence activity in Huslia. Trapping is a major activity that supports the subsistence lifestyle of the residents of Huslia, providing furbearers for clothing, crafts, and sale, as well as food.

Response: *The requested change was made.*

Page 3-72, Galena, third paragraph, first sentence: For the same reasons as noted above, we request that the reference to trapping be changed from a “*very active subsistence activity*” to “*a common activity that supports the subsistence lifestyle of the residents of Galena.*”

Response: *The requested change was made.*

Page 3-77, Section 3.4.6, first paragraph, fifth sentence: Since the Service intends to produce a report that determines whether off-road vehicles were traditionally used for subsistence access on the refuge (Goal 7, Objective 7), we request the following revision to this sentence:

There is currently no known local use of three or four-wheelers or other off-road vehicles for access to subsistence resources on the Refuge.

Response: *The requested change was made.*

Compatibility Determinations

Page D-2, Refuge Purposes, (all CD’s), Nowitna River Wild and Scenic River Designation: While ANILCA designated the Nowitna as a Wild and Scenic River, it did not identify specific attributes as indicated in the CDs. We recommend the following revision:

While not a refuge purpose, ANILCA designated the Nowitna River as a Wild and Scenic River within the refuge boundary. The Nowitna River is managed as a wild river because of its natural, free flowing condition, water quality, wildlife, geology, and primitive setting.

Response: *The requested change was made.*

Page D-7, Commercial Big Game Hunting Guide Services, Description of Use, second to last paragraph: We understand ORV use is not allowed under the 2004 Prospectus for Big-Game Guide Services on the Refuge. Because 43 CFR 36.11(g) includes the option to issue permits for ORV use, we request the following clarification:

The 2004 Prospectus prohibits the use of off-road vehicles by big-game hunting guides and their clients on Koyukuk/Nowitna Refuge.

Response: *The requested change was made on page D-6.*

Page D-12, Commercial Big Game Hunting Guide Service: Regarding the term “high quality” in the CD for Commercial Big Game Hunting Guide Services, we understand this is a reference to a separate prospectus document that is not subject to public review in this planning document. However, neither the regulation at 50 CFR 36.41(e)(4), (which authorizes the prospectus process) nor the policy 605 FW 1.6, refer to a “high quality” experience, but instead direct the Service to evaluate the success of programs based on visitor experience (“quality”). For the record, we are concerned when this terminology is used to set a subjectively high bar for management without accompanying definition or standards. In a separate venue, we will be contacting the Division of Visitor Services and Communications to discuss this issue.

Response: *The requested change was not made. The ability to provide a “high-quality” hunt as defined in the prospectus is a key selection factor for big-game hunting guide applicants.*

Page D-18, Commercial Fish Guiding Services, 5th bulleted stipulation: According to the Alaska Department of Environmental Conservation (DEC) regulation at 18 AAC 72.020, human waste must be disposed of at least 100 feet away from the ordinary high water mark (OHWM) of streams, rivers, or lakes. This distinction is important because a separation of 150 feet from surface water may, in some instances, still not meet the required 100 foot setback from the OHWM. We request wording this stipulation consistent with the applicable DEC regulation.

Response: *The requested change was not made because these are Regional Standard Special Conditions. We have provided these comments to the office responsible for Regional Standard Special Conditions.*

Page D-19, Commercial Fish Guiding Services, Refuge Specific Special Conditions, 4th stipulation: We appreciate that this stipulation specifies “intentional” in reference to actions that interfere with subsistence activities or access. We request the stipulation be worded the same in all CDs where included (see below).

Commercial Transporter Services, D-32
Commercial Big-Game Hunting Guide Services, page D-11
Commercial Recreational Guide Services, page D-27
Helicopter Landing, page D-41
Subsistence Cabins and Trapping Cabins, page D-83

It would also be useful for the public to know where maps of the refuge are available. (e.g., the refuge office in Galena, regional headquarters in Fairbanks, on the internet, or elsewhere). We recommend including that information in the stipulation.

Response: *The requested changes were made. Map availability information was also added.*

D-41, Helicopter Landings CD, Refuge Specific Special Conditions, 1st bullet: We request this stipulation be removed from the CD primarily because direction related to operation of in-flight aircraft falls under the authority of the Federal Aviation Administration. Secondly, while we appreciate the intent is to reduce disturbances to wildlife, for all practical purposes it is very difficult under some circumstances (e.g. sighting at short distances) to avoid unintentionally disturbing wildlife and studies have generally shown that many unintentional disturbances are usually short lived and have few long term effects. At a minimum, we recommend changing “*Ensure that...*” in the first sentence to “*Encourage...*” In addition, this stipulation may actually result in increased disturbances if changes to a flight path or altitude cause an aircraft to stay within sight and sound of wildlife longer or resulting adjustments to rotor “pitch” increase or otherwise alter noise levels. We request the Service instead continue to rely on flight advisories currently in effect (and noted on FAA Flight Charts) for transiting refuges as well as existing federal and state regulations that prohibit the intentional harassment of wildlife.

Response: *The phrase “Ensure that” was replaced with the word “encourage”.*

Page D-58, Recreational Hunting, Justification, first sentence: We request this sentence be revised to more accurately portray the intent of the Koyukuk Controlled Use Area.

All lands within the Koyukuk /Nowitna Refuges, except private inholdings, are open to general public access, except in the Koyukuk Controlled Use Area, where use of aircraft in the support of moose hunting is not allowed.

Response: *The section was changed to read, “All lands within the boundary of the Koyukuk/ Nowitna Refuges, except private inholdings, are open to general public access. In the Koyukuk Controlled Use Area, use of aircraft in the support of moose hunting is not allowed. Aircraft access in support of moose hunting is allowed in all other areas of the Refuge.*

Page D-63, Recreational Fishing, Anticipated Impacts of the Use, first paragraph: We request the following revision of this paragraph to more accurately reflect the status of salmon fisheries within the area:

Salmon stocks have displayed the normal variation of abundance expected in wild salmon, with some years having reduced returns and others displaying high productivity. In response to the variation of abundance, State and federal fishery management may be adjusted to allow increased or reduced harvest, as appropriate. Currently, there are no

indications that recreational fishing (for resident and anadromous fish) is not sustainable.

Response: *We checked with our fisheries staff, and they recommended we modify the language in the first paragraph to say:*

Both the Federal Subsistence Board and State Board of Fisheries regularly adopt regulations in response to fish population levels and to address issues of fishery allocation. Providing an opportunity for continued subsistence uses of fishery resources by local residents receives the highest priority from the Federal Subsistence Board. Recent, 1918 to present, Chinook salmon returns have been characterized as poor, and managers (State and federal) may restrict recreational use of this resource. Chum salmon experienced a worrisome decline in the late 1990s; however, recent run strengths indicate that a recreational fishery on chum salmon currently is sustainable.

We defer to their expertise and are not making the change recommended by the State. We will modify our response to comments accordingly.

Page D-68, Scientific Research, and Description of Use, last paragraph, 2nd sentence: We request the following revision to clarify that the listed modes of access are authorized under ANILCA 1110(a):

Potential means of access include those authorized under ANILCA 1110(a), such as fixed-wing aircraft, motorboats, snowmachines (during adequate snow cover) and nonmotorized surface transportation such as canoeing, hiking, snowshoeing, and cross-country skiing.

Response: *The requested change was made.*

Thank you for this opportunity comment. Please contact me at (907) 269-7529 if you have any questions.

Sincerely,

/ss/

Susan E. Magee
ANILCA Project Coordinator

cc: Sally Gibert, ANILCA Program Coordinator



THE WILDERNESS SOCIETY

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(sent via electronic and regular mail)

December 15, 2008

RE: Comments On Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges Draft Revised Comprehensive Conservation Plan and Environmental Assessment

Dear Helen Clough:

Thank you for the opportunity to comment on the Draft Environmental Assessment (EA) of the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuge Comprehensive Conservation Plan (CCP) Revision. Please accept the following as comments submitted by The Wilderness Society and the Northern Alaska Environmental Center.

The Wilderness Society (TWS), founded in 1935, is a non-profit membership organization devoted to preserving wilderness and wildlife, protecting America's prime forests, parks, rivers, deserts, and shorelines, and fostering an American land ethic. With 225,000 members nationwide, TWS has approximately 758 members in Alaska, all of whom share an interest in how the Koyukuk/Northern Unit of Innoko/Nowitna National Wildlife Refuge is managed.

First, we recognize and commend the overall good work that has gone into identifying the purposes, values and research goals of the Refuge outlined by the U.S. Fish and Wildlife Service (the Service) in the Draft CCP. In general, we support the Service's goals and objectives for the Refuge, and the Service's preferred alternative.

We do have some specific concerns with the EA and additional comments, however, and they are as follows:

I. Wilderness Reviews:

The Service has clarified that the CCP revision process is one where refuges will be evaluated and lands designated related to their resources and values. In a newsletter regarding the Koyukuk/Northern Unit of Innoko/Nowitna National Wildlife Refuge CCP revision process, for example, the agency indicated:

These plans designate areas within the Refuge according to their resources and values; specify programs for conserving fish and wildlife and maintaining other special values of the Refuge

Both existing and potential future designated wilderness is a resource and a value of the refuges which must be addressed. The Service's laws and policies require that wilderness reviews be conducted as part of the CCP process. However, the Service has failed to complete wilderness reviews or make recommendations for future wilderness designation thus far in the CCP revision process for Koyukuk/Northern Unit of Innoko/Nowitna Refuge.

For example, Section 304(g)(1) and (2) of the Alaska National Interest Lands Conservation Act (ANILCA) directs the Service to develop and periodically revise CCP's which must identify and describe the special values of the refuge, including wilderness values. Specifically, the Alaska National Interest Lands Conservation Act (ANILCA) Section 304(g) states:

- (1) The Secretary shall prepare, and from time to time, revise, a comprehensive conservation plan (hereinafter in this subsection referred to as the 'plan') for each refuge.
- (2) Before developing a plan for each refuge, the Secretary shall identify and describe –
 - (A) the populations and habitats of the fish and wildlife resources of the refuge;
 - (B) the special values of the refuge, as well as any other archeological, cultural, ecological, geological, historical, paleontological, scenic, or wilderness value of the refuge;”

Additionally, Section 1317(a) of ANILCA directs the Service to study all of the non-wilderness lands in Alaska refuges and recommend areas suitable for inclusion in the National Wilderness Preservation System. Section 1317(a) of ANILCA states:

Within five years from the date of enactment of this Act, the Secretary shall, in accordance with the provisions of section 3(d) of the Wilderness Act relating to public notice, public hearings and review by State and other agencies, review, as to their suitability or nonsuitability for preservations as wilderness, all lands within units of the National Park System and units of the National Wildlife Refuge System in Alaska not designated as wilderness by this Act and report his findings to the President.

While the Service completed a process to determine wilderness recommendations in the 1980's, the Secretary of the Interior never forwarded the recommendations to the President. Therefore, the Service still has not met the requirements of Section 1317 of ANILCA.

Additionally, the National Environmental Policy Act requires that an agency analyze a reasonable range of alternatives in every agency action, such as a planning process like the CCP Revision. Because all values and uses of the refuges must be considered in a broad planning

effort such as a CCP revision, analysis of wilderness recommendations is included within the reasonable range of alternatives.

The Service's Refuge Planning Policy (65 Federal Register 33892, May 25, 2000), which "applies to all units of the National Wildlife Refuge System" (i.e., it applies to refuges in Alaska) (602 FW 1.2), also requires that a new wilderness review be conducted as one of the required elements of all CCP's. Specifically, the Service's planning policy directs the following:

- "Concurrent with the CCP process, we will conduct a wilderness review and incorporate a summary of the review into the CCP" (602 FW 3.4(C)(1)(c));
- "Identify and describe the following conditions and their trends for the planning unit and, as appropriate, for the planning area: ... (xx) Existing special management areas, or the potential for such designations (e.g. wilderness, research natural areas, and wild and scenic rivers" (602 FW 3.4(C)(1)(e));
- "Develop a range of alternatives, or different approaches to planning unit management, that we could reasonably undertake ... to help achieve the goals of the National Wilderness Preservation System" (602 FW 3.4(C)(4)(b));
- The "Checklist of Required Comprehensive Conservation Plan Elements" found in Exhibit 3-3 of the planning policy includes "Wilderness review." "Wilderness review" is defined in the policy as "[t]he process we use to determine if we should recommend Refuge System lands and waters to Congress for wilderness designation. The wilderness review process consists of three phases: inventory, study, and recommendation. The inventory is a broad look at the refuge to identify lands and waters that meet the minimum criteria for wilderness. The study evaluates all values (ecological, recreational, cultural), resources (e.g. wildlife, water, vegetation, minerals, soils), and uses (management and public) within the Wilderness Study Area. The findings of the study determine whether we will recommend the area for designation as wilderness."

The "Checklist of Required Comprehensive Conservation Plan Elements" found in Exhibit 3-3 of the planning policy includes "Wilderness review." "Wilderness review" is defined in the policy as "[t]he process we use to Additionally, "Fulfilling the Promise: The National Wildlife Refuge System", the Service's vision document, released in March 1999, guides administration of the Refuge System. That document directs in part that:

The Service should evaluate lands added to the System since the Service completed its wilderness reviews and recommend suitable areas for designation. In addition, the Service should take a fresh look at areas previously studied for suitability as wilderness that were not recommended. For example, while the Service determined, in 1985, that 52.7 million acres of refuge lands in Alaska qualified for designation as wilderness, only 3.4 million acres were recommended for such designation. On many refuges, circumstances and management may have changed since the recommendations were made (pg. 23).

Thus, the legal requirements for including wilderness reviews and recommendations within CCP revision processes are clearly laid out, and TWS requests that the Service sufficiently review wilderness lands and make a range of wilderness recommendations within the Alternatives to be analyzed in the CCP revision process. Without completing a wilderness review and/or making recommendations for wilderness, we believe the Service is out of compliance with ANILCA, the National Environmental Policy Act (NEPA) and the agency's own policies and guidelines. The

U.S. District Court ruled in 2001 (*Sierra Club v. Lyons*, No. J00-0009-CV (D. Alaska March 30, 2001)) in a similar situation that the Forest Service needed to complete a wilderness review and analyze wilderness recommendations for the Tongass Land Management Plan in order to satisfy requirements of NEPA. At this time we do not believe the Service has met the legal and regulatory requirements for refuge CCP planning.

We believe planning for wilderness is especially critical in a changing climate, such as we are experiencing today. Wilderness, and other forms of wildland protection that support healthy, intact ecosystems, are our best tools for helping wildlands and the species that depend on them to adapt to climate change. With protection, ecosystem resiliency is maintained and species are provided with the time and space to adapt to climate change without the stress of other anthropogenic disturbances.

Wilderness and other conservation protection strategies provide important functions critical towards ecosystem resiliency and species adaptation:

1. Wilderness allows for change to occur. As Darwin describes in his 1859 publication *The Origin of Species*, organisms are constantly adapting to a changing environment. Wild ecosystems are constantly changing in response to such forces as fire and water; stasis is the exception. However, climate change is altering the environment to reflect conditions previously considered extreme or which are entirely out of the range that species have contended with. Increases in fire intensity and changes in the timing and intensity of storms will alter the intervals at which ecosystems can recover and provide habitat for wildlife. Wilderness provides species with large, unfragmented habitat for migration and refuge from areas that have burned, are experiencing drought or floods, or from the effects of other climate related disturbances.
2. Wilderness allows species to adapt. Large, unfragmented and wild landscapes can provide the habitat that species need to adapt to climate change. Some components of our natural systems are changing at rates that are out of sync with the species that depend on them. For example, plants may be flowering earlier but their pollinators may be delayed in arriving to do their job, with detrimental consequences for both organisms. In a large protected wildland, there is greater chance that these two species will find the right conditions to re-synchronize their life cycles. Restoration of ecosystems that have been diminished in size and health will increase the area of wildlands that can provide habitat for species in peril.
3. Wilderness protects diversity all scales. The increased health and diversity observed in the Yellowstone ecosystem when wolves were reintroduced is the way that wilderness operate everyday. Natural food webs grow from the bacteria in the soil that recycle the nutrients that support the plants that elk eat, and they, in turn, support the wolves, bear and humans that depend upon them. Only when a complete food web is protected can we achieve the resiliency needed for most, if not all, species to adapt to climate change.
4. Wilderness provides us with a healthy planet. Large ecosystems have shaped regional climates for millennia, as well as provided many other services that would cost us millions of dollars to replace. Clean air and water come from healthy undisturbed ecosystems; large, mature forests, grasslands and tundra store an abundance of carbon and are inherently resilient to fire; fish spawn in healthy, wild watersheds; waterfowl and songbirds feed, nest and rest in our wildlands; even natural forage for wild and domestic animals is abundantly produced on managed wildlands. Delivery of these services may become increasingly

difficult for ecosystems facing unprecedented warming and altered precipitation. Wilderness provides protection against additional human impacts to these services.

Wild ecosystems are inherently complex and variable. While scientific research is improving our understanding of them and improving predictions of how they will be impacted by climate change, we already know that by providing the above services, wildland protection and restoration of healthy ecosystems is the number one thing we can do right now towards helping the inhabitants of our planet adapt to climate change.

We believe the Service's decision not to review or recommend lands for wilderness recommendations is lacking and out of compliance with federal laws and agency regulations. We strongly urge the Service to complete wilderness reviews and recommendations in this comprehensive conservation planning process and request that this deficiency be rectified in the Final EA and Revised CCP.

Response: *After a thorough review of ANILCA section 304(g) planning requirements and the Refuge System planning policy, the Service determined that, until our wilderness review policy was complete, we could best meet the ANILCA requirements by identifying the special values of the Refuge and providing clearer direction for how the Refuge will be administered to protect these values without conducting a wilderness review. See section 2.7.2 of the draft plan. Wilderness values are described in Chapter 3. Note: The Service wilderness policy released on November 17, 2008, states (610 FW 5.17), "We have completed wilderness reviews for refuges in Alaska in accordance with section 1317 of ANILCA. Additional wilderness reviews as described in the refuge planning policy (602 FW 1 and 3) are not required for refuges in Alaska. During preparation of CCPs for refuges in Alaska, we follow the provisions of section 304(g) of ANILCA, which requires us to identify and describe the special values of the refuge, including wilderness values. Subsequently, the CCP must designate areas within the refuge according to their respective resources and values and specify the programs for maintaining those values. However, ANILCA does not require that we incorporate formal recommendations for wilderness designation in CCPs and CCP revisions."*

II. Wilderness Stewardship and Management:

We believe that wilderness character must be maintained on the Koyukuk Refuge, which includes the 400,000 acre designated Koyukuk Wilderness Area. In order to ensure that wilderness character remains, with outstanding opportunities for solitude, we strongly support the Service's efforts to this end. We believe the Objectives listed under Goal 8, "*Maintain the special values of the Nowitna Wild River and Koyukuk Wilderness and the wild character of the Refuge*" could be enhanced by additional focus and effort on wilderness stewardship and management.

Wilderness stewardship is a critical part of national wildlife refuge and ecosystem management. The following points have been adapted from the publications: Keeping it Wild: A Citizens Guide to Wilderness Management¹ and Wilderness Management: Stewardship and Protection of Resources and Values.² We believe recognition and the inclusion of these concepts would greatly benefit the wilderness stewardship and management efforts on the Koyukuk Refuge.

¹ TWS and US Forest Service Keeping it Wild: A Citizens Guide to Wilderness Management. 1992.

² Hende, John C. and Chad P. Dawson. Wilderness Management: Stewardship and Protection of Resources and Values. 3rd ed. Colorado: Fulcrum, 2002.

1. Allow natural processes to operate freely within wilderness. The Service should manage wilderness uses to minimize impacts to wilderness values. In wilderness, the natural forces of insects, disease, wildfire, wind, and wildlife are the managers.

2. Manage wilderness as a distinct resource with inseparable parts. The Service should look at the integrity of the whole wilderness area in making management ever mindful of what impact every decision, large or small, could have on wilderness. The Service should also look at the ecoregion or ecosystem context of a wilderness to see what decisions are being made outside of the wilderness that could affect or impact it.

3. Set carrying capacities to prevent unnatural change. Wilderness has a limited capacity to absorb the impacts of use and still retain its wilderness qualities. The Service should work within the Limits of Acceptable Change framework to protect the wilderness character of the Kenai Refuge while providing reasonable opportunities for wilderness-dependent recreation.

4. Monitor the social and ecological conditions of the area as a key to long-term wilderness stewardship. Only through sound research and monitoring can the Service identify baseline conditions and determine whether management objectives have been met.

5. Control and reduce the adverse impacts of human use in wilderness through education or minimum regulation. Wilderness management is not passive; it is very active, but it should be designed to be as unobtrusive as possible. The Service should think about temporal or spatial permitting or zoning of wilderness in very high use areas to protect the quality of the visitor experience. However, when use levels threaten the wilderness resource, then the Service must limit uses to protect the wilderness.

While we recognize that budgets are tight at this time, we strongly encourage education and direction along these lines regarding wilderness management on refuges.

Response: *Goal 8 specifically addresses maintaining the special values of the Koyukuk Wilderness and the wild character of the refuge.*

III. Motorized and Mechanized Activities in Wilderness:

We are concerned that recreational helicopter access may be allowed on the refuge and within designated Wilderness. Page 2 – 40 of the EA states that, “Where such use was established prior to Wilderness designation, it [helicopters] may be allowed to continue.” The Service, however, does not clarify under which authority it may allow helicopter air taxis in wilderness. We disagree that helicopter air taxis are allowed within refuge wilderness.

Section 4(c) of the Wilderness Act states, for example:

Except as specifically provided for in this Act, and subject to existing private rights, . . . there shall be no . . . use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure of installation within any such area.

Section 4(d) of the Wilderness Act continues:

The following special provisions are hereby made:

(1) Within wilderness areas designated by this Act the use of aircraft or motorboats, where these uses have already become established, may be permitted to continue subject to such restrictions as the Secretary of Agriculture deems desirable. . . (emphasis added).

The exception for activities that occurred prior to the establishment of a wilderness area applies only to Forest Service wilderness areas or other wilderness areas where such uses are permitted in the statutes that established such areas.

Clearly, helicopter use is not permitted in refuge wilderness areas under the Wilderness Act.

ANILCA does not allow helicopters in wilderness either. ANILCA outlines special motorized and non-motorized access provisions in section 1110(a) regarding conservation system unit lands, including wilderness. Section 1110(a) of ANILCA states the following:

Notwithstanding any other provision of this Act or other law, the Secretary shall permit the use of snowmachines, motorboats, airplanes, and non-motorized surface transportation methods for traditional activities (where such activities are permitted by this Act or other law) and for travel to and from villages and homesites.

ANILCA is very clear that it is *airplanes* that may be allowed in conservation system units, including wilderness, not helicopters. In addition, recreation is not a “traditional activity” for which airplane use may be allowed. It is not clear under what authority the Service believes it can allow for recreational helicopter air taxis in wilderness. Thus we believe that the proposed management direction, or “template”, violates the Wilderness Act regarding the potential use of helicopter air taxis for recreational purposes in refuges in Alaska.

IV. Overall Motorized Access:

Congress created limited exceptions in ANILCA to the restrictions normally implemented for motorized uses in conservation system units, including designated wilderness. These were important exceptions designed to accommodate and maintain opportunities for legitimate subsistence uses, which honor Alaska Natives and other rural Alaskans and their subsistence way of life. Specifically, ANILCA allows for subsistence purposes the use of snowmachines, motorboats and “other means of surface transportation traditionally employed for subsistence.” In addition, ANILCA allows snowmachines, motorboats and fixed-wing aircraft to be used in designated wilderness and other conservation system units for “traditional activities” and travel to and from homesites.

As outlined in the ANILCA Report of the Senate Committee on Energy and Natural Resources, traditional activities include “traditional and customary activities,” such as subsistence and sport hunting, fishing, berrypicking and travel between villages (Senate Report 96-413, 1979). Congress never intended to include recreational activities in the category of traditional activities. The Service should prohibit recreational use of snowmachines and ORVs within the Refuges.

The EA indicates that motorized access is and would be allowed “throughout the refuges.” The Service must clarify specifically what types of motorized use are being allowed on the refuges and for what purposes. In doing so, it should prohibit recreational use of snowmachines and ORVs.

Until the Service defines traditional activities, the agency must clarify that snowmachine and powerboat use is allowed on the Refuges for traditional activities as authorized under ANILCA Title XI or for subsistence as authorized under ANILCA Title VIII. The rulemaking process for defining traditional activities adopted for snowmachine use in the Old Park of Denali should be

followed by all Alaska federal land managing agencies, including the U.S. Fish and Wildlife Service. The EA appears may deviate from this planned approach. We believe that the Service should not authorize recreational snowmachine or powerboat use, until the Service defines traditional activities for the Refuges in a separate rulemaking process.

1. All-Terrain Vehicles (ATV's) and Off Road Vehicles (ORV's):

We are pleased to see that the USFWS intends to monitor and assess the use of off-road vehicles (ORV's) such as 4-wheelers and ARGO's on refuge lands by federally qualified subsistence users. We also strongly support the action to produce a report that determines if ORV's were traditionally used for subsistence access and examines the need for regulation of ORV use within three years of approval of the revised CCP. It is unclear to us at this time if ORV use is already occurring on the refuge, or if it is limited to off-refuge trails. We urge the agency to move quickly with its intended plan to determine traditional use of ORV's so that decisions can be made about ORV closures on the refuge.

Studies have shown that ATV use causes compaction and displacement of soils, erosion and sedimentation of riparian areas, air pollution, spread of invasive species, habitat destruction and fragmentation, and displacement and stress to wildlife populations. Studies in Wrangell St. Elias National Park and Preserve found that low levels (10 passes) of ATV use over tussock-shrub terrain, similar to much of the terrain in Alaska Peninsula and Becharof Refuges, causes substantial resource damage.³ We believe that cross-country, disbursed ATV/ORV travel and the resultant proliferation of user-developed routes are especially damaging to Refuge lands.

The Service has a responsibility to take protective measures before damage occurs. U.S. Fish and Wildlife Service regulations implementing ANILCA Section 811 stated:

The Refuge manager may restrict a route or area to the use of snowmobiles, motorboats, dog teams and other means of surface transportation traditionally employed by local rural residents engaged in subsistence uses if the Refuge Manager determines that such use is causing or is likely to cause an adverse impact on public health and safety, resource protection, protection of historic or scientific values, subsistence uses, conservation of endangered or threatened species, or other purposes and values for which the refuge was established. 50 CFR Sec. 36.12(b). (Emphasis added).

ANILCA Section 811 and U.S. Fish and Wildlife regulations at 50 CFR 36.12 directed the Service to proactively manage subsistence ATV use to prevent adverse impacts. On average, national ATV sales have increased 10 percent each year since 1996 and the vehicles are now going faster and further into the backcountry than ever before. It is widely accepted among land managers, scientists, and the general public that disbursed ATV use causes adverse impacts. We support the immediate implementation of the proposed ORV management actions outlined in Table 6-2 (DEIS, p. 6-8), such as designating areas or trails for use and limiting use in undesignated areas, and designating times of year or seasons that travel by ORV would be permitted.

³ National Park Service, U.S. Department of the Interior, "Response of Tussock-Shrub terrain to Experimental All-Terrain Vehicle Tests in Wrangell-St. Elias National Park and Preserve, Alaska, A Progress Report," by Charles H. Racine and Gary M. Ahlstrand. 1985.

Response: *Regulations (43 CFR 36.11) prohibit use of ORVs on refuge lands for recreational purposes, except on established roads, parking areas, and routes designated by the agency. There are no established roads, parking areas, or designated routes on the Refuge, and none are planned.*

Compatible public recreational activities are allowed on Alaska refuges under 50 CFR 36.31(a). We have not defined “traditional” as it applies to this refuge; however, we have found recreational use to be a compatible use at current levels. We have also found current and projected use of motorboats, snowmobiles, and airplanes compatible with refuge purposes (see Appendix D, Compatibility Determinations).

2. Helicopters:

The Wilderness Society and Northern Center strongly support a prohibition on recreational helicopter access to the refuges. Such a prohibition should extend to all refuge lands. We believe that the social and ecological impacts from this type of access are significant and will alter the overall wilderness and natural character of the Refuges (please also see wildlife section regarding impacts from helicopters).

Response: *Service policy is that applications for permits to land helicopters for recreational purposes shall be considered on a case-by-case basis.*

3. Airboats:

The Service should clarify that airboats are prohibited on the Refuges because they were not found to be a traditional mode of access under ANILCA Title XI. The preamble to 50 CFR 36.39(i)(3)(i), a U.S. Fish and Wildlife Service regulation implementing ANILCA Title XI (as referenced in the preamble to the 2000 NPS Personal Watercraft Rule) states, “[w]ith respect to airboats, section 1110(a) of ANILCA and its legislative history indicate that motorboats were the only methods of motorized water transport that were to be given special access to conservation units.”⁴

Our groups in general object to airboat use on Alaska refuges because of their significant impacts to fish, wildlife, natural soundscapes, vegetation, and soils. The Service should review impacts from airboat use on navigable waters, however. If the use of airboats on navigable waters disturbs or would disturb wildlife, then the Service has the authority, grounded in its Property Clause authority, to manage the public lands and to restrict the use of airboats even if the state has regulatory authority over the navigable waters.

Response: *By regulations, airboats are classified as off-road vehicles. Current regulations prohibit their use except on designated routes or areas or under special use permits. Currently there are no designated routes or areas or special use permits authorizing their use nor are any planned. Airboats are not an issue on the refuge.*

V. Wild and Scenic Rivers:

There is currently a designated Wild River -- the lower 223-mile portion of the Nowitna River -- within the Koyukuk/Northern Unit of Innoko/Nowitna National Wildlife Refuge. The EA

⁴ Personal Watercraft Use Within the NPS System, 65 Fed. Reg. 15082, 15082-3 (April 20, 2000).

outlines management direction for this river on page 2-22. In general we support the management direction outlined in the EA for the Nowitna Wild River; however, we believe the USFWS management of this Wild River could be enhanced by incorporating relevant items under Wilderness Stewardship and Management into the management direction. As is true with wilderness recommendations, the Service has unfortunately opted not to include Wild and Scenic River recommendations in this CCP revision process.

We believe the Service is missing an important opportunity to recommend Wild and Scenic Rivers for the Refuge. We believe the Service must give consideration to potential national wild, scenic and recreational river areas as directed by 16 U.S.C. Sec. 1276(d) (1).

***Response:** After a thorough review of ANILCA Section 304(g) planning requirements and Refuge System planning policy, we determined that we would best meet ANILCA requirements by identifying the special values of the refuge without conducting a Wild and Scenic Rivers review. Section 3.6 of the plan provides the Service's rationale for not conducting Wild and Scenic River reviews.*

VI. Climate Change and Ecological Research

We believe that maintaining healthy, wild ecosystems is critical towards helping all organisms, including humans, adapt to climate change. The Koyukuk, Nowitna and Innoko NWRs are an excellent example of such ecosystems. Keeping this area wild and protected from adverse levels of anthropogenic stressors, include increasing wildlife harvest demands, will promote resiliency and adaptation in the face of rapid environmental change.

In Section 2.9.3.4 (Issue 4: How will the Refuge monitor and address the effects of climate change?) the draft CCP states that no climate change specific monitoring plans are in place and the refuges covered in this EA will not develop such a plan. We do hope to see climate change addressed in step-down plans in the future. At this time, however, we feel that it is important to take into consideration future climate scenarios when designing inventorying and monitoring plans. Capturing the impacts of climate change may require concomitant collection of data on other variables. Having future climate scenarios will help with hypothesis formulation on the impacts of climate change and subsequently assist in study design to assess the actual changes. At present there are no climate change-specific monitoring plans in place. Changes in climate would be deduced from changes measured/observed in existing wildlife and habitat monitoring efforts.

We are pleased to see the CCP include assessment of climate change and its effects within Goals and Objectives outlined in Chapter 2. We feel the following points are especially critical and make suggestions for further action in a few instances:

- 1) We support the inclusion of climate change in the updated Inventory and Monitoring Plan as indicated in Goal 1 and Objectives 1 and 4 of Alternative B. Future climate scenarios are readily available from the University of Alaska for use in developing hypothesis to guide monitoring climate change impacts to species and ecosystems on the refuges. The Wilderness Society can help the refuges access this information. We encourage expanded monitoring within the permissible level of action or development allowed within management categories.

Response: *The climate change modeling work being conducted by the University of Alaska Fairbanks has been used by refuge staff to assess effects on the refuge resources and will continue to be used along with other state-of-the-art information.*

- 2) It is important to prioritize monitoring and evaluation of abiotic parameters, especially climate, in order to interpret changes in biotic variables. We encourage the refuges to maintain, and expand if possible, weather station monitoring on the refuges or to support monitoring conducted locally by villages or other agencies.

Response: *The updated Inventory and Monitoring Plan will include monitoring priorities. These will be evaluated periodically and adjusted as they change over time. Local weather records have already been analyzed by the Refuge and will continue to be monitored.*

- 3) Fire frequency and severity is predicted to increase as temperatures warm and moisture diminishes as a result of climate change. Incorporating the knowledge gained through cooperative efforts between the USFWS (Karen Murphy) and the University of Alaska SNAP program to model future climate, fire and vegetation scenarios on the refuge will be helpful in designing Refuge Fire Management Plans. We suggest that Goal 2 Objective 2 be expanded to specifically include these data and results. We strongly support refuge efforts to maintain GIS databases of fire frequency and occurrence to help understand current and future fire and landcover patterns. These scenarios and data will also be critical towards Goal 3, and so future fire scenarios should be used in revising Fire Management Plans.

Response: *The results of the modeling work being conducted by UAF (using the ALFRESCO model) have already been incorporated in this plan and in the refuge fire management strategies.*

- 4) Coupled with climate monitoring, an understanding of hydrologic conditions on the refuges is needed. Inclusion of climate change impacts and future scenarios of water availability should be included in Goal 4 (Water Resources). We strongly support improving the hydrologic assessments as recommended in the CCP.

Response: *The Wetland Inventory and Monitoring Plan (section 2.14) would address climate change impacts on water availability.*

- 5) Because climate change science is progressing at a rate nearly as rapid as the phenomena itself, it is important for refuge personnel to be aware of the potential impacts to and solutions appropriate for the refuge. We encourage the incorporation of training and education for current and new staff on climate change under Goal 12 (Personnel) in order to insure that refuge personnel are encouraged to stay abreast of the latest science and engage in research and solutions. Further, inclusion of opportunities for better understanding of climate change impacts on infrastructure and energy conservation under Goal 11 (Facilities) would also contribute to the sustainable operation and management of the refuge.

Response: *Climate change training has been and will continue to be available on national and regional levels. The Alaska Region and the Refuge are committed to working with other agencies, the State, local governments, and other partners in addressing climate change issues.*

In addition to specific concerns about how climate change is addressed in the CCP, we feel the following ecological research objectives are also important to sustainable management of the refuge:

- 6) We strongly support continuation of long-term research and monitoring which appears to be administered through the I&M Plan. These types of data are important for detecting change and inclusion of this in Section 2.4.9 Ecosystem and Landscape Management is strongly supported.
- 7) Section 2.4.10.1 describes habitat management goals. We feel that it is important to manage the landscape in order to maintain natural diversity and natural processes. However, as climate change potentially alters the landscape and species assemblages, it may be impossible to manage the landscape to resemble what it looks like historically. To address this, we reiterate the importance of incorporating future climate, fire and vegetation scenarios into management planning. Encouraging refuge staff to expand their understanding of climate change impacts and staying abreast of the current science is critical. Further, adopting a regional approach, rather than individual refuge-specific, to habitat management will be important. Integrating these 3 refuges into one CCP is one way to achieve integrated regional planning, and further cooperation with other adjacent federal, state and tribal resource managers is also important.
- 8) We would like to suggest inclusion of specific objective under Goal 1 that prioritizes data sharing. Data sharing between the refuge, partners and other interested parties is perhaps of equal importance as the actual data collection for refuge purposes, and we suggest that the CCP identify this as a general management direction. Even though data sharing is implicit in the direction for some specific management directions (e.g. developing an interagency program to monitor...wolves, wolverines, bears...), we suggest that it be incorporated as a specific objective in order to insure consideration of personnel and systems needed to contribute to data to broader science synthesis goals.

Response: *Goal 10 (section 2.1.10) addressed this concern.*

- 9) Incorporating a ecological network or flow diagram to aid in elucidating the cause-and-effect relationships within the refuge's ecosystems and across the broader landscape occupied by these refuges may help to insure appropriate prioritization of objectives, given time and funding limitations, and help insure that the ultimate choice of methods maximizes realization of the top objectives.

Response: *The scale of this level of analysis encompasses a landscape larger than the Refuge and is being done by regional and national office staff in collaboration with other agencies, the State, local governments, and other partners.*

- 10) Use of Least Cost Path Analysis and other connectivity modeling tools can help the refuge assess implications of land management decision on refuge goals and resources. We encourage the refuge to include analyses in the Final CCP that demonstrate how chosen actions will preserve the connectivity of the refuge in the face of recreational, industrial and administrative demands, fire and insect ecology, the cumulative effects of climate change and other factors which threaten the integrity of wildland habitat. We provide an example of how Least Cost Path Analysis can be used to assess the impacts of roads on road-shy wildlife in an

attached document by TWS Landscape Ecologist., Bo Wilmer. Within the USFWS there is an effort to understand connectivity across Alaskan landscapes, and when data become available we encourage refuge staff to consider the outcomes of this study, lead by John Morton and Karen Murphy, in their planning.

Response: *Other connectivity models have been and will continue to be utilized by refuge staff to assist in the management of refuge resources.*

Overall we feel that this CCP suggests an intent to consider climate change. We would like to see more specific actions that can be taken to insure that managers and scientists have access to and prioritize the best available climate change science in developing mid to long-term research plans.

Response: *Altering the trajectory of climate change is beyond the scope of the Refuge. The Refuge has decided to actively monitor changes in wildlife populations and activities, habitat, the hydrologic cycle, weather patterns, and fire activity as surrogates of climate change, incorporating local knowledge and observations.*

IV. RS2477:

We agree with the Service that the identification of RS 2477 rights-of-way by the State of Alaska does not automatically make them valid; rather, such claimed rights-of-way are not valid until they have been determined to be so through a legitimate process applying the proper legal standards. Under no circumstances may section line easements be legitimate RS 2477 rights-of-way. We appreciate the Service's attempt to disclose the States assertions regarding RS2477.

V. Conclusion:

Overall, we support the conservation measures proposed in the revised CCP Draft EA, and encourage the Service to revise some of the proposals that we have expressed concern over in this letter, such as wilderness reviews, recommendations, stewardship and management, wild and scenic river recommendations, and a greater emphasis and integration of climate change measures in planning and future management.

We appreciate the opportunity to submit these comments on behalf of our collective members in Alaska and nationwide.

Sincerely,



Nicole Whittington-Evans, M.S.
Associate Regional Director, Alaska

And



Wendy Loya, PhD
Ecologist

The Wilderness Society

Cc: Kenton Moos, Refuge Manager

NULATO TRIBAL COUNCIL

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October 22, 2008

Helen Clough, Chief of Planning
U.S. Fish and Wildlife Service
1011 East Tudor Road, MS 231
Anchorage, Alaska 99503

RE: Comprehensive Conservation Plan/Koyukuk and Northern Unit of Innoko Refuges

Dear Ms. Clough,

A public meeting will be held in Nulato on Wednesday, October 29, 2008 to discuss management of the Wildlife Refuges that will be the operative policy for the next decade and beyond.

It is impossible for every individual to review the draft plan and for them to comment on the plan. A few public disclosures about the plan will be beneficial to the attendees' and provide them with information they need to know regarding their traditional and continued usage of the resources within the Refuges.

Without question, Attentive A is the preferred management alternative for the following sound reasons:

- the traditional users are familiar with current rules and regulations
- current policies manifest minimal management
- current policies minimize disturbance of fish and wildlife

Subsistence activities and opportunities must be maintained for the local residents (traditional users) and must have priority over all other uses of fish and wildlife resources. Recreational and sporting activities must be minimized. A couple prohibitions will be standing policy: there will be no wilderness designation in the Northern Unit of Innoko Refuge (Kaiyuh Flats) and there will be no oil and gas leasing.

Response: *Subsistence activities and opportunities are provided for under ANILCA and specifically addressed by Goal 7 (section 2.1.7).*

The Land Bank Agreement that Fish and Wildlife Service has with Gana-A'Yoo, Limited must be maintained and that Gana-A'Y00, Limited's shareholders are aware of the conditions implied in the Agreement.

Response: *The Land Bank Agreement between Gana-A'Yoo and the Service is no longer in effect. Amendments to ANILCA (1988) provided for the same protections of Native-owned lands, and it was mutually decided to cancel the agreement.*

Twenty years ago, no commercial guides or outfitters operated in the Northern Unit of Innoko Refuge (Kaiyuh Flats). Now, they are permitted to operate in the Refuges. There cannot be legal prohibition of these activities. Therefore, these activities must be strongly (as opposed to reasonably) regulated.

ATV's must be prohibited in the Refuges and timber harvesting, for commercial purposes will remain a prohibitive activity.

Response: *Commercial guides are regulated through the compatibility determination process and have to comply with regional and refuge stipulations. See Appendix D pages D-6 through D-34.*

ATVs are only allowed on designated trails; currently there are no designated trails on the Refuge, and we have no plans to designate any trails at the present time.

Only subsistence use of timber is permitted on the Refuge (50 CFR part 36.15).

Sincerely,

Peter Demoski
Tribal Administrator

cc: Kenton Moos, Refuge Manager
Fish & Wildlife
Galena, Alaska 99741

November 26, 2007

Helen Clough
Chief of Planning
U.S. Fish and Wildlife Service 101 East Tudor Road MS 231
Anchorage, AK 99503

Sent via U.S. Mail and E-mail Koyukuk/Nowitna planning@fws.gov

RE: Koyukuk, Northern Unit Innoko and Nowitna NWR: Draft Revised Comprehensive Conservation Plan

Dear Ms.Clough,

On behalf of Born Free USA. United with Anima! Protection Institute (Born Free USA) and our supporters nationwide, I am pleased to offer these comments on the Draft Revised Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Koyukuk, Northern Unit and Nowitna National Wildlife Refuges (NWRs).

Our organization is very concerned that in managing National Wildlife Refuges, the U.S. Fish and Wildlife Service (FWS) has strayed far from its own policy, which "directs that wildlife comes first in the National Wildlife Refuge System" (602 FW § I.4A; emphasis added). Many refuges allow, and even encourage, activities detrimental to wildlife, including hunting, fishing, trapping, motor boating, and jet skiing. In many instances, these recreational uses are permitted in the absence of thorough and accurate biological data on the species inhabiting and migrating through the refuge.

While the National Wildlife Refuge System Improvement Act of 1997 16 U.S.C. § 668dd, et seq. (hereafter "the Act") establishes hunting as a priority use, the Act also requires refuges to conduct rigorous scientific research into the status of refuge wildlife populations and use this information to guide refuge planning. Further, the Act makes does require trapping to be considered as a "priority use."

It is our hope that the management team for the NWRs in question will help to restore these public lands to their original purpose of providing a "refuge and breeding place" for "migratory birds, other wild birds, game animals, fur-bearing animals, and for the conservation of wild flowers and aquatic plants." (Per Public Law 268).

Response: *Refuge purposes are presented in section 1.4.1 of the plan. One of these purposes is to provide the opportunity for continued subsistence uses by local residents. This includes subsistence use of wildlife and fish. ANILCA sections 302(1) and (2) specify that these activities will be allowed as long as they are consistent with the other refuge purposes of conserving fish and wildlife populations and habitats in their natural diversity and with meeting international treaty obligations. Trapping has been determined to be compatible with refuge purposes (see Compatibility Determination - Appendix D).*

Requirements of the National Wildlife Refuge System Improvement Act of 1997

The Act requires that the FWS "ensure the biological integrity, diversity and environmental health of the [Refuge] System are maintained" (Section 7(e) (2) (B), National Wildlife Refuge System Improvement Act) and that refuge planning be firmly grounded in these concepts. A thorough discussion and investigation of the biological integrity, diversity, and environmental health of a refuge must therefore occur before planning can ensue.

In developing each comprehensive conservation plan under this subsection for a planning unit, the Secretary acting through the Director, shall identify and describe ... the distribution, migration patterns, and abundance of fish, wildlife, and plant populations and related habitats within the planning unit-- Section 7(e) (2)(B), National Wildlife Refuge System Improvement Act

Furthermore, FWS regulations require that before the sanctioning of hunting, trapping, or fishing can occur, a determination must be made that "wildlife are surplus to a balanced conservation program on any wildlife refuge area" (50 C.F.R. §31.2 et seq.). To determine if there is a surplus of wildlife on a refuge, the "populations and requirements of wildlife species shall be determined by population census, habitat evaluation, and other means of ecological study" (Id. at §31.1).

The mere presence of a species on a refuge is not evidence of a surplus; rather, a surplus determination has to consider both the population size and requirements of the target species. If no surplus is determined, then, unless the species is damaging or destroying federal property within a refuge, the species cannot be subject to live removal or lethal control, including through official animal control operations.

To my knowledge a comprehensive biological inventory of the species on these NWRs has not yet been conducted. While I found mention in the CCP proposals for inventory studies and population surveys currently being conducted, I found no data on completed inventory and population surveys nor any expected date for the completion of such information.

Information cited in the CCP regarding habitat use of refuge furbearers is limited to general observation and conjecture and no recent refuge-specific studies were cited in the CCP and again, no population estimates or trends for furbearers on the refuge were provided. This leaves me wondering what are the current populations of the targeted species and what models were used to determine that trapping is a "compatible use?"

In lieu of conducting its own surveys and evaluation it appears the FWS has relied heavily on state wildlife agency management practices and season limits which have not been independently and rigorously evaluated by the Service. Alaska while beaver, marten, otter are supposed to be sealed -tagged and registered with the state wildlife agency -most trapped species in Alaska are not sealed or tracked. Since no records are kept, one cannot accurately report the primary trapped species in Alaska. Moreover, population trends in furbearers can not be interpreted from trends in harvest reports. Finally, Alaska does not track the trapping of non-target animals, and since there are no trapper education requirements to obtain a trapping license and no required trap check time, nor trap identification requirements, the likelihood of non-target catches, and failure to report take, is great.

Response: *Refuge biologists perform annual inventories of moose, caribou, beaver, wolf, migratory waterfowl, swans, geese, and neo-tropical birds. Periodic habitat assessments are*

performed. Population and habitat data combined with on-the-ground observations are used to assess biological diversity and overall health.

In addition, in the "Compatibility Determination" the FWS states that most trapping on the refuge "can be characterized as an extension of subsistence because much of the fur harvest is used for clothing, including hats, parka ruffs, and gloves," and that "the income and products from trapping add to the self sufficiency of people living in remote regions of Alaska." However, the FWS does not provide any documentation to support these assertions, and does not set forth criteria for trappers to be deemed "subsistence trappers" or even provide a clear definition of "subsistence trapping." The Compatibility Determination also notes that access to traplines is primarily by snowmachine -an additional impact.

The Compatibility Determination also asserts that managing trapping on the refuges requires only "a few days of staff time" each year to "survey and map traplines, review harvest estimates, and consider the occasional application for permits." Given the long trapping season in Alaska and that different traplines are "separated by several miles" I find it hard to imagine that adequately monitoring trapping on the refuge requires only a "few days," and, if so, I question the level of management assigned to regulating trapping. While the FWS states that, "the Refuge will also be engaged in field enforcement of trapping regulations" it is questionable how much enforcement can be achieved in "a few days" of effort per year.

The FWS seems to acknowledge the considerable time that would be required to accurately monitor trapping, in the Compatibility Determination it is stated that refuge staffs will monitor harvest "to the extent possible" and "attempt to determine trends through field observations and trapper interviews." If the "extent possible" is just "a few days," I again question the quality of such monitoring. The FWS states that only if "population concerns manifest" (again, based on a just a "few days" of data collection and monitoring) will the Service "become engaged in review of the appropriate State of Alaska trapping regulations."

Born Free USA asserts that the FWS should review the State of Alaska trapping regulations prior to deeming the activity compatible.

To attempt to determine compatible wildlife-dependent recreation for the NWRs in question prior to completing a thorough biological inventory may violate federal mandates under the Act. This is especially true for hunting and trapping since both activities result in the direct and intentional removal of species and can negatively impact populations, particularly when such activities are geographically focused to particular regions/areas.

Moreover, the recent ruling by U.S. District Judge Ricardo M. Urbina that the U.S. Fish and Wildlife Service violated federal law by expanding hunting at 37 refuges from 1997-2003, should be seriously considered. The statewide and national cumulative impacts of allowing hunting and other consumptive uses on this refuge should be thoroughly and objectively evaluated by the CCP and EA.

Response: *Refuge biologists use State of Alaska trapping data along with on-the-ground observations to oversee trapping on the refuges. The state of Alaska trapping data is compiled from an annual survey of all trappers in the State. Trapping is not a wide-spread activity on the refuges.*

Potential Negative Impacts of Hunting and Trapping on the Refuge

The CCP fails to evaluate the impacts of consumptive use activities on refuge wildlife. As mentioned above, a biological inventory has not been fully implemented, and there is a lack of accurate data on hunted and trapped species on the refuges presented in the CCP. As a consequence, we assume that the biological baseline data is inadequate or nonexistent. I question how hunting and trapping can be deemed compatible on the refuge in absence of this essential information.

***Response:** We feel the impacts of consumptive use activities were addressed in the effects analysis in the Draft Plan (sections 4.2.2.2 through 4.2.3.1 and section 4.2.3.3).*

With no baseline population data of unexploited wildlife on the refuges, it would be nearly impossible to determine with accuracy any change in population dynamics as a result of consumptive use. The FWS cannot determine that trapping on the refuges has no impact simply because they have not looked. In essence FWS seems to have accepted a "don't look, don't see" policy with regard to consumptive use impacts on the refuge.

Aside from the obvious detrimental effects to the individual animals killed, hunting and trapping disrupts, resting as well as foraging behavior and increases stress and caloric exertion which potentially decreases fitness and survival. These factors should be systematically researched before a compatibility determination is assessed.

For the above reasons, the CCP/EIS do not allow for the adequate evaluation and consideration of the proposed alternatives. It is therefore premature for the FWS to issue a Final CCP and EA.

Born Free USA contends the FWS must fully analyze its preferred alternative in a revised CCP/EA and re-circulate an amended version of these documents for public comment.

Body-Gripping Traps Pose Serious Hazard to Non-Target Wildlife

There is wide spread agreement among veterinarians, veterinary associations, biologists and the general public that the primary traps used today-legholds and Conibears are both inhumane and indiscriminate.

In addition, leghold traps and Conibear traps pose a serious hazard to non-target wildlife, including threatened and endangered species (T&E species). Records obtained from state and federal wildlife agencies by Born Free USA show that bald eagles, lynx, wolves, and other species listed under the Endangered Species Act have been injured and killed in leghold and Conibear traps. Recently, when citizens provided documentation that three Bald Eagles and numerous Canada Lynx had been incidentally killed in traps set for coyotes in the state of Maine, the Maine Attorney General ruled that the state Inland Wildlife & Fisheries agency had to end its coyote trapping program until the state obtained an Incidental Take Permit (ITP) under the Endangered Species Act from the FWS.

Lack of adequate enforcement personnel needed to ensure compliance with trapping regulations is a well-known and acknowledged problem among state wildlife agencies. Surveys of game wardens indicate that violations of trapping regulations are commonplace. Common violations include trapping for species out of season, and using traps that do not comply with mandated regulations. Surely ensuring compliance with state and refuge-specific requirements on the

refuge will require more than "a few days" of law enforcement effort and evaluation of the impacts and analysis of trapping data will or should require far more than "a few days" per year.

Any assessment of trapping on refuges must include a thorough literature review of trap studies and of the potential impacts traps may have on non-target wildlife. I cite the following as examples of studies that should be incorporated into the assessment of any trapping activity on the refuge:

Response: Enforcement of game regulations occurs on the Refuge through the refuge law enforcement officer and the Alaska State Troopers.

A. Leghold traps

The Animal Welfare Institute sent a questionnaire to veterinarians in Illinois, Michigan, New York, Texas, North Dakota, Washington, and Louisiana. Veterinarians were asked if they supported or opposed the use of this trap. An overwhelming percentage, 79.3 percent of the 936 veterinarians responding, opposed steel-jawed leg-hold traps. The Animal Welfare Institute survey also requested information relative to injuries to pets and wild animals. More than 4,000 injuries or deaths of domestic or non-target animal were reported from the 936 veterinarians in seven states (CDFG pg. 95-96).

Atkeson (1956) reported that >24% of minks, raccoons and foxes were crippled while escaping from leghold traps set in on a National Wildlife Refuge in Alabama over a four year period. In contrast, opossums and skunks were crippled in only 2% of captures. For the purposes of this study, "all animals were considered crippled that pulled out of traps, escaped by wringing off or gnawing off feet, or escaped with traps." During a study of population dynamics in Canada, MacPherson (1969) found most trapped arctic foxes he observed had ingested pieces of their own hair, bone and skin. The struggle can also lead to a variety of bone fractures, including simple, compound and compression fractures. Olsen et al. (1986) observed a 9 I% leg fracture rate for coyotes caught in unpadded traps, while 3 of 4 captured kit foxes caught had nearly or completely amputated their trapped leg. Damage to teeth and gums can occur when a captured animal attacks the trap with its mouth in an attempt to escape (MacPherson 1969; England 1982; Van Ballenberghe 1984; Keuhn et al. 1986; Kern et al 1994; Hubert et al. 1997), though this type of injury is generally

ignored by most trapping studies (Onderka et al. 1990). Englund (1982) found severe dental injuries in 58% of adult foxes captured in leghold traps while Van Ballenberghe (1984) reported that injuries to teeth, lips and gums occurred in 46% of 109 wolves captured. Other studies corroborate these findings (Berchielli and Tullar 1980; Novak 1981; Englund 1982; Van Ballenberghe 1984; Tullar 1984; Kuehn et al. 1986; Linhart et al. 1988; Olsen et al. 1988; Onderka et al. 1990; Phillips et al. 1992; Kern et al. 1994; Mowat et al. 1994; Proulx et al. 1994; Phillips et al. 1996; Hubert et al. 1997).

Despite the preponderance of evidence showing that leghold traps cause severe injuries to captured animals, most studies have actually underestimated the extent of injuries caused by these devices. With very few exceptions (Onderka et al. 1990; Huber et al. 1997) injury studies have limited their analysis of injuries to the trapped limb (Tullar 1984; Olsen et al. 1986, 1988; Houben et al. 1993; Gruver et al. 1996; Phillips et al. 1996) or the leg plus the head (Van Ballenberghe 1984; Kern et al. 1994) and thus have not considered injuries to other areas of the

body. The importance of examining the whole body was stressed by Hubert et al. (1997), who found leg injury scores of coyotes were approximately 15% lower than whole body scores. Without an analysis of the entire body, critical injuries may be missed and therefore the true extent of injury not determined.

Aside from the injuries they cause, leghold traps are notorious for no being species-specific. Beasom (1974), Berchielli and Tullar (1980), and Novak (1981) found non-target animals comprised 56%, 32% and 76% of leghold captures, respectively and Beasom (1974) noted that "more individuals and species of animals were caught with steel traps in this study than with any other control methods used."

B. "Padded" Leghold traps

While padded leghold traps are ostensibly more humane than unpadded traps, studies confirm that even padded traps can cause significant damage to trapped animals.

"In a letter to the Department dated August 13, 1990, Dr. N. C. Buyukmihci, DVM, Associate Professor of Surgery, University of California, Davis, writes: 'Several Studies have been done comparing the effects of padded verses unpadded traps on various animals. These have shown that both could and did cause the same degree of damage to a limb, including laceration of skin and fracture of bones'" (CDFG pg. 98).

"Padded leghold traps show injury reduction for some species, but not for others. They have failed to consistently reduce injuries to raccoons (Bishop 1990). The No. IV, size padded traps cause fewer injuries to foxes than standard traps, but there was no difference of bobcats. Considering research findings to date, Soft Catch traps achieve injury reduction for some species, but not for others (Bishop 1990, from CDFG)."

While padded leghold traps have been shown to reduce the occurrence and severity of injuries in a number target species by 48-85% (Saunders and Roswell 1984; Olsen et al. 1986; Onderka et al. 1990), injuries have not been eliminated and injuries to smaller non-target species may be especially severe. Even if captured animals are alive when released, any injury or disfigurement will invariably reduce an animal's ability to survive. Van Ballenberghe (1984) noted that "Reduced fitness and shortened life span ultimately resulting from capture caused injuries may be as important to consider as proximate mortality."

New devices have the potential to reduce the incidence of non-target captures. Pan tension devices (PTD) have been shown to exclude up to 98% of non-target animals in studies (Turkowski et al. 1984; Phillips and Gruverd 1996). However, since PTDs also reduce target capture rates it is unlikely that they will be widely used by commercial and recreational trappers. If the refuges insist that leghold traps are needed for research then padded traps equipped with pan tension devices should be required.

C. Conibear Traps

As a trap designed to kill animals instantly, the Conibear poses a serious hazard to T&E species and other non-target wildlife. While studies suggest that the ability of kill-type traps to produce rapid death have been greatly improved, for a number of species (Proulx et al. 1989; Barrett et al. 1989; Proulx et al. 1990; Proulx and Barrett 1993; Proulx et al. 1995) there have been no significant advances in reducing non-target captures. Research has shown that for every target animal captured at least 2 other non-target animals are caught (Novak 1987; Barret et al. 1989; Proulx and Barrett 1993).

The California Department of Fish and Game reported that, "Several factors keep this trap from killing consistently and quickly, including the size of the animal, the species involved, the position of the animal at trap closure, and the impact and clamping levels of the trap. The most significant flaw is the trigger system that performs erratically, preventing a fatal blow to the animal's body (CDFG pg. 94)."

Response: Trapping on the refuge is regulated by the State of Alaska, which regulates the methods and means of harvesting animals.

Alternatives to Lethal Control

It is well known that killing wildlife as a means to resolve human/wildlife conflicts is ineffective in the long run, an important argument that the CCP/EA fails to adequately address. When animals are killed, they leave behind a habitat vacancy that new animals eventually fill—particularly if the attracting features or resources have not been eliminated. Moreover predator control as means of boosting populations of game species to appease human hunters is highly controversial and should have no place on NWRs.

In addition, it is important to point out that animals are commonly viewed as "overpopulated" or "overabundant" when the animals a) threaten human life or livelihood; b) depress the densities of species favored by humans; or c) are "too numerous for their own good" i.e. when some animals are periodically in poor condition and undergo natural mortality, as through natural selection (Macnab 1985). None of these situations, however, represent an actual "overpopulation" of animals in a biological sense.

Lethal control of species for purposes of predator control or otherwise not only raises serious ethical questions, it may be no more effective, especially over the long-term, than innovative non-lethal solutions (Goodrich and Buskirk 1995). Indeed, research indicates that killing predators to protect ground-nesting birds does not reliably increase breeding populations of ground-nesting birds; where such increases have been documented, they tend to be temporary at best (Cote and Sutherland 1997)..

Whether there is an actual or perceived need to control wildlife on the NWRs there are many humane, non lethal, methods available to resource and refuge managers to alleviate conflicts. For example, with regard to beaver conflicts, the construction of water-level control devices could be used to prevent flooding and could serve as a humane substitute for trapping and killing beavers. Such devices have been successfully implemented by municipalities and state wildlife agencies in a number of states, including Maine and Connecticut, and should be used more frequently by federal wildlife management agencies.

Response: There is no predator or wildlife control program in place on the Refuge.

With the above issues in mind, we request that the FWS provide the following information in a revised CCP/EA:

- Current and historic (last 20 years) population status of species targeted in refuge trapping and or other lethal control programs.
- Number of target and non-target animals trapped each year under the past trapping program(s) and projected data on number of animals trapped under any proposed action.

- Impacts of species-specific "overpopulations" on ecosystem and / or other species.
- Description, and degree, of damage to facilities/habitat as a result of perceived "overpopulations" of targeted species, if any, and effects of trapping or lethal control in past years on perceived damage and on targeted species populations.
- Detailed analysis of changes in prey species population in response to predator control
- Wounding and retrieval rates of hunting on the refuge.

Response: *Current and historic furbearer population information can be obtained from the refuge office in Galena. The term "overpopulations" was not used in this analysis. Wounding and retrieval rates on the Refuge would be very difficult to obtain.*

We also ask that the FWS discuss and evaluate the following:

- The population demography of the species in question.
- Have any alternative methods of habitat protection/facilities management been explored?
- What efforts have been taken to reduce trap-related injuries to captured animals?
- What are the real and potential impacts of trapping and lethal control to non-target species, including protected species?
- What efforts have, will, or are, being taken to ensure that non-target species will not be injured or killed by the current or future trapping and other lethal control programs?

Public Opposition to Recreational Killing of Wildlife on National Wildlife Refuges

Theodore Roosevelt established Pelican Island as the first refuge in 1903 as an "inviolable sanctuary" for the protection of the brown pelican. The original intent and purpose of subsequent refuges were clear: the protection of wildlife from exploitation and deliberate harm. Most Americans still view wildlife refuges as places where wild animals are protected from human interference. That is in fact the common definition of the word "refuge."

The majority of Americans oppose the recreational and commercial killing of wildlife on National Wildlife Refuges. The results of a 1999 national Decision Research public opinion poll support this assertion.

- 78% of those polled opposed allowing refuge officials to kill wildlife by trapping, hunting, or poisoning.
- 71% agree that as long as refuge officials can remove dangerous animals, there is no reason to allow any other killing of animals on refuge property.
- 88% agreed that wildlife and habitat preservation should be the highest priority of the refuge system.
- 83% disagreed that the rights of hunters and trappers are more important than the need to protect wildlife on refuges.

Response: *Population demography information can be obtained from the refuge office. Habitat is managed via allowing natural processes to occur such as flooding and wildfire. Trapping clinics in conjunction with the Alaska Department of Fish and Game have been held in several villages in order to share state-of-the-art technology and knowledge. The impacts to non-target species are felt to be very minimal. Trapping clinics will continue to be a part of the refuge programs.*

Given the overwhelming public opposition to the allowance of consumptive use activities on National Wildlife Refuges any proposal to expend limited resources maintaining and establishing new hunting programs at the refuge would be fiscally irresponsible. Moreover, efforts to manage and regulate hunting can quickly detract from efforts aimed at more important refuge purposes.

Response: Trapping will continue on the refuges, as long as it remains compatible with refuge purposes because it is part of the subsistence way of life guaranteed by ANILCA.

Conclusion

I appreciate the opportunity to comment on this issue, which is of great importance to our members and supporters nationwide.

Born Free USA contends the FWS must implement a rigorous biological inventory and analysis of the fish and wildlife populations as required by law (16 U.S.C. § 668dd (a) (4) (N)) before making any compatibility determinations. Moreover, the FWS must fully analyze the site-specific and cumulative impacts of all proposed activities affecting the environment and wildlife inhabiting the refuge, which this CCP and EA have failed to do.

Born Free USA requests that the feasibility of non-lethal alternatives be evaluated and presented.

I look forward to reviewing a revised CCP/EA when these documents become available and request to be informed of their availability for further comment.

Sincerely,

Monica Engebretson
Senior Program Associate

LITERATURE CITED

- Atkeson, T. Z. 1956. Incidence of crippling loss in steel trapping. *Journal of Wildlife Management* 20:323-324.
- Beasom, S. L. 1974. Selectivity of predator control techniques in south Texas. *Journal of Wildlife Management* 38:837-844.
- Berchielli, L. T. and B. F. Tullar. 1980. Comparison of a leg snare with a standard leg-gripping trap. *NY Fish and Game Journal* 27:63-71.
- California Department of Fish and Game. 1996. Final Environmental Document on Furbearing and Nongame Mammal Hunting and Trapping. Sacramento, California..
- Cote, I. M. and Sutherland, W.,J. 1997. The effectiveness of removing predators to protect bird populations. *Conservation Biology*, 11(2): 395 -405.
- Englund, J. 1982. A comparison of injuries to leg-hold trapped and foot-snared red foxes. *Journal of Wildlife Management* 46: 1113-1117.
- Goodrich, J.M. and Buskirk, S.W. 1995. Control of abundant native vertebrates for conservation of endangered species. *Conservation Biology*, 9(6): 1357 -1364.
- Hubert, G. F., L. L. Hungerford, and R. D. Bluett. 1997. Injuries to coyotes captured in modified foothold traps. *Wildlife Society Bulletin* 25: 858-863.

- Kern, J. W., L. L. McDonald, D. D. Strickland, and E. Williams. 1994. Field evaluation and comparison of four foothold traps for terrestrial furbearers in Wyoming. Western EcoSystems Technology, Cheyenne, Wyoming.
- Kuehn, D. W., T. K. Fuller, L. D. Mech, J. P. William, S. H. Fritts, and W. E. Berg. 1986. Trap-related injuries to gray wolves in Minnesota. *Journal of Wildlife Management* 50:90-91.
- Linhart, S. B., F. S. Blom, G. J. Dasch, and R. M. Engeman. 1988. Field evaluation of padded jaw coyote traps: effectiveness and foot injury. *Proceedings of the Vertebrate Pest Conference* 13:226-229.
- Macpherson, A. H. 1969. The dynamics of Canadian arctic fox populations. *Canadian Wildlife Service Report Series* 8. 8pp.
- Macnab, J. 1985. Carrying capacity and related slippery shibboleths. *Wildlife Society Bulletin*. 13:403 -41 O.
- Mowat, G., B. G. Slough, and R. Rivard. 1994. A comparison of three live capturing devices for lynx: capture efficiency and injuries. *Wildlife Society Bulletin* 22:644-650.
- Novak, M. 1987. Traps and trap research. Pages 941-969 in M. Novak, J. A. Baker, M. E. Obbard, and B. Malloch, editors. *Wild furbearer management and conservation in North America*. Ontario Trappers Association, North Bay, Ontario, Canada.
- Olsen, G. H., S. B. Linhart, R. A. Holmes, G. J. Dasch, and C. B. Male. 1986. Injuries to coyotes caught in padded and unpadded steel foothold traps. *Wildlife Society Bulletin* 14:219-223.
- Olsen, G. H., R. G. Linscombe, V. L. Wright, and R. A. Holmes. 1988. Reducing injuries to terrestrial furbearers by using padded foothold traps. *Wildlife Society Bulletin* 16:303-307.
- Onderka, D. K., D. L. Skinner, and A. W. Todd. 1990. Injuries to coyotes and other species caused by four models of footholding devices. *Wildlife Society Bulletin* 16:303-307.
- Phillips, R. L., F. S. Blom, G. J. Dasch, and J. W. Guthrie. 1992. Field evaluation of three types of coyote traps. *Proceedings of the Vertebrate Pest Conference* 15:393-395.
- Phillips, R. L. and K. S. Gruver. 1996. Performance of the Paws-I-Trip™ pan tension device on 3 types of traps. *Wildlife Society Bulletin* 24: 119-122.
- Phillips, R. L., K. S. Gruver, and E. S. Williams. 1996. Leg injuries to coyotes captured in three types of foothold traps. *Wildlife Society Bulletin* 24:260-263.
- Proulx G. 1999a. Review of current mammal trap technology in North America. Pages 1-46 in G. Proulx, editor. *Mammal trapping*, Alpha Wildlife Research & Management Ltd., Sherwood Park, Alberta.
- Proulx, G. And M. W. Barrett. 1993. Evaluation of mechanically improved Conibear 220™ traps to quickly kill fisher (*Martes pennanti*) in simulated natural environments. *Journal of Wildlife Diseases* 29:317-323.
- Proulx, G., S. R. Cook, and M. W. Barrell. 1989. Assessment and preliminary development of the rotating-jaw Conibear 120 trap to effectively kill marten (*Martes americana*). *Canadian Journal of Zoology* 67: 1074-1079.
- Proulx, G., W. Barrett, and S. R. Cook. 1990. The C 120 Magnum with pan trigger: A humane trap for mink (*Mustela vison*). *Journal of Wildlife Diseases* 26:511-517.
- Proulx, G., A. J. Kolenosky, P. J. Cole, and R. K. Drescher. 1995. A humane killing trap for lynx (*Felis lynx*): the Conibear DOTM with clamping bars. *Journal of Wildlife Diseases* 31:57-61.

- Proulx, G., I. M. Pawlina, D. K. Onderka, M. J. Badry, and K. Seidel. 1994. Field evaluation of the number 1Y, steel-jawed leghold and the Sauvageau 2001-9 traps to humanely capture arctic fox. *Wildlife Society Bulletin* 22: 179-183.
- Saunders, B. P. and H. C. Roswell. 1984. Padded trap testing in British Columbia. *Proceedings Western Conference of the International Association Fish and Wildlife Agencies* 64: 136-142.
- Tullar, B. F. 1984. Evaluation of a padded leg-hold trap for capturing foxes and raccoons. *NY Fish and Game Journal* 31:97-103.
- Turkowski, F. J., A. R. Armistead, and S. B. Linhart. 1984. Selectivity and effectiveness of pan tension devices for coyote foothold traps. *Journal of Wildlife Management* 48:700-708.
- United States of America / European Community. 1997. Agreed minute and annex: Standards for the humane trapping of specified terrestrial and semi-aquatic mammals. Brussels.
- Van Ballenberghe, V. 1984. Injuries to wolves sustained during live-capture. *Journal of Wildlife Management* 48: 1425-1429.

Appendix Q
Finding of No Significant Impact

**U. S. Department of the Interior
Fish and Wildlife Service
Region 7, Alaska**

FINDING OF NO SIGNIFICANT IMPACT

**Revised Comprehensive Conservation Plan
Koyukuk and Northern Unit Innoko/Nowitna National Wildlife Refuge, Alaska**

The U.S. Fish and Wildlife Service (Service) has completed the Revised Comprehensive Conservation Plan (Plan) for the Koyukuk and Northern Unit Innoko/Nowitna National Wildlife Refuge (Refuge). The draft revised plan and Environmental Assessment (EA) (herein incorporated by reference) describe two alternatives for managing the Refuge and associated effects on the human environment. No substantive changes in Alternative B, the proposed action, were made in response to public comments. Technical corrections and edits were made in response to public comments. Alternative B is selected for implementation.

Alternatives Considered

The Alaska National Interest Lands Conservation Act (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 established management categories for the refuges including Minimal, Moderate, Intensive, Wilderness, and Wild River Management. Appropriate activities, public uses, commercial uses, and facilities are identified for each management category. Minimal, Wilderness, and Wild River Management apply to the Refuge.

Two alternatives were considered in the EA. Alternative A, the no-action alternative, would continue current management. Alternative B, the proposed action, would include management direction updated by changes and adjustments to policy since completion of the 1987 plan. Alternative B also includes a vision statement, goals, and objectives for management of the Refuge. Under both alternatives, management of the refuge would generally continue to follow the current course of action, but Alternative B provides additional details in the vision statement, goals, and objectives and incorporates new regional management policies and guidelines. The distribution and amount of land in the Minimal, Wilderness, and Wild River Management is the same under both alternatives.

Public Review

Public comments on the draft plan and EA were solicited from October 6, 2008 through December 15, 2008. Public meetings were held in Galena, Hughes, Huslia, Kaltag, Koyukuk, Nulato, Ruby, and Tanana. These villages are located near or within the Refuge. Comments were received from four individuals, the State of Alaska; The Wilderness Society, the Nulato Tribal Council, and Born Free USA.

Appendix Q: Finding of No Significant Impact

There were no comments specific to the draft plan received during the village meetings. The majority of comments made regarded the current population of moose, wolf, and salmon or wildlife observations made over the years.

One individual commenter asked “how about making these refuges into a wilderness area?” Another individual commented “that my priorities for our NWRs are making them places where animals and nature are prioritized, NOT humans and all their ‘recreational’ needs.” The third individual said that “global warming is a great concern.” A fourth individual, who commented via e-mail, felt we should use the word “protection” instead of “conservation”; hunting was not a compatible use; we are not meeting the needs of the public; there should be no prescribed fires; and old data was used for the analysis.

The state of Alaska made several helpful suggestions that clarified various parts of the plan. The Wilderness Society was concerned about the wilderness review process, wilderness stewardship and management, motorized and mechanized activities in wilderness, the wild and scenic river review process, and climate change. The Nulato Tribal Council was concerned about maintaining subsistence activities, an expired Land Bank Agreement, and the regulation of commercial guides, ATVs, and commercial timber harvest. Born Free USA was concerned about a comprehensive, biological inventory, management of trapping, the impacts of trapping and hunting, the use of leg-hold traps, and alternative trapping methods.

Revisions from Draft Plan

No substantive revisions to Alternative B, the proposed action, were made as a result of the public comments on the Draft Revised Refuge Plan. A number of technical corrections were made in response to comments and many of the editorial suggestions provided by the state of Alaska were adopted.

Alternative B, the preferred alternative, provides a realistic balance between public use of the Refuge and the conservation needs of the Refuge. 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. It provides long-term protection of fish and wildlife populations and their habitats while allowing for appropriate levels of fish and wildlife-dependent recreation, interpretation and environmental education, subsistence, and other public uses.

Analysis of Impacts

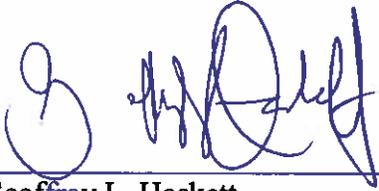
The EA analyzed direct, indirect, and cumulative impacts on the physical, biological and socio-economic environment. It included an ANILCA Section 810 subsistence evaluation and finds the proposed action would not result in restrictions of subsistence use. No significant effects were identified in the analysis.

Conclusions

Based on review and evaluation of the information contained in the EA and revised plan, I have determined that there will be no significant individual or cumulative impacts to the human environment, within the meaning of section 102(2)(c) of the National Environmental Policy Act

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of 1969, as amended. I have determined that the activities prescribed in this plan are not major Federal actions. Accordingly, the Service is not required to prepare an environmental impact statement.



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4/27/09

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