National Park Service
U.S. Department of the Interior

Alaska Region
Programmatic Fire Hazardous Fuels Management Plan
Public Review Environmental Assessment

August 2013

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ACRONYMS

ADEC	Alaska Department of Environmental Conservation
AICC	Alaska Interagency Center
AKRO	Alaska Regional Office
ANILCA	Alaska National Interest Lands Conservation Act of 1980
ATV	all-terrain vehicle
BELA	Bering Land Bridge National Preserve
BLM	Bureau of Land Management
CAKR	Cape Krusenstern National Monument
CFR	Code of Federal Regulation
CO	Carbon monoxide
DCCED	Department of Commerce, Community, and Economic Development
DO	Director's Orders
EA	environmental assessment
EO	Executive Order
EPA	Environmental Protection Agency
ESMP	Enhanced Smoke Management Plan
F	Fahrenheit
FAA	Federal Aviation Administration
FMP	Fire Management Plan
FONSI	Finding of No Significant Impacts
GAAR	Gates of the Arctic National Park and Preserve
GIS	geographical information system
GMP	general management plan
ICC	International Code Council's
KATM	Katmai National Park and Preserve
KOVA	Kobuk Valley National Park
LACL	Lake Clark National Park and Preserve
MAP	Maximum Allowable Perimeter
MR/MT	Minimum Requirements/Minimum Tool
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Protection Act
NOAT	Noatak National Preserve
NO_x	Nitrogen Oxide
NPS	National Park Service
NRHP	National Register of Historic Places
O_3	Ozone
OHV	off-highway vehicle
ORV	off-road vehicle
Pb	Lead
PM	Particulate Matter
RM-18	Reference Manual 18
SHPO	State Historic Preservation Office

SO_2	Sulfur dioxide
U.S.	United States
USDOI	United States Department of the Interior
WEAR	Western Arctic National Parklands
WRST	Wrangell–St. Elias National Park and Preserve

1.0 PURPOSE OF AND NEED FOR ACTION

1.1 Introduction

The National Park Service (NPS) is considering adopting new more-detailed protocols to manage hazardous vegetative fuels to protect the built environment and human lives from wildfires within the boundaries of National Park System units within Alaska. This analysis does not include areas in Southeast Alaska and Denali National Park and Preserve, the latter which already have an approved fire hazardous fuels management plan. Areas covered in the proposed program include: Katmai National Park and Preserve (KATM), Lake Clark National Park and Preserve (LACL), Wrangell-St. Elias National Park and Preserve (WRST), Yukon-Charley Rivers National Preserve (YUCH), Gates of the Arctic National Park and Preserve (GAAR), and Western Arctic National Parklands (WEAR). WEAR parks include Bering Land Bridge National Preserve (BELA), Cape Krusenstern National Monument (CAKR), Noatak National Preserve (NOAT), and Kobuk Valley National Park (KOVA). See figure 1.1.

Each of the affected NPS areas has an approved fire management plan and associated vegetative fuels management plan designed to protect the built environment (including historic structures) and the lives of visitors, employees, and firefighters in the event of wildfires. These plans did not address the scope of mitigation actions regarding hazardous vegetative fuels build-up that is part of a proactive fuels reduction program. For these areas, most of the environmental assessments (EAs) were written 8–12 years ago for the original fire management plans (FMPs), but since they were written these FMPs have been reviewed annually and updated during the comprehensive reviews completed every 7 years. The original plans emphasized the response to wildfire and were developed during a time when the magnitude of the vegetative fuels management program was not fully developed due to an incomplete asset inventory and the lack of community protection plans. The fire management program has evolved over time to accommodate an increased need to protect NPS and community assets. Though the current FMP/EAs include fuel reduction techniques (mechanical and prescribed fire) to reduce or remove vegetation to create and maintain defensible spaces around park structures and private inholdings, these plans were programmatic in nature and did not address the potential environmental impacts of specific fuel reduction prescriptions, since developed for these areas. That level of detail was beyond the scope of the original FMP/EAs.

This environmental assessment (EA) is needed to evaluate the scope and effects of detailed protocols for the removal of vegetation that could carry a wildfire toward infrastructure and humans, and to address a maintenance plan for retaining competent fire breaks around facilities and sites. The EA analyzes the proposed action and alternatives and their impacts on the environment. The EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and regulations of the Council on Environmental Quality (40 Code of Federal Regulation (CFR) 151508.9).

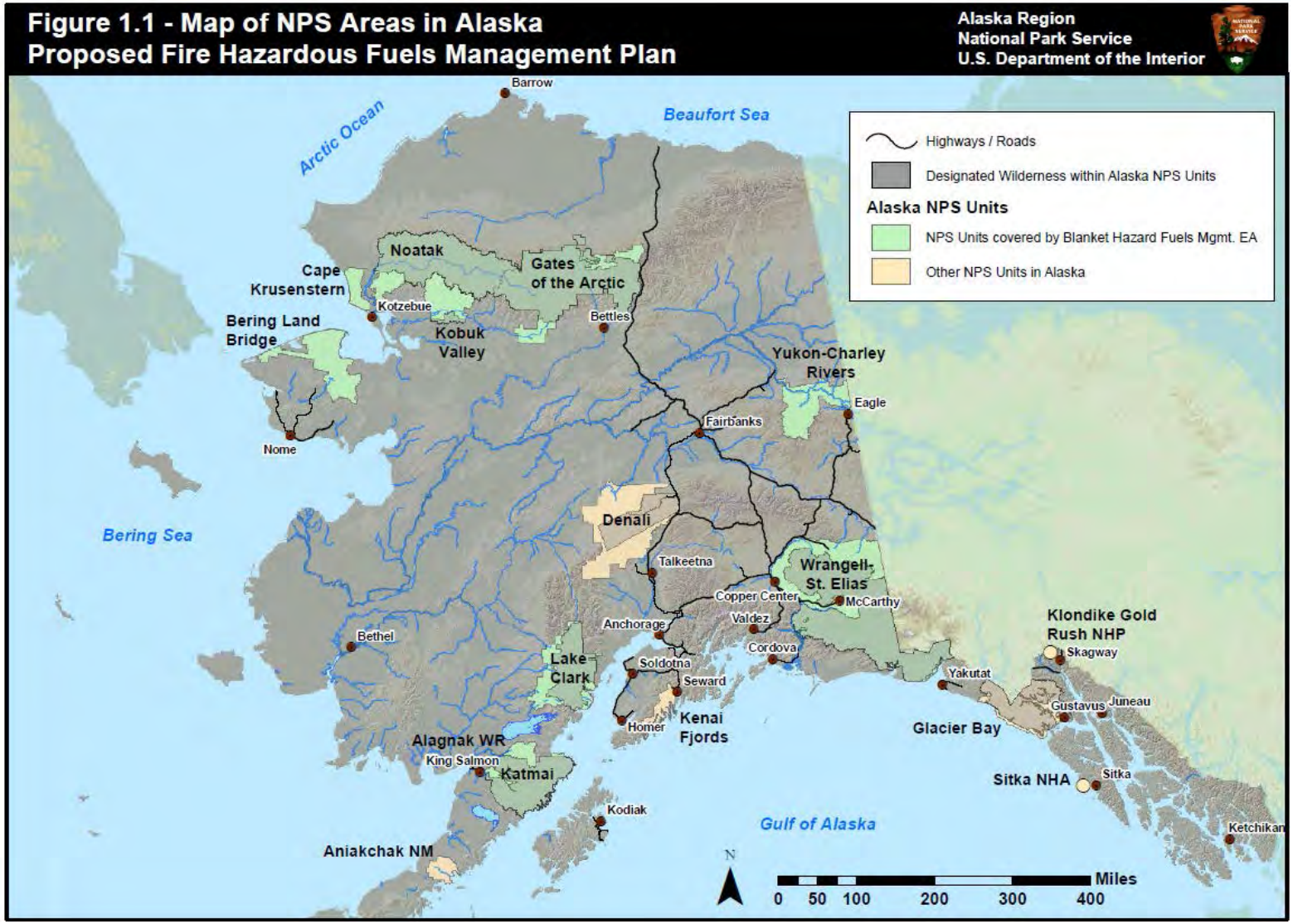

Figure 1.1. Parks Overview Map

1.2. Background

1.2.1 Authorities to Manage Vegetation and Fire in Alaska NPS Areas

Authorities to manage natural and cultural resources in National Park System units are derived from the NPS Organic Act of 1916 and its amendments, the Alaska National Interest Lands Conservation Act of 1980 (ANILCA), and regulations at 36 CFR Parts 1-14. NPS Management Policies 2006 provide further guidance for management of vegetation and fire.

1.2.1.1 NPS Organic Act

The Act creating the NPS states the NPS will "… conserve the scenery and the natural and historic objects and the wild life therein and … provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

1.2.1.2 ANILCA

Title 1 of ANILCA establishes the purposes for the entire statute as well as the National Park and other conservation system units in Alaska. Section 101 states the units are established to "… preserve for the benefit, use, education, and inspiration of present and future generations certain lands and waters in the State of Alaska that contain nationally significant natural, scenic, historic, archeological, scientific, wilderness, cultural, recreational, and wildlife values." Furthermore, this section states:

> "It is the intent of Congress in this Act to preserve unrivalled 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 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, with large arctic and subarctic wildlands and on free flowing rivers; and to maintain opportunities for scientific research and undisturbed ecosystems. It is further the intent and purpose of this Act consistent with management of fish and wildlife in accordance with recognized scientific principles and the purposes for which each conservation system unit is established, designated, or expanded by or pursuant to this Act, to provide for the opportunity for rural residents engaged in a subsistence way of life to continue to do so."

Title II of ANILCA established new NPS units, adds to existing units, and specified their purposes and values. The following purposes and values for the affected parks are noted here.

ANILCA Section 201(2) established Bering Land Bridge National Preserve: "To protect and interpret examples of arctic plant communities, volcanic lava flows, ash explosions, coastal formations, and other geologic processes; to protect habitat for internationally significant populations of migratory birds; to provide for archeological and paleontological study, in cooperation with Native Alaskans, of the process of plant and animal migration, including man, between North America and the Asian Continent; to protect habitat for, and populations of, fish and wildlife including, but not limited to, marine mammals, brown/grizzly bears, moose, and wolves; subject to reasonable regulation as the Secretary may prescribe to continue reindeer grazing use, including necessary facilities and equipment, within the areas which on January 1, 1976, were subject to reindeer grazing permits, in accordance with sound range management practices; to protect the viability of subsistence resources; and in a manner consistent with the foregoing, to provide outdoor recreation and environmental education activities including public access for recreational purposes to the Serpentine Hot Springs area. …."

ANILCA Section 201(3) established Cape Krusenstern National Monument: "To protect and interpret a series of archeological sites depicting every known cultural period in arctic Alaska; to provide for scientific study of the process of human population of the area from the Asian Continent; in cooperation with Native Alaskans, to preserve and interpret evidence of prehistoric and historic Native cultures; to protect habitat for seals and other marine mammals; to protect habitat and populations of birds and other wildlife, and fish resources; to protect the viability of subsistence resources."

ANILCA Section 201(4) established Gates of the Arctic National Park and Preserve: "To maintain the wild and undeveloped character of the area, including opportunities for visitors to experience solitude, and the natural environmental integrity and scenic beauty of mountains, forelands, rivers, lakes, and other natural features; to provide continued opportunities, including reasonable access, for mountain climbing, mountaineering, and other wilderness recreational activities; and to protect habitat for and the populations of, fish and wildlife, including, but not limited to, caribou, grizzly bears, Dall sheep, moose, wolves, and raptorial birds. Subsistence uses are permitted in the park…."

ANILCA Section 201(6) established Kobuk Valley National Park: "To maintain the environmental integrity of natural features of the Kobuk River Valley, including the Kobuk, Salmon, and other rivers, the boreal forest, and the Great Kobuk Sand Dunes, in an undeveloped state; to protect and interpret, in cooperation with Native Alaskans, archeological sites associated with Native cultures; to protect migration routes for the Arctic caribou herd; to protect habitat for, and populations of, fish and wildlife, including but not limited to caribou, moose, black and grizzly bears, wolves, and

waterfowl; and to protect the viability of subsistence resources. Subsistence uses by local residents shall be permitted in the park…."

ANILCA Section 201(7) established Lake Clark National Park and Preserve: "To protect the watershed necessary for perpetuation of the red salmon fishery in Bristol Bay; to maintain unimpaired the scenic beauty and quality of portions of the Alaska Range and the Aleutian Range, including active volcanoes, glaciers, wild rivers, lakes, waterfalls, and alpine meadows in their natural state; and to protect habitat for and populations of, fish and wildlife including but not limited to caribou, Dall sheep, brown/grizzly bears, bald eagles, and peregrine falcons."

ANILCA Section 201(8) established Noatak National Preserve: "To maintain the environmental integrity of the Noatak River and adjacent uplands within the preserve in such a manner as to assure the continuation of geological and biological processes unimpaired by adverse human activity; to protect habitat for, and populations of, fish and wildlife, including but not limited to caribou, grizzly bears, Dall sheep, moose, wolves, and for waterfowl, raptors, and other species of birds; to protect archeological resources; and in a manner consistent with the foregoing, to provide for opportunities for scientific research…."

ANILCA Section 201(9) established Wrangell-St. Elias National Park and Preserve: "To maintain unimpaired the scenic beauty and quality of high mountain peaks, foothills, glacial systems, lakes, and streams, valleys, and coastal landscapes in their natural state; to protect habitat for, and populations of, fish and wildlife, including but not limited to caribou, brown/grizzly bears, Dall sheep, moose, wolves, trumpeter swans and other waterfowl, and marine mammals; and to provide for mountain climbing, mountaineering, and other wilderness recreational activities. Subsistence uses by local residents shall be permitted in the park…."

ANILCA Section 202(2) established Katmai National Park and Preserve: "To protect habitats for, and populations of, fish and wildlife including, but not limited to, high concentrations of brown/grizzly bears and their denning areas; to maintain unimpaired water habitat for significant salmon populations; and to protect scenic, geological, and cultural and recreational features."

Title VIII of ANILCA declares Congress' findings, policy, and definitions for subsistence management and use in Alaska conservation system units. Pertinent to this exercise, Congress finds in ANILCA Section 801 (1) that:
"The continuation of the opportunity for subsistence uses by rural residents of Alaska, including both Natives and non-Natives, on the public lands and by Alaska Natives on Native lands is essential to the Native physical, economic, traditional, and cultural existence and to non-Native physical, economic, traditional and social existence."

ANILCA Section 802(1) declares the policy of Congress, which states: "Consistent with sound management principles, and the conservation of healthy populations of fish and

wildlife, the utilization of the public lands in Alaska is to cause the least adverse impact possible on rural residents who depend upon subsistence uses of the resources of such lands; consistent with management of fish and wildlife in accordance with recognized scientific principles and the purposes for each unit established, designated, or expanded by or pursuant to titles II through VII of this Act, the purpose of the title is to provide the opportunity for rural residents engaged in a subsistence way of life to do so."

ANILCA Section 803 defines subsistence uses as "the customary and traditional uses by rural Alaska Residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for the customary trade."

1.2.1.3 Pertinent NPS Regulations

Closures for access to areas are made pursuant to 36 CFR 1.5 and 36 CFR 13.50 for purposes of public health and safety, protection of natural and cultural resources, and other management considerations.

1.2.1.4 Pertinent NPS Management Policies

NPS Management Policies 2006 address fire management in general terms in section 4.5–Fire Management with additional guidance in section 5.3.12 for Fire Detection, Suppression, and Post-fire Rehabilitation and Protection of cultural resources, section 6.3.9 for Fire management in Wilderness, section 8.2.5.1 for Visitor Safety, and section 9.1.8–Structural Fire Protection and Suppression.

Section 4.5 outlines the basic objectives for fire management programs that:

- Respond to the park's natural and cultural resource objectives;
- Provide for safety consideration for park visitors, employees, and developed facilities;
- Address potential impacts on public and private neighbors and their property adjacent to the park; and
- Protect public health and safety.

Section 5.3.1.2 emphasizes that the NPS will take action to prevent or minimize the impact of wildland, prescribed, or structural fires on cultural resources. Park and local fire personnel will be advised of the locations and characteristics of cultural resources threatened by fire and of any priorities in protecting them during any planned or unplanned fire incident.

Section 6.3.9 states that all fire management activities conducted in wilderness areas will conform to the basic purposes of wilderness. Actions to suppress wildfires must use the

minimum requirements concept unless the on-site decision-maker determines in his or her best professional judgment that conditions dictate otherwise. Additional guidance is provided in Director's Orders (DO) #18—Wildland Fire Management.

Section 8.2.5.1 places a preference on the saving of human life over all other management actions by the Service. The NPS recognizes it cannot eliminate all natural hazards; however, the NPS will strive to protect human life and provide for injury-free visits.

Section 9.1.8 states that superintendents will manage structural fire activities as part of a comprehensive interdisciplinary effort to protect resources and promote the safe and appropriate public enjoyment of those resources. Developing defensible spaces around such structures is an element of fire management around and in structures. Park interdisciplinary teams have evaluated structural resources to determine fire protection needs.

The NPS Management Policies at section 1.4 address the purposes and values versus authorized uses in parks.

> *"Impairment" and "Derogation": One Standard (Policy at Section 1.4.2)*
>
> Congress intended the language of the Redwood amendment to the General Authorities Act to reiterate the provisions of the Organic Act, not create a substantively different management standard. The House committee report described the Redwood amendment as a "declaration by Congress" that the promotion and regulation of the national park system is to be consistent with the Organic Act. The Senate committee report stated that under the Redwood amendment, "The Secretary has an absolute duty, which is not to be compromised; to fulfill the mandate of the 1916 Act to take whatever actions and seek whatever relief as will safeguard the units of the national park system." So, although the Organic Act and the General Authorities Act, as amended by the Redwood amendment, use different wording ("unimpaired" and "derogation") to describe what the National Park Service must avoid, they define a single standard for the management of the national park system—not two different standards. For simplicity, *Management Policies* uses "impairment" (or a variation thereof), not both statutory phrases, to refer to that single standard.
>
> *The NPS Obligation to Conserve and Provide for Enjoyment of Park Resources and Values (Policy at 1.4.3)*
>
> The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. This mandate is independent of the separate prohibition on impairment and applies all the time with respect to all park resources and values, even when there is no risk that any park resources or values may be impaired. NPS managers must always seek ways to avoid, or to

minimize to the greatest extent practicable, adverse impacts on park resources and values. However, the laws do give the Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, so long as the impact does not constitute impairment of the affected resources and values.

The fundamental purpose of all parks also includes providing for the enjoyment of park resources and values by the people of the United States. The enjoyment that is contemplated by the statute is broad; it is the enjoyment of all the people of the United States and includes enjoyment both by people who visit parks and by those who appreciate them from afar. It also includes deriving benefit (including scientific knowledge) and inspiration from parks, as well as other forms of enjoyment and inspiration. Congress, recognizing that the enjoyment by future generations of the national parks can be ensured only if the superb quality of park resources and values is left unimpaired, has provided that when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant. This is how courts have consistently interpreted the Organic Act.

1.2.1.5. Park Purposes and Legislatively Authorized Uses (Policy at 1.4.3.1)

Park purposes are found in the general laws pertaining to the national park system, as well as the enabling legislation or proclamation establishing each unit. In addition to park purposes, in many cases the enabling legislation or proclamation for a park unit may also identify uses that are either mandated or authorized. In the administration of mandated uses, park managers must allow the use; however, they do have the authority to and must manage and regulate the use to ensure, to the extent possible that impacts on park resources from that use are acceptable. In the administration of authorized uses, park managers have the discretionary authority to allow and manage the use, provided that the use will not cause impairment or unacceptable impacts. In determining whether or how to allow the use, park managers must consider the congressional or presidential interest, as expressed in the enabling legislation or proclamation that the use or uses continue. Where there is strong public interest in a particular use, opportunities for civic engagement and cooperative conservation should be factored into the decision-making process.

Furthermore, policy interprets law to prohibit impairment of park resources:

What Constitutes Impairment of Park Resources and Values (Policy at 1.4.5)

The NPS interprets the Organic Act and the General Authorities Act (Section 1.2.1.1) to indicate impairment would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Whether an impact meets this definition

depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question.

An impact to any park resource or value may, but does not necessarily, constitute impairment. An impact would be more likely to constitute impairment to the extent that it

- affects a resource or value whose conservation is necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- is key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- is identified in the park's general management plan or other relevant NPS planning documents as being of significance.

An impact would be less likely to constitute impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values and it cannot be further mitigated.

An impact that may, but would not necessarily, lead to impairment may result from visitor activities; NPS administrative activities; or activities undertaken by concessioners, contractors, and others operating in the park. Impairment may also result from sources or activities outside the park.

A non-impairment determination will be prepared for the selected action and appended to the decision in the Finding of No Significant Impacts (FONSI).

1.2.2 Director's Orders #18—Wildland Fire Management

Reference Manual 18 (*RM-18*)*: Wildland Fire Management*, Chapters 1 through 21 represents the most detailed and comprehensive guidance on implementing Service-wide wildland fire management policy for the National Park Service. RM-18 provides NPS field employees legal references, operating policies, standards, procedures, general information, recommendations, and examples to assist them in carrying out Management Policies and DO. The document is intended to be read in its entirety. While certain chapters or sections provide important guidance by themselves, there is an interrelationship among the chapters that provides clarity and continuity for the management of wildland fire on lands administered by the NPS.

In consideration of the interrelationship with other aspects of wildland fire management, Chapter 7 of *Reference Manual 18* provides the purpose and guidance for implementing a hazardous fuels program:

The fuels management program of the National Park Service has become increasingly important for reducing the risk of severe wildland fire to human communities and for maintaining or improving the integrity of park ecosystems. The NPS, along with other federal, state, tribal, and local land managers, must continue to work collaboratively to ensure that safe and effective fuels treatment efforts are planned and implemented. Because firefighter and public safety is the first priority in every fire management activity, fuels management programs will include a risk assessment process that adequately identifies and controls hazards in order to protect life, property, and resources.

Many of the wildland areas found in NPS units are characterized as fire-adapted or fire-dependent and thus require periodic fire to maintain a healthy, resilient condition. Within these ecosystems, certain kinds of fire are beneficial. Conversely, in the absence of wildland fire, including fuels treatments such as prescribed fire, undesirable impacts may occur. Therefore, a program that fails to responsibly conduct fuels management activities and treatments may carry significantly greater risks, long-term adverse ecological impacts, and life safety consequences than a proactive management program that includes these activities.

NPS fuels management program objectives may include, but are not limited to, maintaining natural processes and natural fire regimes, replicating the effects of natural fire, maintaining cultural and historic scenes, reducing hazardous fuels, managing condition class, managing non-native species, and preserving endangered species and habitat. Throughout the NPS, fuels management treatments are also used to accomplish basic maintenance needs, including maintaining open areas—such as scenic vistas, trails, and roadsides—and disposing of vegetation and debris. Fuels management includes not only naturally occurring fuels but also accumulation of fuels resulting from resource management and land-use activities. Fuels management programs entail strategic planning and collaboration, environmental compliance, interdisciplinary coordination, treatment implementation, and adaptive management practices ranging in scale from site specific to landscape level. Many projects are designed to achieve resource benefits and protection benefits simultaneously.

All NPS design and construction projects must consider wildland fire prevention, protection capability, and mitigation measures to reduce the potential for adverse impacts of wildland fire. They must also take into account preconstruction vegetation and fuels management and use of fire resistant design and materials. The NPS has adopted the International Code Council's (ICC's) International Urban-Wildland Interface Code (2006). Contained in the ICC's code (sections 603 and 604) are descriptions of defensible space and maintenance requirements for urban wildland interface areas. Maintenance of the defensible space includes modifying or removing non-fire-resistant vegetation and keeping needles, leaves, and other dead vegetative material regularly removed from around structures and roofs.

The code stipulates that the minimum requirement for defensible space around structures is 30 feet. Tree crowns should be pruned and maintained to a minimum of 10 feet horizontal clearance from structures and overhead electrical facilities. Tree limbs should be pruned to maintain a 6-foot clearance above the ground. High fire-hazard areas, flammable construction materials, topography, and fuels may require up to, and possibly more than, 100 feet of additional clearance space. The need for additional clearance should be determined by the park structural fire coordinator, fuels manager, fire management officer, chief ranger, or park superintendent.

1.2.3 Section 106 of the National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA), as amended in 1992 (16 USC 470 *et. seq.*) requires the consideration of impacts on cultural resources that are listed, or eligible to be listed, in the National Register of Historic Places. The National Register is the nation's inventory of historic places and the national repository of documentation on property types and their significance. Consultation with the Alaska State Historic Preservation Office (SHPO) has been ongoing since the inception of the plan. This environmental assessment for the Fire Hazardous Vegetative Fuels Management Plan will also be submitted to the Alaska SHPO for review and comment to fulfill Park's obligations under §106 (36 CFR §800.8[c], *Use of the NEPA process for section 106 purposes*).

1.2.4 Wilderness Policies

By policy the term "wilderness" includes the categories of eligible, study, proposed, recommended, and potential as well as designated wilderness. In policy, "the NPS will take no action that would diminish the wilderness eligibility of an area possessing wilderness characteristics until the legislative process of wilderness designation has been completed." (NPS Management Policies, Chapter 6.3.1, 2006). This includes use of the minimum requirements concept regardless of wilderness category.

Wilderness character is the fundamental concept in the Wilderness Act of 1964 and is broadly defined in Section 2(c) but is not further defined in NPS policies. Wilderness character is the overarching and supplemental park management goal for areas so delineated. The NPS manages wilderness areas to be protected and remain unimpaired for future enjoyment as wilderness. Any proposal having the potential to impact wilderness resources will be evaluated in accordance with NPS policy or implementing NEPA. In evaluating environmental impacts, the NPS will take into account: 1. wilderness characteristics and values, including the primeval character and influence of the wilderness; 2. the preservation of natural conditions; and 3. assurance that there will be outstanding opportunities for solitude, that the public will be provided with a primitive and unconfined type of recreational experience, and that wilderness will be preserved and used in an unimpaired condition (NPS Management Policies, Chapter 6.3.4.3, 2006).

The control of fire in wilderness is addressed in NPS Management Policies at Chapter. 6.3.7. NPS Director's Order # 18: Wildland Fire Management directs that all fires burning within wilderness will be classified as a "wildland fire" or a "prescribed fire." Wildland fires are those that result from unplanned ignitions. Prescribed fires are those resulting from planned ignitions. All wildland fires within wilderness will be managed to include the application of minimum requirement suppression techniques, the consideration of firefighter and public safety, a cost/benefit analysis, sensitive natural and cultural resources, and will use the strategic and tactical options described in an approved fire management plan.

1.2.5 Relationship of Proposal to Other Planning Projects

As noted in section 1.1, generic Park Fire Management Plans exist for all of the affected parks. Denali National Park and Preserve already adopted a hazardous vegetative fuels treatment plan (NPS 2003). This plan would provide general prescriptions and estimated areas of effect from fire management activities to protect human life and associated structures and assets in park areas where hazardous vegetative fuels management plans were relatively vague and did not identify the magnitude of treatment.

All NPS fire management plans were written or revised based on the *Review and Update of the* 1995 *Federal Wildland Fire Management Policy, January 2001.* Each plan had to address 17 policy statements identified on pages 22-24 of the January 2001 Wildland Fire Policy Review and Update.
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The Department of Interior committed itself to having its bureaus' wildland fire management plans completed by September 30, 2004. The Office of Management and Budget had interest in this requirement and tracked accomplishments with the expectation that the task would be completed by the due date.

All NPS units in the Alaska Region requiring Fire Management Plans are on file and were completed as noted below.

- Gates of the Arctic National Park & Preserve–May 2003
- Katmai National Park & Preserve–June 2013
- Lake Clark National Park & Preserve–May 2010
- Western Arctic National Parklands–June 2012
    - Bering Land Bridge National Preserve
    - Kobuk Valley National Park
    - Noatak National Preserve
    - Cape Krusenstern National Monument
- Wrangell-St. Elias National Park & Preserve–June 2010
- Yukon-Charley Rivers National Preserve–June 2010

This hazardous vegetative fuels management plan EA supplements those FMPs with treatment details and estimated acres expected to be treated and maintained over the next 10–15 years.

1.3. Issues

Issues and concerns with this project are grouped into distinct impact topics to aid in analyzing environmental consequences, which allows for a standardized comparison of alternatives based on the most relevant information. The impact topics were identified on the basis of federal laws, regulations and orders, NPS Management Policies 2006, and NPS knowledge of potentially affected resources. A brief rationale for selecting or dismissing each topic is provided below. See chapter 5 for more details on public scoping, consultation, and coordination.

1.3.1 Issues Selected for Detailed Analysis

Based on scoping, the NPS identified the following issues for evaluation in this EA.

1.3.1.1 Air Quality

Prescribed burns near rural communities and human structures could adversely affect air quality used and enjoyed by the public in those areas.

1.3.1.2 Aquatic Resources and Fisheries

Wildland fires may adversely affect water quality, aquatic resources, and fisheries in affected areas.

1.3.1.3 Cultural Resources

Archeological, historical, and ethnographic resources could be affected at locations where a site or materials are burned or impacted from fire management activities.

1.3.1.4 Recreational and Scenic Values

Wildland fires and management activities could adversely affect public uses and enjoyment of NPS areas including the enjoyment of scenery and noise from management activities.

1.3.1.5 Socio-economics and Local Businesses

Guiding and other public service businesses and assets could be adversely affected by wildland fires where defensible spaces are not created and maintained, and some local communities and businesses could benefit from fire prevention and suppression activities.

1.3.1.6 Subsistence Resources/Uses

Subsistence resources and use areas could be adversely affected by inadequately managed wildland fires. For more information see the ANCILA Subsistence Evaluation and Findings prepared by NPS (Appendix A).

1.3.1.7 Terrestrial Vegetation
Vegetation may be removed through various techniques to reduce hazardous fire regimes around assets to be protected. Impacts to vegetation may be both adverse and beneficial.

1.3.1.8 Wilderness
Use of mechanized equipment and broad cast burning activities to manage hazardous fire fuels could degrade four primary qualities of wilderness character (naturalness, untrammeled, undeveloped, and having opportunities for solitude and unconfined recreation) in wilderness areas within the Alaska Region. See the Wilderness Minimum Requirements/Minimal Tool (MR/MT) Analysis for more details (Appendix B).

1.3.1.9 Wildlife/Habitat
Wildland fires can rejuvenate, and if severe, depress wildlife habitat and populations.

1.3.2 Issues Dismissed From Detailed Analysis

Issues dismissed from detailed analyses will not be addressed further in the EA.

1.3.2.1 Floodplains and Wetlands
The potential fire management actions are not expected to have any measureable lasting effect on floodplains or wetlands.

1.3.2.2 Threatened and Endangered Species
Hazardous vegetative fuels management activities are not likely to have an adverse effect on any federally listed threatened or endangered species or their habitat in Alaska NPS units. The removal of threatened and endangered plants would be prohibited. See Appendix C for the NPS summary judgement on the potential effects of the proposed action on listed threatened and endangered species and their habitat resulting from informal consultation with the U.S. Fish and Wildlife Service.

1.3.2.3 Low Income and Minority Populations
Several low income and minority populations live in remote communities near NPS areas in Alaska, but the proposed activity would protect their assets and communities. The proposal therefore would not have a disproportionate adverse effect on these populations pursuant to Executive Order (EO) 12898, Environmental Justice.

1.4. Permits and Approvals Needed to Implement Project

The NPS must obtain a burn permit from the Alaska Department of Environmental Conservation before starting any prescribed burn that may reach or exceed 40 acres in area. When conducting prescribed burning, the NPS shall follow the Enhanced Smoke Management Plan (ESMP). The ESMP is a program plan developed and agreed upon by the Alaska Wildland Fire Coordinating Group. The purposes of the ESMP is to mitigate the nuisance, health and safety hazards to transportation, such as, roadway and airport visibility impairment, smoke sensitive features (such as hospitals, schools, and clinics) posed by smoke intrusions into populated areas; to prevent deterioration of air quality and

Alaskan Ambient Air Quality Standard violations; and to reduce visibility impacts in mandatory Class I Federal Areas in accordance with Regional Haze Rules.

Where private inholders may need to perform minimal Firewise maintenance on NPS lands near their buildings, a special use permit issued from the appropriate superintendent would be required pursuant to 36 CFR Part 1.6. See appendix D for an example.

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2.0 DESCRIPTION OF ALTERNATIVES

2.1 Introduction

This chapter describes a reasonable range of alternatives, including the proposed action alternative and a no-action alternative. Note that this chapter also describes those alternatives and actions that will not be considered further (i.e., those not analyzed in Chapter 4).

These alternatives were developed in consultation with Alaska Region Fire Management officers and the regional Environmental Compliance Team.

The tables at the end of this chapter compare the alternatives in terms of potential actions to be taken and their environmental impacts.

2.2 Alternative A (No Action)

Under this alternative no coordinated program for clearing or thinning vegetation around structures would occur. Vegetation would continue to grow and accumulate around structures. Working through the appropriate Protection Agency partners the park's wildland fire management staff would respond to fires in accordance with the Alaska Interagency Wildland Fire Management Plan 2010 (Alaska Wildland Fire Coordinating Group) . Trees which present a physical hazard to personnel, structures, or equipment would be removed on a case by case basis.

2.3 Actions Common to Alternatives B & C

Mechanical fuels reductions, as described for alternative B, are actions that would be common to alternatives B and C. See Appendix D for an example Special Use Permit that NPS may issue to private landowners to clear vegetation from NPS lands pursuant to the Firewise guidelines where a private structure within 100 feet of the boundary with NPS lands may be threatened from potential wildfire.

2.4 Alternative B: Mechanical Fuels Reduction

2.4.1 General Concept

The National Park Service will remove hazardous vegetative fuels that surround structures in the developed areas and at remote backcountry structures utilizing general Alaska Firewise concepts. Fuel reduction techniques would utilize mechanical treatments to reduce or remove vegetation to create and maintain a defensible space around park structures or private inholdings. Mechanical fuels reduction is defined as the use of power saws, cross-cut saws, mowers, hand tools, or similar devices to mitigate hazard fuel buildup or recreate historical landscape conditions in areas where fire would pose an unreasonable threat to property or resources. Creation of this space would reduce the risk of property damage in the event of a wildfire, improve security for visitors and residents, and reduce the risks for firefighters. As part of the park FMPs, multi-year fuels projects

are identified for potential treatment. The planning and implementation of mechanical fuels reduction are to be in accordance with RM-18 and fuels reduction plans are to be written for specific projects.

2.4.2 Scope

The proposed areas of hazardous vegetative fuel treatments are primarily focused on fuels that surround structures in the developed areas and at remote backcountry structures. The proposal also includes isolated historic and cultural sites located throughout the affected NPS areas. To continue the benefits of hazardous vegetative fuel reduction, a maintenance program involving periodic removal of vegetation in these same areas is addressed in this proposal. Similar treatments would also be applied to new structures. (See Table 2.1 for estimated specific treatment acres/park).

2.4.3 Treatment Zones

The area around each structure would be divided into three fuel treatment zones (Figure 2.1). Figure 2.1 Schematic of fuels treatment zones around a structure, is based on recommendations from the Firewise Alaska.

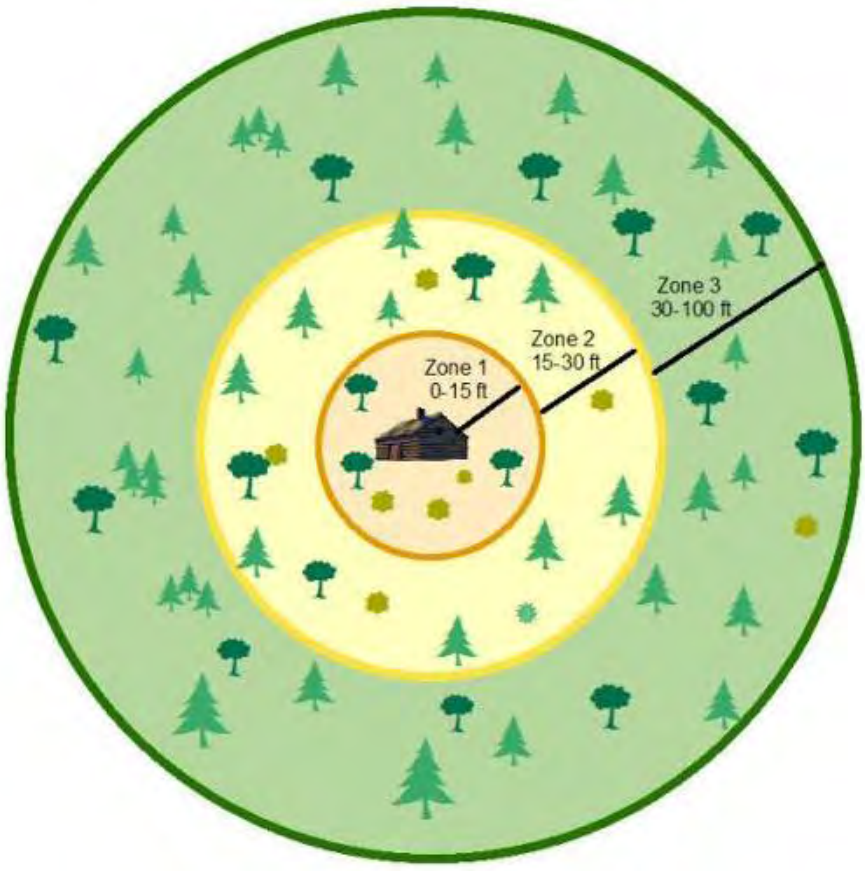

Figure 2.1.Schematic of fuels treatment zones around a structures

Zone 1 has a radius of about 15 feet, which extends immediately from the structure. Zone 1 would be cleared of all conifers and dry or dead vegetation. The edge of the building could have small plants, mowed grass, flowers or gravel.

Zone 2 would extend an additional 15 feet from Zone 1 to a 30-foot radius around a structure. This zone would include removal of all dry or dead vegetation, removal of shrubs beneath trees, pruning of limbs of mature conifers (>20 feet tall) to 6-8 feet above the ground surface, and thinning of conifers or clumps of small conifers up to about 15 feet between extending branches..

Zone 3 would extend a minimum of an additional 70 feet from Zone 2 for a minimum distance of 100 feet from each structure (where the slope is less than 30%). The distance for thinning on the downslope side of the slopes steeper than 30% could increase, depending on slope steepness and vegetation types. In Zone 3, the removal of dead or dry vegetation, shrubs beneath trees and the limbing of conifers would be the same as in Zone 2. Zone 3 would change the thinning of trees to a spacing of 10-15 feet between extending branches, depending on the location and flammability of the trees. Black spruce would be cleared to clusters less than 10 feet in diameter with 10–15 feet of spacing between clusters.

Depending on the availability of natural barriers, the extent of Zone 3 may have to be modified. Modification of Zone 3 on slopes would expand the treatment area. The increase of space on slopes is needed to accommodate the increased intensity in fire behavior on slopes. As heat rises, fuel on slopes preheats and ignites quickly, causing fires to travel faster upslope. Enlarged defensible space around structures on slopes is needed especially on the downhill side. Figure 2.2 also shows the minimum distances that Zone 3 should be extended depending on the percent slope and position of the slope relative to the structure.

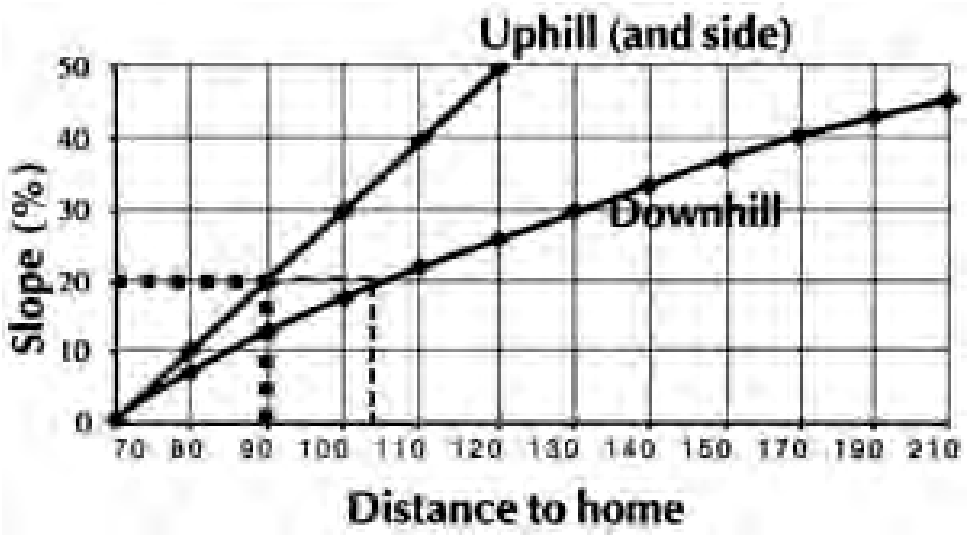

Figure 2.2. Distance (feet) calculations for zones where buildings are located on a slope

Areas around each structure would be individually evaluated to design defensible spaces within the context of that structure's use, location, and cultural significance. It is important to evaluate each structure on its own relative to the proximity of green lawns, driveways, roads or natural fuel breaks. For example, a spruce tree could be left in Zone 2 if lawn and driveway extended the largely vegetation-free area beyond the 30-foot point. Limited numbers of trees could remain as long as they are not leaning toward the structure or do not have branches that extend over the roof. Wildland fire staff would make a concerted effort to work with residents in identifying trees that could remain around their house. Should a fire occur and approach a particular structure, residents would need to understand that there is a high probability that even those trees that are not removed in advance would have to be removed to protect the structure. Individual plans and prescriptions will be developed and implemented based on the needs identified by fire management staff.

2.4.4 Criteria Used to Determine Treatment Priority for Structures

Because the protection of every known structure within parks cannot happen at the same time, criteria have been established to provide managers with sound methodology for determining which structures to treat first. In addition to the criteria listed below, the inherent risk to the site would be described (i.e. flammability of fuels and fire frequency adjacent to the site). Criteria for protection are generally derived from the Alaska Interagency FMP (2010, page 28) and more specifically from current approved individual unit FMPs and a letter from NPS to the Alaska SHPO describing Alaska NPS Structure Protection Procedures (July 30, 2005). These criteria are generally described below:

2.4.4.1 Critical Management Option, Top Priority

1. Year-round residences or domiciles.
2. Other structures occupied by humans regularly or daily such as NPS administrative sites or lodges.
3. National Historic Landmarks that may be threatened by wildland fire.

2.4.4.2 Full Management Option, Second Priority

1. Structures determined eligible for or on the National Register of Historic Places (NRHP), which have structural integrity, have routine maintenance/restoration, and are at potential risk from wildland fire.
2. NPS administrative structures used periodically (e.g., patrol cabin) or public use structures for which public funds are used to maintain (e.g., shelter cabins).
3. Structures under NPS permit (e.g., subsistence or guide facility) or an approved Mining Plan of Operations.
4. Structures undergoing NRHP eligibility or management assessment, which have structural integrity (e.g. intact roof and walls) and a reasonable probability for defense or are involved in a legal process.

2.4.4.3 Non-sensitive Structures

1. Trespass cabins, tent platforms, and other mom-authorized structures.
2. Abandoned historic structures that are not eligible for NRHP and generally have less than 50% integrity.

2.4.4.4 Avoid

1. These are sensitive sites that should not receive any pre-fire treatments such as burial sites or buried or other archaeological features/sites.

2.4.5 On-site Evaluation

Site reconnaissance would be completed to evaluate planned actions with actual field conditions. For example, trees selected for removal and areas selected for clearing and thinning would be identified and inspected to confirm planned actions. Representatives from Cultural Resources and Fire Management would review all actions in the field and agree on the designations made for each area or building perimeter. The number of trees removed would vary at each location depending on the type and characteristics of the vegetation, slope and aspect, and degree of significance of the structure and cultural resource interests (e.g., culturally modified trees, cultural landscape features, fish racks). Each site, structure, and situation is unique (for example, fire history, roadside screening, roof material, siding material, continuum of fuel, location of road, privacy, aesthetic considerations), so the treatment of the site would be tailored accordingly. Paramount consideration would be for the safety of personnel protecting the structure should a fire occur.

Specific aspects of removal and clearing to be evaluated include, but are not limited to: resulting vegetative edge conditions, integration of root systems, and canopy constraints. Resulting vegetative edge conditions should be reviewed to ascertain potential weakness of remaining plant materials that would be exposed to wind, sunlight and a change in precipitation levels. Roots of a number of trees may in fact share a singular root system and may require careful evaluation before removing single specimens. Consideration of canopy form and aesthetic appearance of those trees that would remain should be evaluated to determine whether excessive pruning and/or limbing would be required.

NPS staff would devise a site protection plan for each backcountry structure at the initial clearing. This plan would estimate the amount of time and resources needed for maintenance of the site.

All on-site evaluations and site reconnaissance would be completed well in advance of the proposed treatment actions to allow for any necessary survey or mitigation work needed to prepare a site-specific treatment plan. Each site would have a site-specific treatment plan developed in consultation with natural and cultural resource Park specialists as well as the Park Section 106 Coordinators. These plans would identify cultural resources features and elements (e.g., culturally significant trees, vegetation) that

are not to be impacted by the hazardous fuel reduction activities. The plan would also identify locations where burn piles could be placed and if raking would be permitted. The treatment plans would provide fire crews and maintenance staff their roles and responsibilities for thinning and burning activities and if a cultural resources monitor would need to be consulted prior to fieldwork or would be required on-site during the proposed treatments. The SHPO may need to review and comment on individual site protection plans. The Park Section 106 Coordinators are part of the annual planning meetings as well.

2.4.6 Staff/Contractor Pre-removal Meeting

Prior to the mobilization of removal equipment and workers, a meeting would be held on site to review procedures, answer questions and explain expectations by all parties. If drawings, specifications, or any other project information were available, a review of those materials would be included. Authorized individuals would be in attendance and identified so that all parties involved are informed of those responsible for all decisions made during the removal/clearing activity.

2.4.7 Site Access

Staff and/or contractors involved in the removal/clearing of vegetation would be provided with the locations of all accessible routes into the area. Locations for staging, stockpiling, parking, landing, and administrative functions should also be identified so that activities are restricted from areas that will continue to be used by public/park staff during the removal period or that contain resources that are to remain undisturbed. Access to wilderness sites would be determined in a site-specific MRA.

2.4.8 Operations in Wilderness

Mitigation measures would be implemented to minimize impacts to the natural and cultural resources within the wilderness. The following measures would be taken to mitigate noise intrusion and resource damage in areas designated as or eligible for wilderness:

- Strictly limit work to installations authorized under ANILCA sections 1310 and 1315 (e.g., communications sites, facilities for weather, climate, and fisheries research and monitoring, shelter cabins, residences, historic cabins, and other significant cultural resources/sites). The sites where work is proposed constitute the most critical needs. No work is proposed at other installations not directly related to the protection of public health and safety (e.g., temporary structures, trespass structures, and other structural resources that do not fit in one of the above categories).

- As a general rule, broadcast burning would not occur in designated or eligible wilderness. It may be considered on a case-by-case basis to protect human health and safety.

- In backcountry areas in wilderness and within areas eligible for wilderness a minimum requirement/minimum tool analysis will be completed for each project that will include access method options. If aircraft are used, such use would be programmed to coincide with other uses of aircraft, where practicable.

- Crews would perform long-term maintenance in some backcountry sites during winter.

- Where feasible, subsistence permit holders on private allotments would be encouraged to maintain the defensible space around the cabins they use in the course of their normal activities. This would reduce NPS administrative presence and associated helicopter use in adjacent wilderness areas.

Use of Tools:
Motorized tools such as chainsaws and "weed eaters" may be permitted for the initial fuel reduction at both designated and suitable wilderness sites subject to the minimum requirement/ minimum tool analysis.

Subsequent maintenance work would be accomplished only with non-motorized hand tools at all sites within a designated wilderness.

Motorized tools may be permitted for subsequent work at sites outside a designated wilderness, subject to an MRA on eligible wilderness lands.

2.4.9 Historic Properties Protection Measures

When specific areas are targeted for fuels management projects, the Park Section 106 Coordinator and other Cultural Resource personnel in collaboration with Fie staff will implement the Section 106 process in accordance with the Advisory Council on Historic Preservation's regulations implementing section 106 (36 CFR Part 800, "Protection of Historic Properties") which includes: (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that are either listed on or eligible to be listed on the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed on the National Register; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

The 2008 Nationwide Programmatic Agreement may be used to implement cultural resource monitoring and/or inspections during hazardous fuels reduction projects and post-burn surveys. Cultural resource staff and Fire staff will determine the level of pre- and post-project surveys needed and coordinate SHPO/Tribal consultation. A

Programmatic Agreement may be developed with SHPO to streamline review and consultation for hazardous fuels reduction activities in NPS areas with a large volume and/or magnitude of fuel reduction projects (i.e., mechanical and prescribed burns).

Removal of vegetation would be completed in a manner that does not damage or disturb vegetation to remain, other natural resources, historic and cultural resources, or infrastructure/improvements. If direction by archaeologists, cultural resource specialists, or other park staff is anticipated, proper coordination with contractors or park staff involved with the removal/clearing would be addressed at the pre-removal meeting. Park staff would be responsible for properly identifying any specific resources that are to be protected and to inform the contractor or park staff involved.

Fuel reduction crews would be briefed about cultural resources concerns such as the need to use care when removing vegetation growing on, under, or next to structures; the types of artifacts that may be encountered when working around historic structures; and the requirement that trees and shrubs be cut off at ground level and not uprooted.

Should archaeological resources be identified during proposed hazardous fuels treatments, all work would cease in the immediate vicinity of the discovery until the resources could be identified and documented and an appropriate mitigation strategy developed in consultation with the State Historic Preservation Officer. Sensitive areas would be identified to the crew to minimize foot traffic and dragging of brush over these sites. Tree felling would be accomplished in such a way that trees would be dropped in directions away from identified sites. Vehicles would remain on paved or designated roadways in order to prevent driving over cultural features. A cultural monitor would be present if cultural resources are discovered or unanticipated effects on cultural resources are found.

2.4.10 Removal Techniques

Beyond routine and accepted techniques per arboricultural standards, removal of trees would be accomplished in a manner that minimizes disturbance of administrative and public activities. Re-routing traffic and controlling access to removal areas would be the responsibility of the involved contractor/park staff. All necessary safety precautions would be taken to protect the public, staff and contracted workers.

Trees designated for removal would ideally be felled with the stump flush-cut with the ground. This would facilitate recovery of groundcover and will be consistent with the treatment and appearance of cultural landscape that is to be interpreted. Felling would be accomplished in a manner that does not leave permanent markings or indentations on any surface of the ground. Logs would be bucked up, allowed to dry, and used as firewood at backcountry cabins. Larger tree trunks could be saved for renovation of historic structures. Logs from trees at residences could be used as firewood by the residents. Snags would be removed from Zone 1 and 2 areas because they are ideal sources of burning embers that pose too great a threat to structures.

To plan for successional change, selected seedlings and saplings would not be removed from Zones 2 and 3. They would be permitted to grow and develop naturally to replace trees and shrubs that die off.

Park residents would be encouraged to discuss the details of fuel removal with fire management staff to assure that both fire protection and aesthetic concerns are addressed when decisions are made. The Park Superintendent would retain the authority to override decisions where hazard fuel removal conflicts with overall landscaping intentions.

2.4.10.1 Limb and Branch Pruning
Those trees that are to remain could require pruning of lower limbs, damaged or imbalanced branches, previously cut knobs, and sucker growth. Clean cuts would be kept close to the trunk or connecting branch. Trees that might be retained within the 30-foot clear zone of a building would be limbed up a minimum of 6 feet from the ground. Limbing of trees between 30 and 100 feet away from a building would be evaluated on an individual basis, but a rule of thumb would be the closer to the building, the higher the limbing. Some snags could remain on the outer edges of Zone 3.

2.4.10.2 Debris Disposal
Debris may be disposed of by one or more of the following methods: 1) firewood collection, 2) pile construction and burning, 3) lop and scatter, or 4) chipping. Debris piles intended for burning would be appropriately sized and located in openings far enough away from residual vegetation to prevent or minimize scorching. Debris piles will generally be constructed and allowed to dry for pile burns at a later date. Per NPS policy, a prescribed burn plan would be developed for the implementation of any pile burns.

Fire prevention measures would be taken to assure that a wildland fire is not ignited by burning of shrub and branch debris. These would include burning during appropriate weather conditions, adequate clearing around debris piles (i.e., away from live trees), limiting the number of piles that are burning at one time, and presence of trained personnel with appropriate fire-fighting apparatus.

Where feasible, shrubs and branches would be chipped rather than burned. Shrubs and branches, if burned, would be piled in locations distant from housing areas thus minimizing smoke-related impacts on residents. Shrub and branch piles would be burned during a time when visitation is the lowest and fire danger is low. Burning would be done in compliance with NPS RM-18 and an Alaska Department of Environmental Conservation Air Quality Permit.

2.4.10.3 Clean Up
All debris consisting of trees, limbs, and branches would be removed from non-paved areas, as appropriate. Additionally, the aforementioned materials plus twigs, leaves, needles, chips, and other organics would be removed from all paved areas, rooftops, and site furnishings. Ruts, depressions, or other impressions to the natural grade would be filled, raked, and, if necessary, mulched or seeded. All seed mixes would be native plants

and would be approved by NPS exotic plant management staff or park botanist/ecologist. All refuse generated or brought on site in the form of packaging, equipment parts, or worker supplies would be removed out of the park. Simple maintenance on equipment engines or motors would be allowed in backcountry areas.

2.4.11 Periodic Maintenance

Park staff responsible for ongoing landscape maintenance would have pre-season meetings with fire and resource staff to review site-specific treatment plans to ensure an understanding of the plan and its stipulations. In each case, specific criteria for evaluation of vegetation would be adequately outlined so that any staff person, whether permanent or seasonal, could properly inspect, maintain, care for, and if necessary, repair damage to vegetation.

Sites outside a Historic District would be revisited two years following fuel removal. An evaluation of limb, sapling and shrub re-growth would occur and a determination would be made regarding removal cycles. It is generally anticipated that re-treatment would be necessary roughly every two to five years. In a designated wilderness area, only non-motorized hand tools would be used for follow-up treatments. These may include hand saws, scythes, and pruning tools. In non-wilderness backcountry areas power hand tools may be used. Reduction in the height and density of herbaceous plants, grasses, and small shrubs may be done annually via mowing in developed areas.

2.4.12 Special Considerations for Historic Districts

The goal for these areas is to attain simultaneously the goals for cultural landscape rehabilitation and Firewise landscaping. The guidelines listed above for On-Site Evaluation, Flagging, Staff/Contractor Pre-removal Meeting, Site Access, Use of Tools, Protection of Resources, Removal Techniques, Root Pruning, Limb and Branch Pruning, Burning, Clean Up, and Periodic Maintenance would be followed.

Annual maintenance would consist of an onsite visual review of the historic district to determine the extent of vegetative management required. Areas designated for cleared overstory and thinned understory may receive regular mowing during the season and would be inspected for watering, re-seeding, and fertilization. Areas designated to contain thinned overstory and understory would be culled of most emerging plants in those categories.

Routine maintenance on overstory and understory vegetation to remain would include, but would not be limited to, fertilization, pruning according to cultural landscape/fire management standards, and removal of damaged limbs or branches. As determined by the cultural landscape and fire management park staff, periodic maintenance could be required to retain essential landscape elements or landscape treatments in the historic district. For example, areas to contain thinned overstory and understory vegetation could be mowed on a rotational schedule to ensure vigorous yet controlled growth of grasses

and low shrubs. Plans for each effort would be updated to reflect changes in National Park Service policies, park planning documents, and current maintenance technologies.

2.5 Alternative C: Mechanical Fuels Reduction & Prescribed Fire

This alternative would include all the aspects of Alternative 2 and would use broadcast burning as an additional clearing tool to create a protected buffer for the given asset. See figure 2.3 for a photograph for which broadcast burning would be considered. In addition to, or in lieu of mechanical treatment, Park management would use prescribed fire for the purposes for reducing hazard fuel loads in the vicinity of resources requiring protection or for restoring historical conditions at selected sites.

Within designated or eligible wilderness, broadcast burning may be considered on a case by case basis, subject to a minimum requirements analysis.

Prescribed fire operations constitute the intentional setting of vegetation on fire as an alternative/supplemental means to removing fuels between a protection asset and the environment from which a wildfire would approach. These operations would reduce fuel availability to a wildfire as it advances across the landscape thus greatly reducing the intensity of a fire. Prescribed fire burn plans will be written and approved prior to implementation in accordance with NPS policy.

Figure 2.3. Burnout operations around remote cabin in Yukon-Charley Rivers National Preserve – Yukon Fire 2004. NPS

This alternative may involve treatments of varying size beyond the initially identified Firewise buffer, including fuel breaks. Fuel breaks often serve as the first line of defense. Fuel breaks are typically near a community or high concentration of structures. Fuel breaks may be used in lieu of prescribed fire or in combination with prescribed fire where appropriate. Typically fuel breaks are created using the shaded fuel break concept, much like the mechanical fuels reduction treatment prescription for Zone 2 and Zone 3. Prescribed burns would only occur under favorable conditions generating low intensity burns that could be easily controlled and producing minimal smoke effects to surrounding inhabited areas. The prescribed burns would utilize strategic weather, vegetative and topographic conditions identified in a specific burn plan to attain desired effects. The burn treatments would be located to capitalize on fuel breaks of natural features (e.g. rock outcroppings, streams, and lakes) and manmade facilities (e.g. roads, trails, and utility corridors). They would also be located close enough to structures that a wildfire would not become unmanageably intense before it reached Zone 2 of the Firewise landscaping.

Table 2.1 below lists estimated treatment acreage by park unit over 15 years, addresses the number of structures/sites and/or areas requiring defensible space, describes proposed treatment type (mechanical, broadcast burn around sites, area broadcast burn), and lists treatment rotation periods. All of this information is provided to give a sense of magnitude of hazard fuels work being proposed in each park unit.

Note: Broadcast Burning—Region-wide the figures listed below represent the best estimate of total targeted acres of broadcast burn treatments over the next 10–15 years (Approximately 25,000 acres). However, the size and location (Administrative and geographical) of each broadcast unit may vary due to Park and/or Regional prioritization, prescribed fire prescriptions, location of natural fuel breaks or other factors.

2.6 Other Mitigating Measures

To reduce impacts to avian wildlife, vegetation removal and prescribed burns would avoid periods, to the extent practicable, when birds are nesting in vegetation to be removed as stipulated by the USFWS guidelines (Appendix E). Hazardous fire fuels treatments would be avoided in locations and during times that could adversely affect listed threatened or endangered species pursuant to recommendations from the USFWS (see Appendix C). To mitigate adverse effects on visitors, vegetation removal activities with associated soundscape and air quality effects would be conducted, to the extent practicable, at times when visitation is expected to be low or nonexistent.

2.7 Environmentally Preferable Alternative

Simply put, the environmentally preferable alternative causes the least damage to the biological and physical environment, which also best protects, preserves, and enhances cultural and natural resources. The NPS finds that alternative C best protects cultural and natural resources because Firewise vegetation treatments with prescribed burns around structures and valued sites best protect cultural resources, authorized administrative

facilities, and human life. Proactively protecting sites with hazard fuels treatments would minimize emergency heavy-handed fire suppression methods and response personnel trying to protect valued structures and sites from wildland fires.

2.8 Other Actions Considered but Not Addressed

2.8.1 Prescribed Fire for resource purposes

Incorporating prescribed fire is a long-term objective. Re-introducing fire to the landscape is a long-range fire suppression goal that is not supported by research in NPS Alaska areas at this time.

2.8.2 Clearcut

Clearing large sections of landscape around the built environment does not coincide with park values, so this option was dismissed from further consideration.

Table 2.1. Summary Treatments of Alternative C

Gates of the Arctic National Park and Preserve	
Treatments around Critical or Full Sites	
Number of NPS Owned Sites in Critical or Full	14
Estimated Acres Treated over 15 years—Mechanical (Sites)	14
Estimated Acres Treated / year—Mechanical (Sites)	2
Treatment rotation period in years (Sites)	15
Yukon-Charley Rivers National Preserve	
Treatments around Critical or Full Sites	
Number of NPS Owned Sites in Critical or Full	28
Estimated Acres Treated over 15 years—Mechanical (Sites)	39
Estimated Acres Treated / year—Mechanical (Sites)	2–5
Estimated Acres Treated / year—Broadcast Burn (Sites)*	5,000
Estimated Acres Treated / year—Broadcast Burn*	NA
Treatment rotation period in years (Sites)	3 or 15
Treatments around Native Allotments	
Estimated Acres Treated over 15 years—Mechanical (Allotments)	150
Estimated Acres Treated / year—Mechanical (Allotments)	7–10
Wrangell-St. Elias National Park and Preserve	
Treatments around Critical or Full Sites	
Number of NPS Owned Sites in Critical or Full	119
Estimated Acres Treated over 15 years—Mechanical (Sites)	89
Estimated Acres Treated / year—Mechanical (Sites)	2–5
Treatment rotation period in years (Sites)	20
Treatments around Private Inholdings	
Estimated Acres Treated over 15 years—Mechanical (Private Inholdings)	33
Estimated Acres Treated / year—Mechanical (Private Inholdings)	1–10
Treatment rotation period in years (Private Inholdings)	15
Treatments along the McCarthy Road Corridor	
Estimated Acres Treated over 15 years—Mechanical	1,000
Estimated Acres Treated over 15 years—Broadcast Burn*	8,000
Estimated Acres Treated / year—Mechanical	NA
Estimated Acres Treated / year—Broadcast Burn*	NA
Treatment rotation period in years	15
Western Arctic National Parklands	
Treatments around Critical or Full Sites	
Number of NPS Owned Sites in Critical or Full	78
Estimated Acres Treated over 15 years—Mechanical (Sites)	78

Estimated Acres Treated over 15 years—Broadcast Burn (Sites)*	5,000
Estimated Acres Treated / year—Mechanical (Sites)	5
Estimated Acres Treated / year—Broadcast Burn (Sites)*	NA
Treatment rotation period in years (Sites)	15
Lake Clark National Park and Preserve	
Treatments around Critical or Full Sites	
Number of NPS Owned Sites in Critical or Full	32
Estimated Acres Treated over 15 years—Mechanical (Sites)	32
Estimated Acres Treated over 15 years—Broadcast Burn (Sites)*	5,000
Estimated Acres Treated / year—Mechanical (Sites)	2
Estimated Acres Treated / year—Broadcast Burn (Sites)*	NA
Treatment rotation period in years (Sites)	15
Treatments around Port Alsworth	
Estimated Acres Treated—Broadcast Burn*	2,500
Katmai National Park and Preserve	
Treatments around Critical or Full Sites	
Number of NPS Owned Sites in Critical or Full (estimated)	50
Estimated Acres Treated over 15 years—Mechanical (Sites)	50
Estimated Acres Treated / year—Mechanical (Sites)	3
Treatment rotation period in years (Sites)	15

*Fire managers will define the broadcast burn units using natural boundaries to the greatest extent practicable. Fire Managers shall design prescribed fire unit(s) to first meet the goal of protecting sensitive features while attempting to minimize total acres burned (< 1,000 acres). However, the Maximum Allowable Perimeter (MAP)/Unit may exceed 1,000 acres due to the following factors: Using natural fuel breaks in designing prescribed fire unit boundaries decreases risks to firefighters, reduces impacts to the landscape of constructing control lines and reduces the cost of implementing prescribed fire. Due to the variability of natural landscapes, the location of natural fuel breaks may preclude designing prescribed fire units less than 1,000 acres.

Table 2.2. Summary Description of the Alternatives

Category	Alternative A (No Action)	Alternative B: Mechanical Fuels Reduction	Alternative C: Mechanical Fuels Reduction and Prescribed Fire
Acres Treated	Estimated to be less than 1.	3,985 over 15 years.	28,485 over 15 years.
Treatment Methods	Trees which present a physical hazard to personnel, structures or equipment would be removed on a case by case basis. NPS would respond to fires in accordance with the Alaska Interagency Wildland Fire Management Plan (2012).	Thinning and clearing using power saws, cross-cut saws, mowers, hand tools or similar devices.	Thinning and clearing using power saws, cross-cut saws, mowers, hand tools or similar devices. Prescribed burns to be used in individually approved locations with cultural resources reviews and with wilderness MR/MT analysis where needed.
Effectiveness	Effectiveness would be low. Defensible space would not be created surrounding structures which would remain at high risk for destructive wildfires. Security would not be improved for visitors and residents. Risks would not be reduced for firefighters.	Effectiveness would be moderate. Defensible space would be created surrounding structures which would remain at high risk for destructive wildfires. Security would be improved for visitors and residents. Risks would be reduced for firefighters. Without use of prescribed fire as a management tool, fires would be more intense.	Effectiveness would be high. Defensible space would be created surrounding structures which would remain at high risk for destructive wildfires. Security would be improved for visitors and residents. Risks would be reduced for firefighters. With the use of prescribed fire as a management tool, fires would be less intense and more easily controlled near structures and other valued sites.

Table 2.3. Summary Impacts of the Alternatives

Resources	Alternative A (No Action)	Alternative B: Mechanical Fuels Reduction	Alternative C: Mechanical Fuels Reduction and Prescribed Fire
Air Quality	The impacts to air quality would be local, short-term, minor and adverse as a result of wildfire and fire-fighting activities. The buildup of hazardous fuels would increase the risk of wildfire events over time, which would result in impacts on air quality.	The impacts to air quality would be local, short-term, minor and adverse as a result of wildfire and fire-fighting activities.	Impacts to air quality would result in direct, short-term, localized, minor adverse impacts from prescribed burns to air quality.
Aquatic Resources and Fish	Impacts to aquatic resources and fish would be minor. Impacts to water quality from the inability to treat the hazardous vegetative fuels could also be adverse, up to moderate, long-term, and localized due to future severe wildfires from potential fuel buildup.	Overall impacts to aquatic resources and fish would be minor. Indirect, adverse impacts from potential for increased sediment runoff, which could reduce macroinvertebrate habitat, downed woody debris, and permeability of spawning gravel.	Overall, impacts to aquatic resources and fish would be minor. The reduction in severe wildfires would benefit aquatic resources and fish. Indirect, adverse impacts from potential for increased sediment runoff, which could reduce macroinvertebrate habitat, downed woody debris, and permeability of spawning gravel.
Cultural Resources	Impacts to cultural resources would be direct, adverse, up to moderate, long-term, and localized due to increased potential for more intense wildfires.	Impacts to cultural resources would be direct, beneficial, up to moderate, long-term, and localized due to reduced potential for future severe wildfires that would adversely impact cultural resources.	Impacts to cultural resources would be direct, beneficial, up to moderate, long-term, and localized due to reduced potential for future severe wildfires that would adversely impact cultural resources.
Recreational and Scenic Values	Impacts to visitor use and enjoyment would be minor due to public use closures from fire potential and associated fire suppression tactics. In addition, indirect effects of this alternative would be localized, short-term, and minor.	Impacts to visitor use and enjoyment would be minor and due to public use closures during Firewise operations and beneficial in the long term due to the reduced potential for future wildfires to damage structures and sites that visitors enjoy.	Impacts to visitor use and enjoyment would be minor due to public use closures during Firewise operations and prescribed burning and beneficial in the long term due to the reduced potential for future wildfires to damage structures and sites that visitors enjoy.
Socioeconomics and Local	Impacts to socioeconomics and local	Impacts to socioeconomics and local	Impacts to socioeconomics and local

Resources	Alternative A (No Action)	Alternative B: Mechanical Fuels Reduction	Alternative C: Mechanical Fuels Reduction and Prescribed Fire
Businesses	businesses would be minor, short-term, and localized due to temporary road closures and reduced visibility. Impacts to adjacent landowners and uses from limiting the fire program to presently approved fire management tools could also have direct, up to moderate, long-term, localized effects due to increased potential for future severe wildfires structures and sites used by local businesses in NPS units. The increased potential for uncharacteristic wildfires is from the potential fuel buildup adjacent to communities and buildings as fuels continue to increase.	businesses would be up to moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires as defensible spaces are created around structures an sites used by local businesses in NPS units .	businesses would be moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires as defensible spaces are created around structures an sites used by local businesses in NPS units.
Subsistence Resources and Uses	Impacts to subsistence resources and uses would be negligible to minor, short-term, and localized impacts. Impacts to subsistence resources and uses from limiting the fire program to presently approved fire management tools could also have direct, minor to moderate, long-term, localized effects due to increased potential for future severe wildfires. The increased potential for uncharacteristic wildfires is from the potential fuel buildup within and adjacent to subsistence resource sites and use areas as fuels continue to increase.	This alternative would result in direct, up to moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires as defensible spaces are created around important subsistence resource sites and use areas.	This alternative would result in direct, up to moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires as defensible spaces are created around important subsistence resource sites and use areas.
Terrestrial Vegetation	Impacts to terrestrial vegetation would be minor, adverse, long-term, localized impacts from lack of fire fuels treatments	Impacts to terrestrial vegetation would be minor, adverse, long-term, localized impacts from fire fuels treatments to	This alternative would result in up to moderate, adverse, long-term, localized impacts from fire fuels

Resources	Alternative A (No Action)	Alternative B: Mechanical Fuels Reduction	Alternative C: Mechanical Fuels Reduction and Prescribed Fire
	around valued sites and the indirect effects from full suppression tactics to address the potential for future severe wildfires.	create defensible space around valued sites to minimize impacts from potential future severe wildfires. The minor short-term adverse impacts would be outweighed by the long-term benefits. Impacts to plants requiring shaded overstory could be adverse, long-term, and localized.	treatments to create defensible spaces around valued sites to minimize impacts from potential future severe wildfires. The adverse impacts from treatments including up to 25,500 acres of prescribed burns could result in long-term benefits to vegetation from creation of a mosaic of fire patterns. Impacts to plants requiring shaded overstory could be adverse, long-term, localized.
Wilderness	There would be no direct impacts to wilderness character from no fire treatments, but indirect effects to wilderness character could be up to minor, long-term, localized impacts because the emergency response actions to protect valued structures from future severe wildfires where hazardous vegetative fuels increase around structures .	Impacts to wilderness character would be minor, short-term, localized impacts from hazardous vegetative fuels removal activities around structures to decrease the potential for future severe wildfires effects on these sites.	Impacts to wilderness character would be up to moderate, long-term, localized impacts from vegetative fuels removal activities, including broadcast burns in limited locations around structures to decrease the potential for future severe wildfires effects on these sites.
Wildlife and Habitat	Impacts to wildlife and habitat would be up to moderate by increasing the potential for future severe wildfires as hazardous vegetative fuels increase around structures and adjacent to roads.	Impacts to wildlife and habitat would be up to moderate, beneficial, and long-term, by decreasing the potential for future severe wildfires as hazardous vegetative fuels are reduced around structures and adjacent to roads.	Impacts to wildlife and habitat would be up to moderate, beneficial, and long-term impacts by decreasing the potential for future severe wildfires as hazardous vegetative fuels are reduced around structures and adjacent to roads.

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3.0 AFFECTED ENVIRONMENT

3.1 Project Area

The project area is comprised of the critical and full fire protection points in Park Development zones and isolated historic and cultural sites in six National Park Service Alaska Region Park units: Gates of the Arctic National Park and Preserve (GAAR; Figure 3.1), Katmai National Park and Preserve (KATM; Figure 3.2), Lake Clark National Park and Preserve (LACL; Figure 3.3), Wrangell-St. Elias National Park and Preserve (WRST; Figure 3.4), Yukon-Charley Rivers National Preserve (YUCH; Figure 3.5), and Western Arctic National Parklands (WEAR; Figure 3.6). WEAR parks include Bering Land Bridge National Preserve (BELA; Figure 3.7), Cape Krusenstern National Monument (CAKR), Noatak National Preserve (NOAT), and Kobuk Valley National Park (KOVA). Land ownership within and surrounding the Park units are shown in Figures 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, and 3.7.

WEAR is a National Park Service organizational structure administering four park units located in northwest Alaska: BELA, CAKR, KOVA, and NOAT (Figure 3.6). The Arctic Circle cuts through BELA (Figure 3.7), but the bulk of the park unit is located south of the Arctic Circle within the northern part of the Seward Peninsula. CAKR, NOAT, and KOVA are located north of the Arctic Circle and arranged roughly in a sweeping arc north of Kotzebue, Alaska. CAKR stretches nearly due north, NOAT stretches west to east, and KOVA dips north to south.

GAAR encircles 8.4 million acres of northern Alaska above the Arctic Circle (Figure 3.1). The park unit lies between the James W. Dalton Highway to the east and Noatak National Preserve and the National Petroleum Reserve—Alaska to the west. KATM contains approximately 4 million acres with 308,000 acres designated as KATM preserve and is located on the Alaska Peninsula in southwest Alaska (Figure 3.2). LACL encompasses approximately 2 million acres with 140,000 acres designated as LACL preserve and is located approximately 160 miles southwest of Anchorage on the northern end of the Alaska Peninsula (Figure 3.3). WRST, located in south-central Alaska, is the largest unit in the national park system, with approximately 13.2 million acres falling within the park boundaries (Figure 3.4). Approximately 800,000 acres within the WRST park boundary are non-federal lands owned by Alaska Native Corporations, the State of Alaska, the University of Alaska, and other private owners**.** YUCH encircles 2.5 million acres along a section of the Yukon River near the U.S.-Canadian border between the rural communities of Eagle and Circle (Figure 3.5).

Fire protection points consist of structures, cultural and paleontological sites, small areas of high resource value, and threatened and endangered species nesting areas. The fire protection points are shown in the following figures: GAAR (Figure 3.8), KATM (under development), LACL (Figure 3.9), WRST (Figure 3.10), YUCH (Figure 3.11), WEAR

(Figure 3.12), and BELA (Figure 3.13). Fire protection points have been designated into four classes—critical, full, avoid, and non-sensitive. These designations have been established to identify the appropriate actions to be taken at a specific site, rather than a landscape-scale management option that may be surrounding the site.

- Critical—Sites to be protected from fire and receive the highest priority for suppression actions and assignment of available firefighting resources.
- Full—Sites to be protected from fire and receive a high priority, but are below wildland fires that are within or threatening a critical site.
- Avoid—Areas where fire suppression activities should be avoided and effects from suppression efforts minimized. Aircraft should be restricted from these areas.
- Non-Sensitive—These sites have been identified and located by NPS and do not require any type of protection, suppression actions, or considerations.

3.2 Air Quality

The Clean Air Act of 1963 (42 U.S.C. 7401 *et seq.*) established federal programs that provide special protection for air resources and air quality related values associated with NPS units. Specifically, Section 118 of the Clean Air Act requires a park unit to meet all federal, state, and local air pollution standards. The project areas are designated as Class II air quality area under the Clean Air Act, which means emissions of particulate matter and sulfur dioxide are allowed up to the maximum increase in concentrations of pollutants over baseline concentrations as specified in Section 163 of the Clean Air Act. In addition, the Clean Air Act gives the federal land manager the responsibility to protect air quality related values (i.e., visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse pollution impacts.

National Ambient Air Quality Standards (NAAQS) for criteria pollutants are intended to protect human health and welfare. Criterion pollutants are sulfur dioxide (SO_2), nitrogen oxide (NO_x), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), lead (Pb), and carbon monoxide (CO).

As a Class II area under the Prevention of Significant Deterioration provisions of the Clean Air Act of 1963 and amendments, the area's air quality is protected by allowing only limited increases (i.e., allowable increments) over baseline concentrations of pollution for SO_2, NO_x, and PM. NPS conducts air quality monitoring in the project area. One Class I airshed, the U.S. Fish and Wildlife administered Tuxedni National Wildlife Refuge, is located near the southeast boundary of Lake Clark National Park and Preserve. Ambient monitoring for SO_2, NO_x, O_3, and PM has not been routinely monitored for all of the Project Area, but it is assumed to be in compliance with the NAAQS.

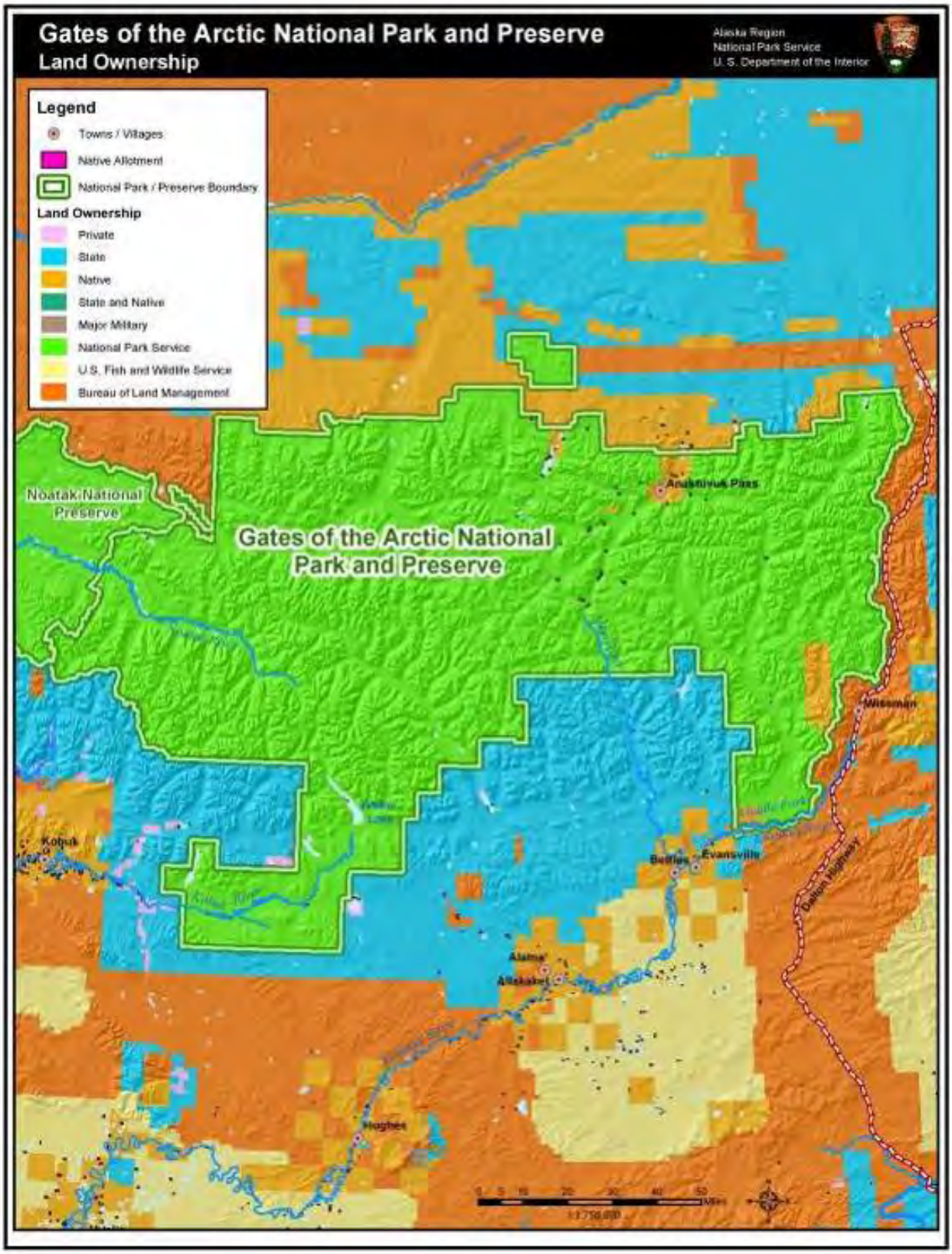

Figure 3.1. Gates of the Arctic National Park and Preserve

Figure 3.2. Katmai National Park and Preserve

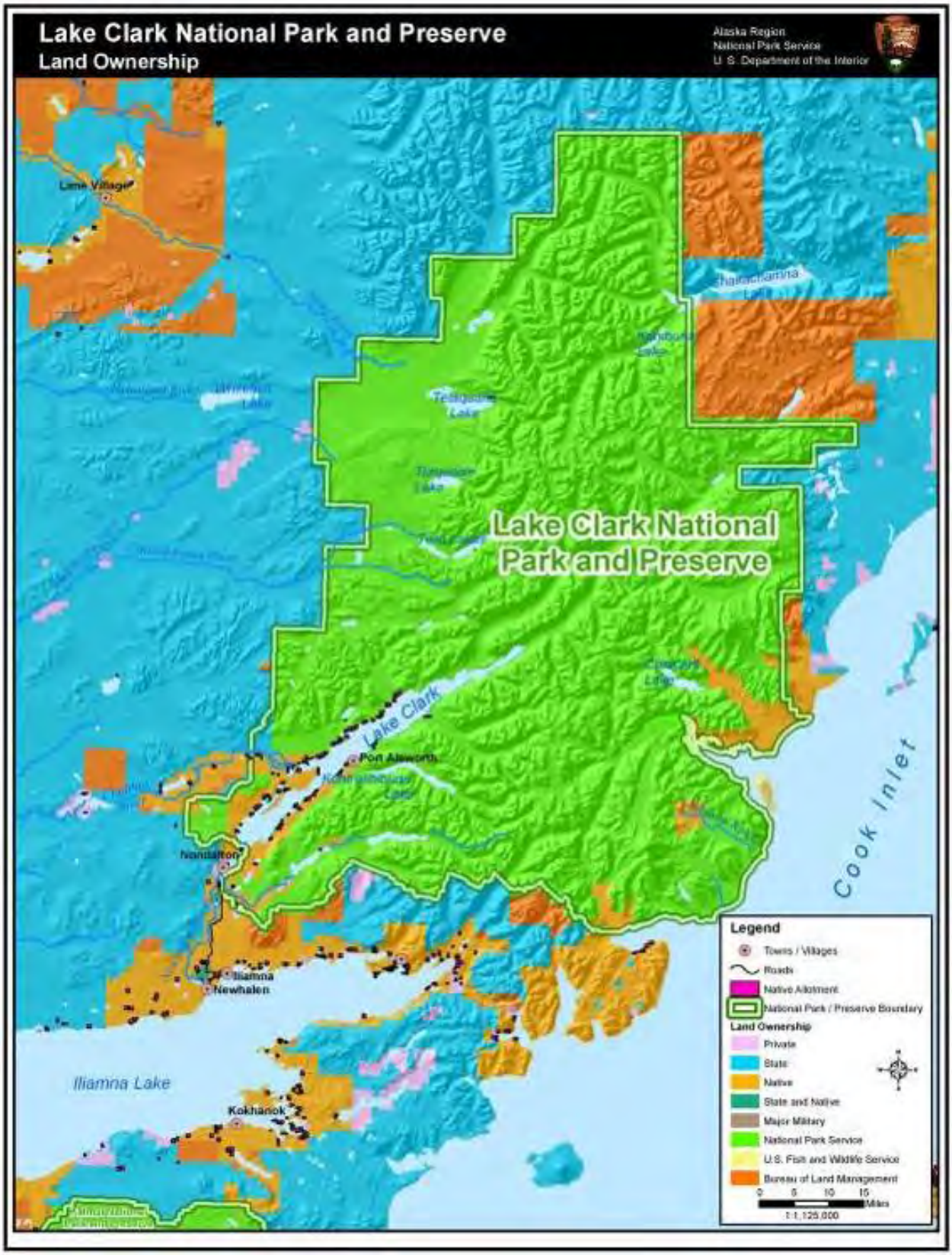

Figure 3.3. Lake Clark National Park and Preserve

Figure 3.4. Wrangell-St. Elias National Park and Preserve

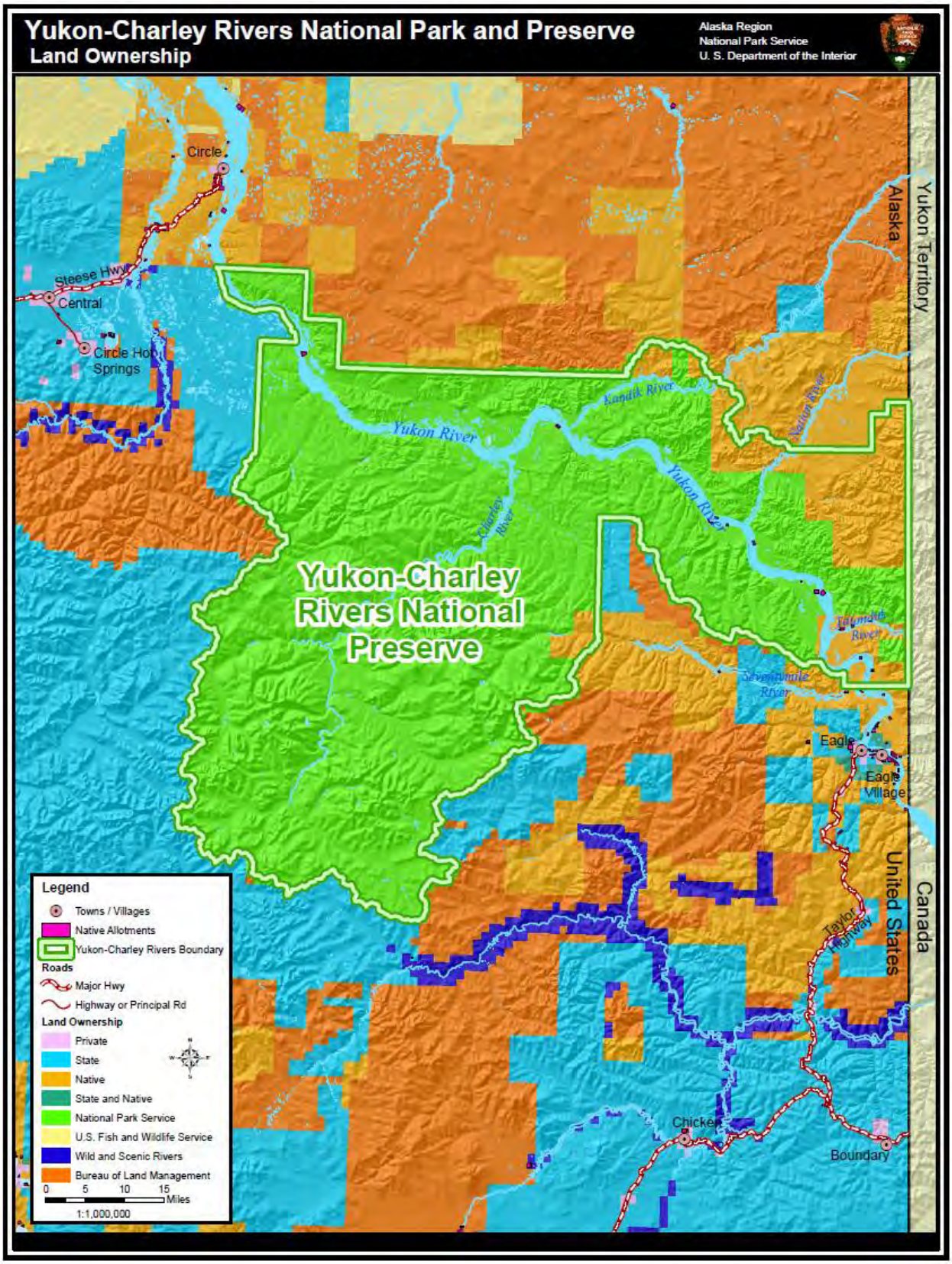

Figure 3.5. Yukon-Charley Rivers National Preserve

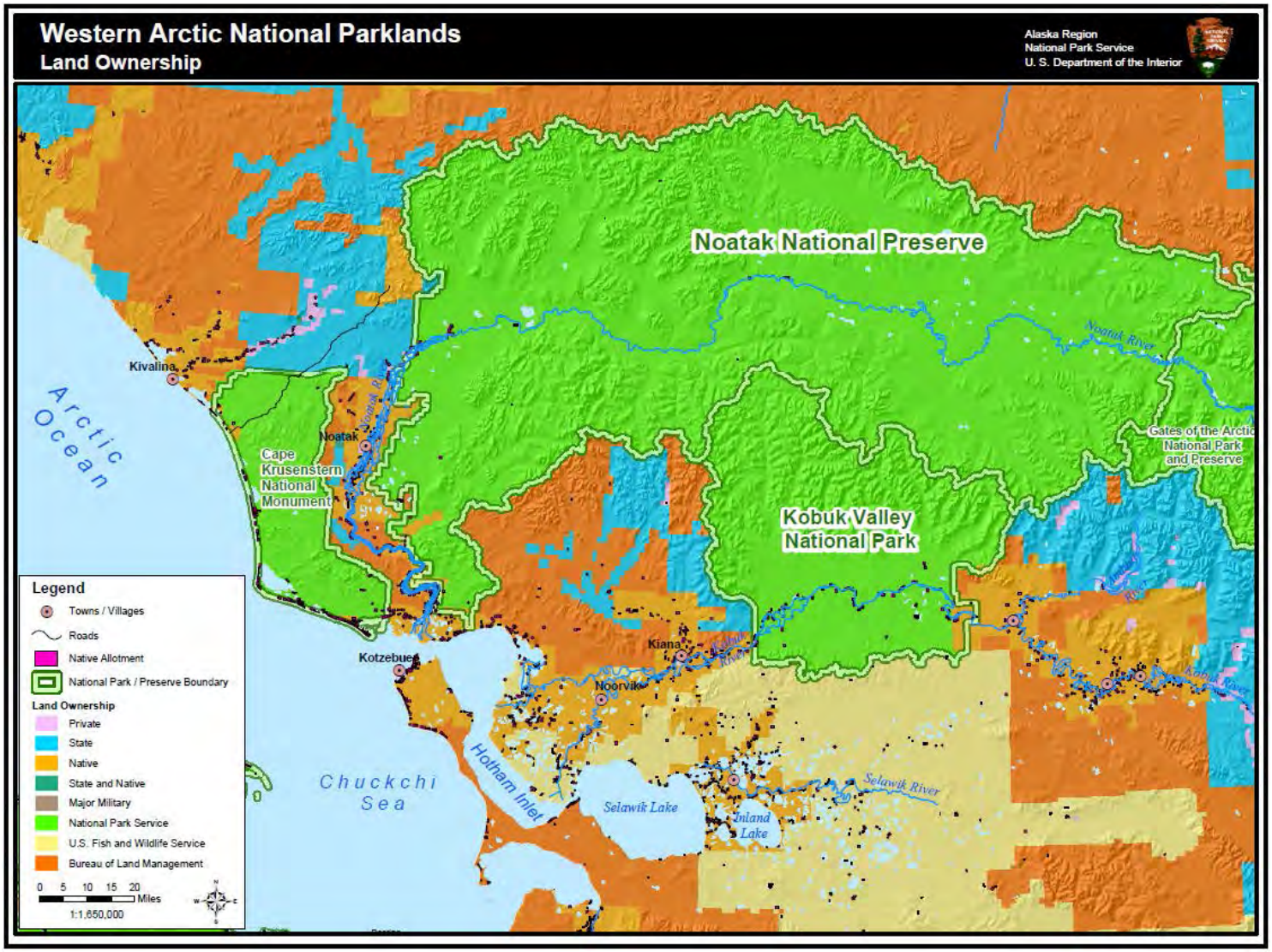

Figure 3.6. Western Arctic National Parklands

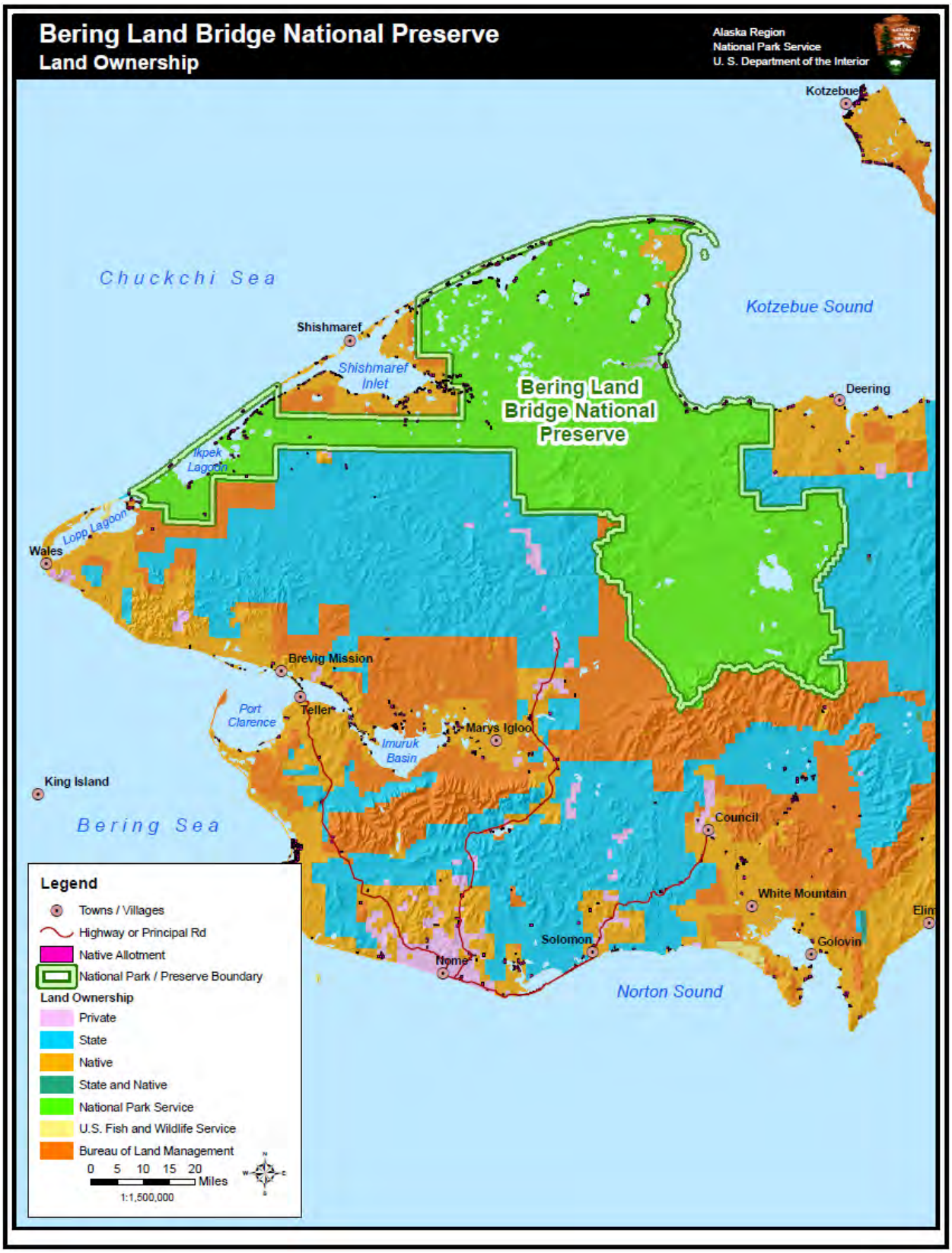

Figure 3.7. Bering Land Bridge National Preserve

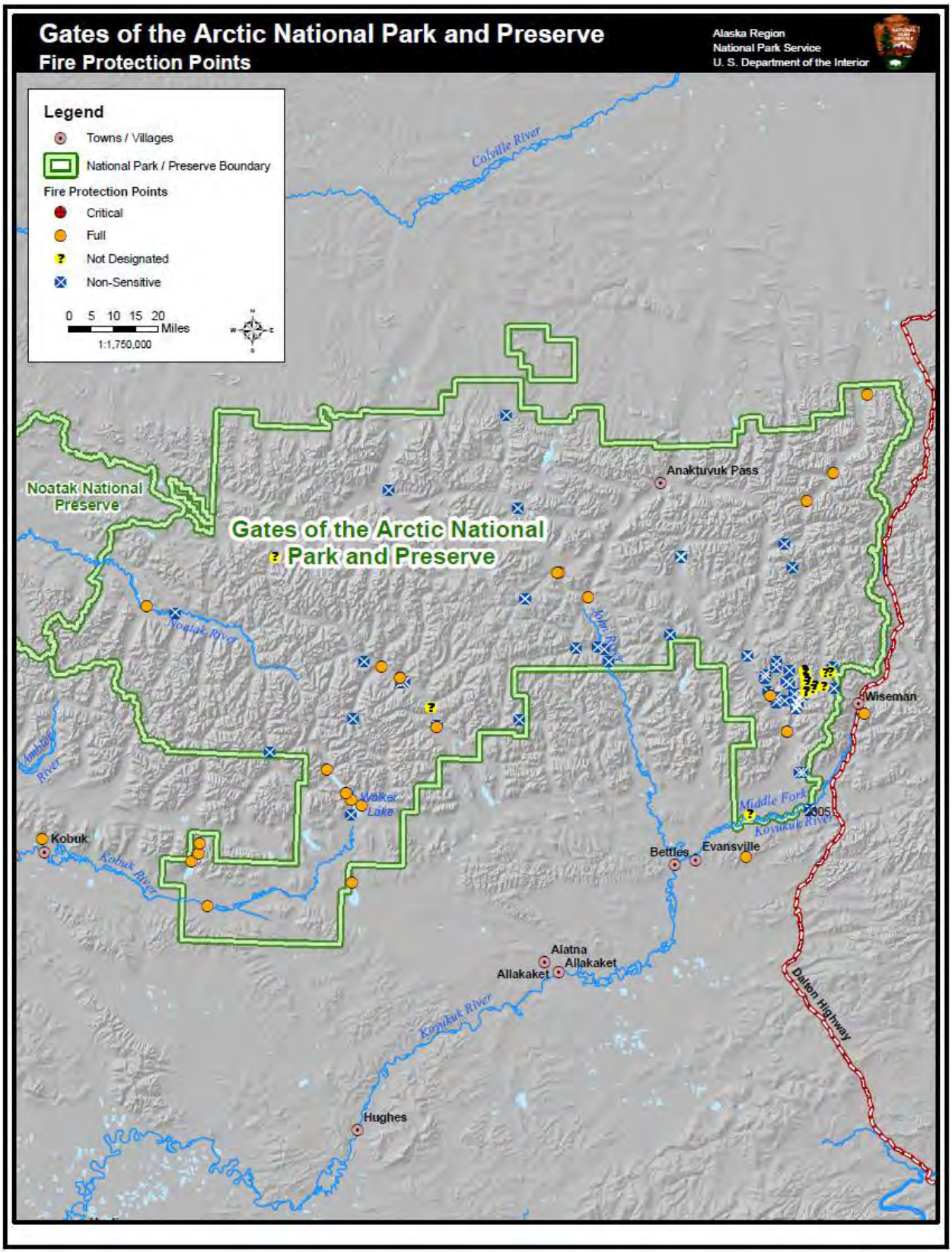

Figure 3.8. Gates of the Arctic National Park and Preserve Fire Protection Points

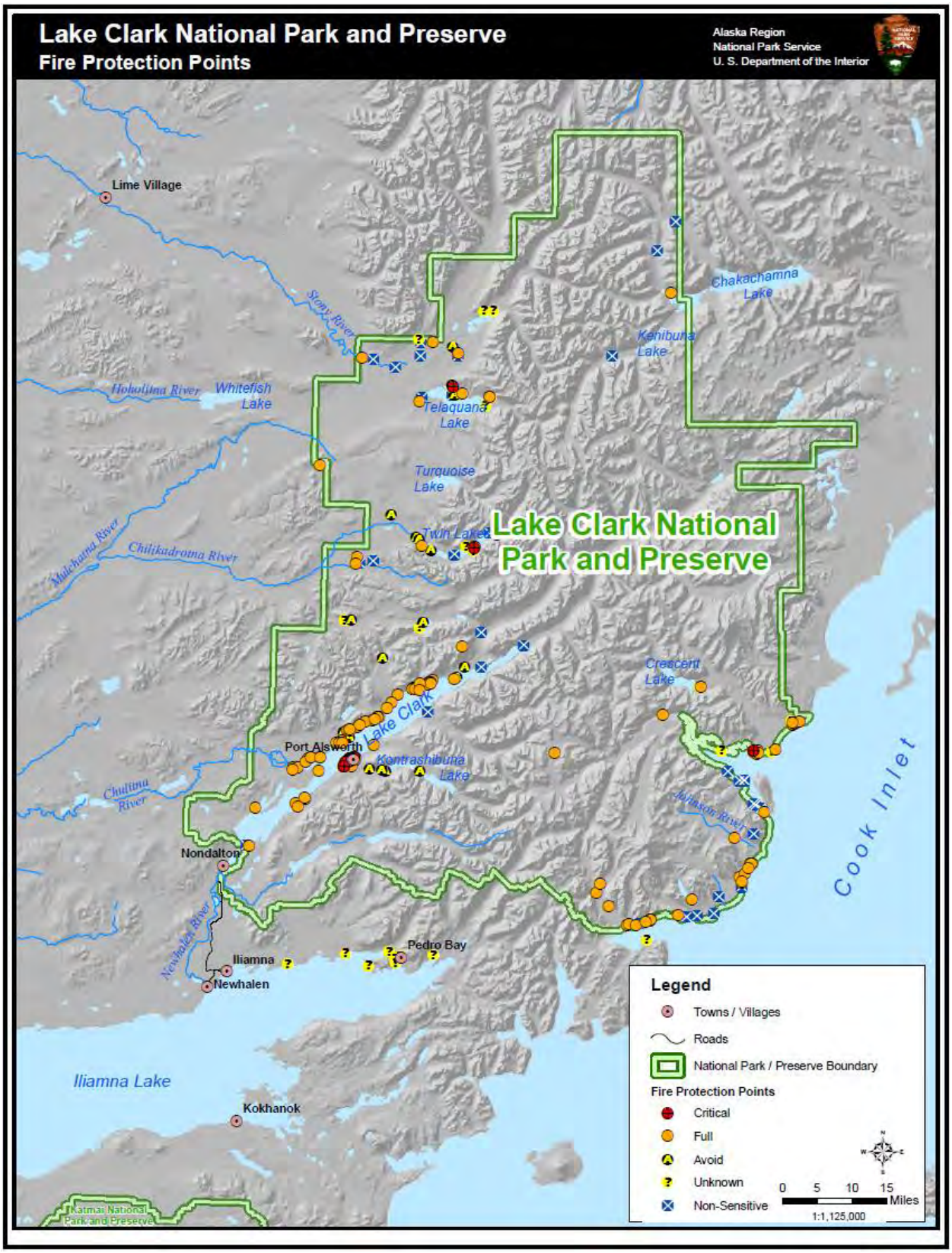

Figure3.9. Lake Clark National Park and Preserve Fire Protection Points

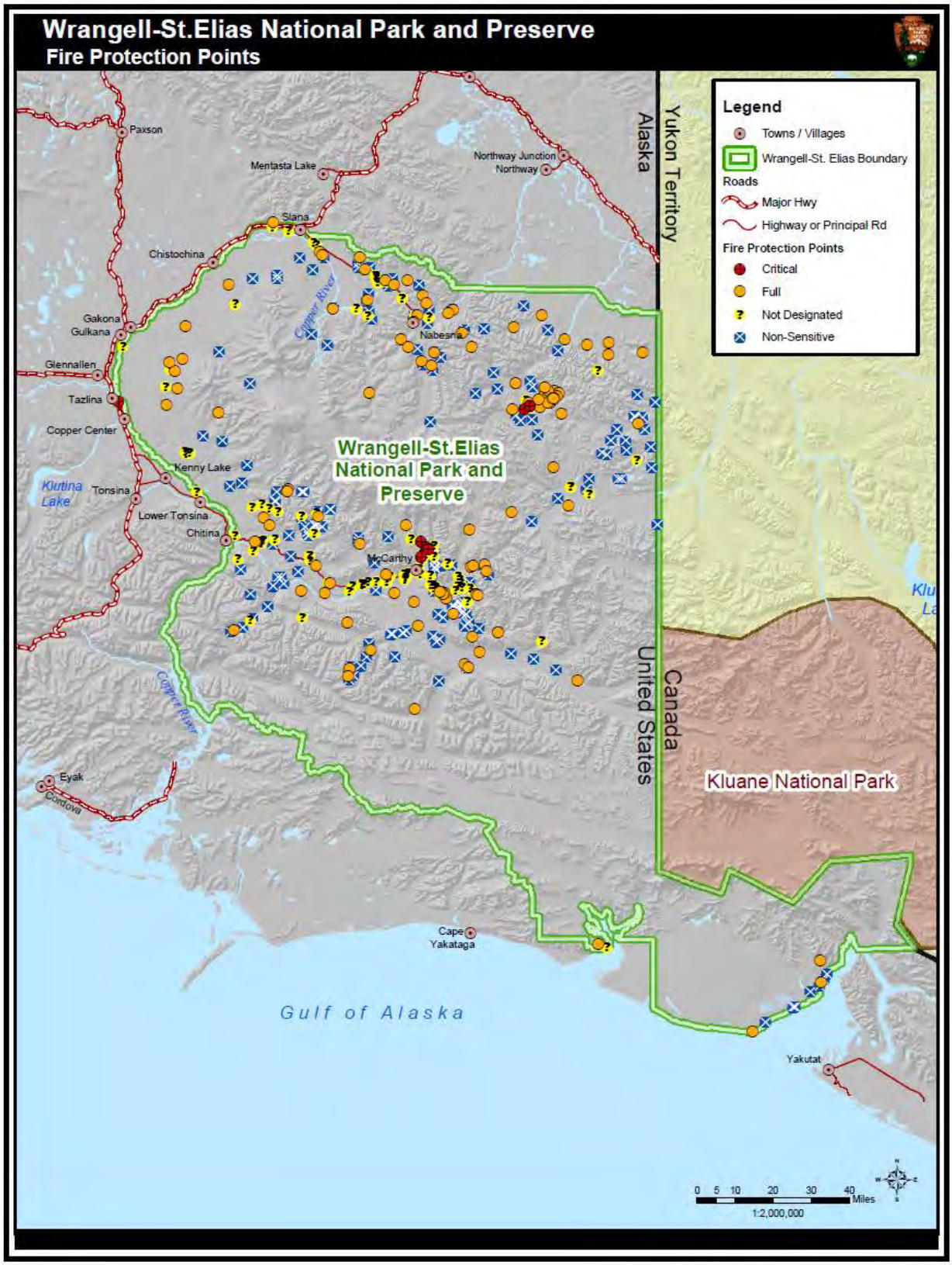

Figure 3.10. Wrangell-St. Elias National Park and Preserve Fire Protection Points

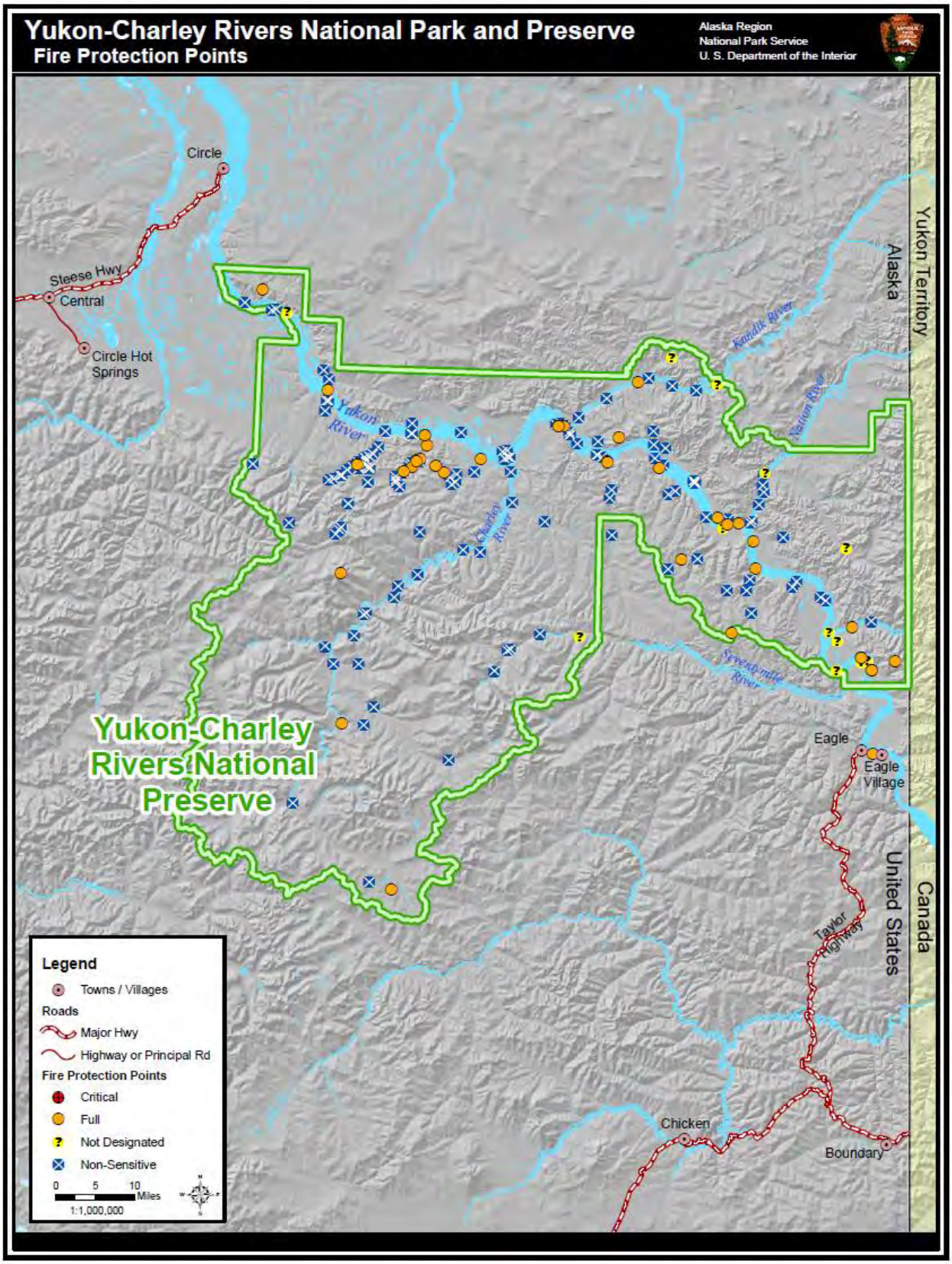

Figure 3.11. Yukon Charley Rivers National Preserve Fire Protection Points

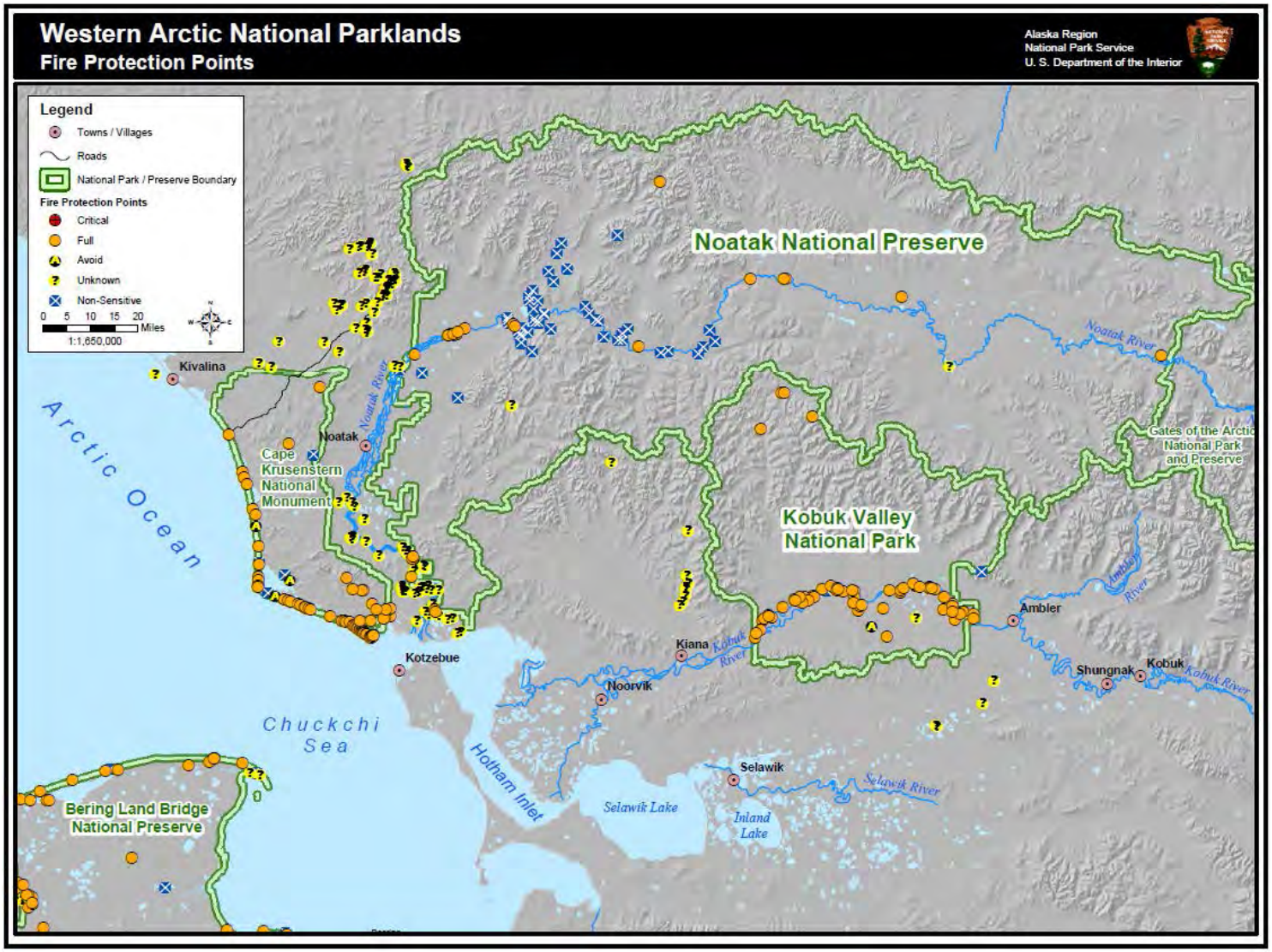

Figure 3.12. Western Arctic National Parklands Fire Protection Points

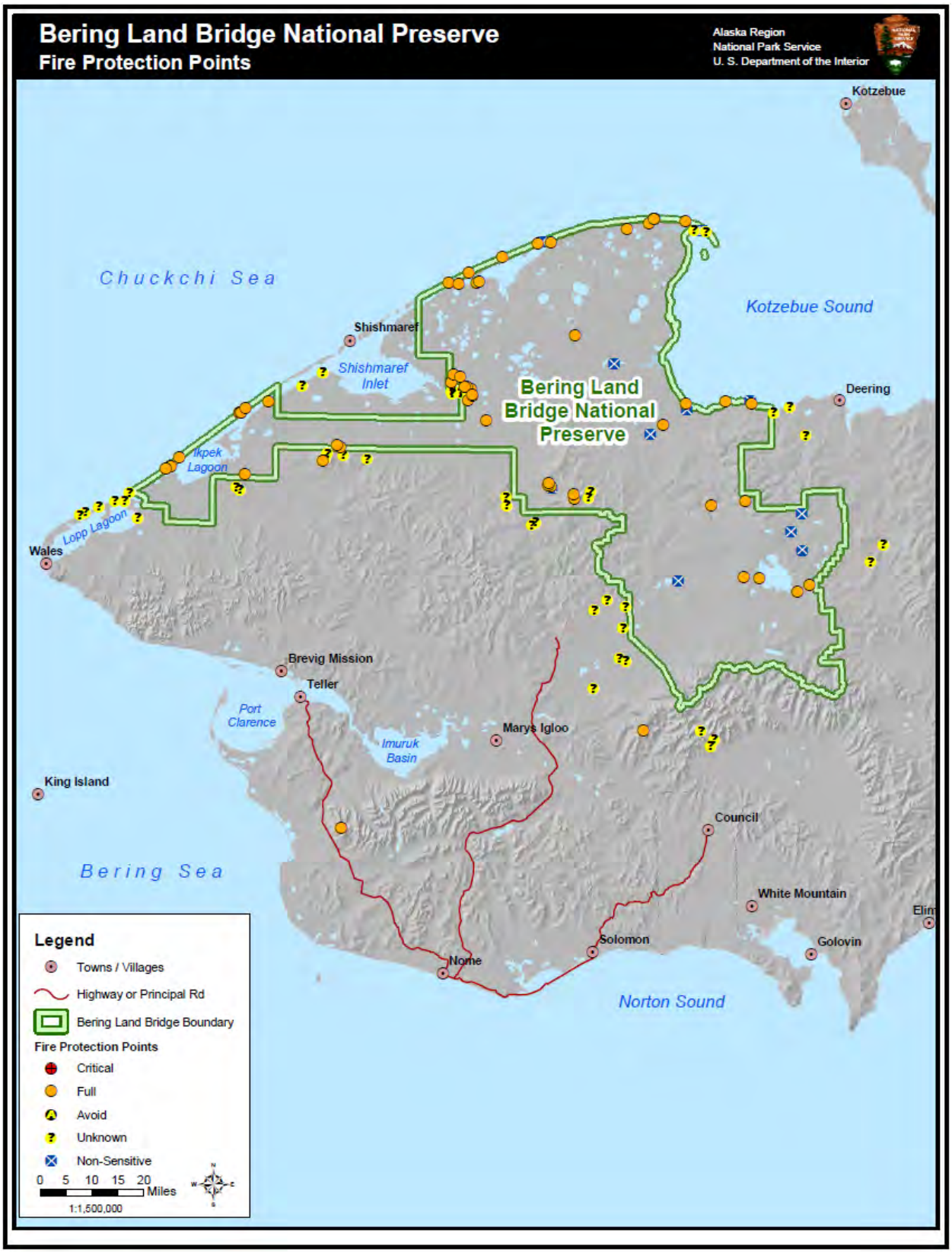

Figure 3.13. Bearing Land Bridge National Preserve Fire Protection Points

Fires are a source of CO and PM air pollutant emissions. Fire effect on air quality and visibility depends on many factors including duration and amount of emissions, wind speed and direction, humidity, weather system patterns, the scope and severity of the fires, terrain, and the type and quantity of fuels burned. Prevailing winds and atmospheric circulation during periods when there are active fires on NPS-managed land may impact Class I airsheds or populated areas.

The Alaska Department of Environmental Conservation (ADEC) is responsible for issuing air quality advisories and declaring air episodes during periods of poor air quality or inadequate dispersion conditions. The ADEC Enhanced Smoke Management Plan addresses procedures for managing smoke from prescribed fires (ADEC 2011a). Under State law all agencies, corporations and individuals that burn forty acres or more require written approval from ADEC.

3.3 Aquatic Resources and Fisheries

Tens of thousands of pristine lakes and ponds and thousands of largely untouched rivers and streams are found on these parklands. This great diversity of aquatic ecosystems provides critical habitat for dozens of native fishes, including all 5 species of anadromous Pacific salmon, as well as other ecologically and economically important species such as whitefish, Dolly Varden, northern pike, burbot and steelhead. In addition, Alaskan parklands (KATM, LACL, and WRST) contain a substantial portion of the spawning and rearing habitat for two of the richest salmon fisheries in the world, Bristol Bay and the Copper River. Finally, the lakes and streams of Alaskan parklands provide important breeding and rearing habitat for two species of amphibians, the western toad and the wood frog.

NPS policies require protection of water quality consistent with the Clean Water Act. The purpose of the Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." To enact this goal, the U.S. Army Corps of Engineers has been charged with evaluating federal actions that result in potential degradation of waters of the United States and issuing permits for actions consistent with the Clean Water Act. The U.S. Environmental Protection Agency (EPA) also has responsibility for oversight and review of permits and actions, which affect waters of the United States. Water quality in Alaska park units is generally excellent, although there are some cases in which water quality has been impaired due to the effects of extensive historic mining activity.

Fish require a healthy aquatic ecosystem with the proper chemical and physical attributes. The main components of an aquatic community are aquatic plants, bacteria and fungi, and consumers (fish, invertebrates, amphibians and mammals). Chemical and physical attributes influencing fish abundance include water quality, water temperature, streamflow, water velocity, cover, substrate, stream productivity, and riparian vegetation.

Fish species and aquatic fauna have been exposed to the indirect effects of wildfire for thousands of years. Stream ecosystems and water quality may change after fire. Physical

habitat changes may be beneficial or adverse. Stream turbidity and siltation may occur in some anadromous fish streams. In general, fires can benefit fisheries by adding large woody debris, improving nutrient input into streams, and potentially modifying less productive channel types into more productive channel types.

Aquatic species in each park were identified in the National Park Service Integrated Resource Management Applications NPS Species Search (https://irma.nps.gov/App/Species/Search 2012a).

3.3.1 GAAR Aquatic Resources and Fisheries

There are approximately 17 species of fish present or probably present in GAAR. Fish present in the park include salmon, whitefish, lake trout, northern pike, and burbot. The wood frog also occurs in GAAR.

The Kobuk and Koyukuk rivers are the major chum salmon spawning streams. Lake trout and arctic char are found in lakes. The Middle Fork of the Koyukuk River and the Dietrich River run parallel to the Dalton Highway for over 70 miles before flowing into the park and joining the North Fork of the Koyukuk, a National Wild and Scenic River, northeast of Bettles. The village of Anaktuvuk Pass sits at the headwaters of the John River, another National Wild and Scenic River in GAAR. Six Wild and Scenic Rivers have their headwaters in GAAR—Atlanta, John, Kobuk, Noatak, North Fork of the Koyukuk, and Tinayguk.

3.3.2 KATM Aquatic Resources and Fisheries

There are approximately 36 species of fish present or probably present in KATM. Fish present in the park include salmon, whitefish, burbot, northern pike, and whitefish. The Naknek River is known for rainbow trout sport fishing. Katmai watersheds provide salmon-spawning habitat vital to the commercial fishing industry. By the end of July, a million fish may have moved from Bristol Bay into the Naknek system of lakes and rivers. The wood frog also occurs within KATM.

Katmai National Park is drained by several large rivers and creeks. These include the American Creek, Savonoski River, Ukak River, Rainbow River, Margot Creek, Headwaters Creek and Brooks River, which drain through the Naknek Lake and river system into Bristol Bay; King Salmon and Big creeks, which drain into Naknek River; Katmai and Big Rivers, which drain into Shelikof Strait; Douglas and Kamishak rivers, which drain into Kamishak Bay; the Alagnak and Nonvianuk, which drain to the north into the Kvichak River and then into Bristol Bay; and the Egegik and King Salmon rivers, which drain from the southwest into Bristol Bay. Major lakes associated with KATM include Naknek, Grosvenor, Colville, Brooks, Idavain, Kulik, Nonvianuk, Hammersly, Murray, Dakavak, Katmai, Kaguyak, and several unnamed lakes.

3.3.3 LACL Aquatic Resources and Fisheries

There are approximately 46 species present or probably present in LACL. Salmon spawn in all major rivers and streams from June through September. Species include king, sockeye, chum, coho, and pink. An estimated 1.5 million to 6 million sockeye salmon enter the Lake Clark watershed each year through the Newhalen River. This commercially valuable salmon run accounts for approximately 10% of the total Bristol Bay salmon cannery. Sockeye salmon depend on spawning and rearing habitat of the Kijik, Tazimina and other major rivers that empty into Lake Clark and Sixmile Lake. Spawning activity occurs from late August to mid-November (Young 2005). Twin Lakes forms the headwaters of the Chilikadrotna River. Silver Salmon Creek is a low-gradient clear-water side channel of West Glacier Creek along the west side of Cook Inlet. Sport fish in the Lake Clark area include arctic char, arctic grayling, Dolly Varden, northern pike, lake trout, rainbow trout, and sockeye and coho salmon. One amphibian is found in LACL, the wood frog.

Lake Clark is the sixth largest lake in Alaska. Nearby Lake Iliamna is the second largest lake that is entirely in the U.S. There are numerous smaller lakes and ponds throughout the park and preserve. The larger lakes are Telaquana, Two Lakes, Turquoise, Twin, Portage, Fishtrap, Caribou, Lachbuna, Otter, Snipe, Kijik, Lower Tazimina, Upper Tazimina, Kontrashibuna, Hickerson, Crescent, Pickeral, and Summit.

3.3.4 WRST Aquatic Resources and Fisheries

There are approximately 50 fish species present or probably present in WRST. Arctic grayling, Dolly Varden, lake trout, rainbow trout and steelhead, cutthroat trout, and salmon are widespread. Local residents catch burbot, rainbow trout, and round whitefish through the ice in the winter. There are two major watersheds within the boundaries of Wrangell-St. Elias, the Copper River drainage which drains into the Gulf of Alaska and the Yukon River drainage which empties into the Bering Sea. Northern pike are indigenous to the Yukon River drainage but not the Copper River drainage, steelhead and rainbow trout are indigenous to the Copper River watershed but not the Yukon, and there have been no salmon species found in the Yukon River drainage portion of the Park. The Copper River is a large dynamic glacial river with an extensive active channel. Numerous tributaries, many of them draining glaciers in the Wrangell Mountains, enter the Copper from park land.

The Copper River supports one of the most productive sockeye salmon fisheries in the world, and also supports runs of chinook and coho salmon. The upper Copper River basin, near the Nabesna Road, contains an extensively connected network of small lakes and streams that provide critical sockeye, Chinook and coho spawning areas. Streams along the Nabesna Road vary from dynamic alluvial systems, both perennial and seasonal, to small stable groundwater-fed streams. The McCarthy Road is in the Chitina River basin, which contains a substantial portion of the Copper River salmon spawning and rearing habitat. All streams near the McCarthy Road are tributaries of the Chitina River. The Kennicott River is a glacial outwash from the Root and Kennicott Glaciers.

McCarthy Creek is a small glacial river flowing originating at McCarthy Creek Glacier. The majority of streams that cross the McCarthy Road are non-glacial in origin, with the exception of the Kuskulana River, and are therefore important for fish spawning. Long Lake is a particularly important sockeye spawning area and the site of a fish weir used to quantify spawning populations. Lake trout are recorded in Beaver Lake, Beaver, Creek, Ptarmigan Lake, and Rock Lake.

The ADEC and EPA have identified 1.5 miles of Cabin Creek as a 303(d) listed reach on the Wrangell-St. Elias National Park and Preserve. The reasons for the 303(d) listing is toxic and other deleterious organic and inorganic substances from mining (ADEC 2012). This segment was categorized as 4b, which means a Total Maximum Daily Load (TMDL) is not needed because other pollution control requirements are expected to result in the attainment of an applicable water quality standard in a reasonable period of time.

3.3.5 YUCH Aquatic Resources and Fisheries

There are approximately 17 fish species present or probably present in YUCH. The fish species include whitefish, burbot, salmon, and northern pike. The principal drainages are the Yukon and Charley Rivers. The Charley River, a National Wild and Scenic River, flows 106 miles north to its confluence with the Yukon River entirely within the boundaries of YUCH. A central portion of the Yukon River flows 128 miles through YUCH. The Dolly Varden is found in a tributary of the upper Charley River. The wood frog occurs in YUCH.

3.3.6 BELA and CAKR Aquatic Resources and Fisheries

There are approximately 60 species of fish present or probably present in BELA and in CAKR. Fish present in the park units include the arctic cod, northern pike, Arctic flounder, Bering flounder, yellowfin sole, whitefish, Arctic char, Dolly Varden, and salmon.

A maar is a broad, low-relief volcanic crater that was formed by a phreatomagmatic eruption, which is an explosion caused by groundwater coming into contact with hot lava or magma. The maars of Bering Land Bridge National Preserve are unique in their size and location. Devil Mountain Maar, North Killeak Maar, South Killeak Maar, and Whitefish Maar are the four largest maar lakes in the world. Maars usually fill with water to form a shallow crater lake.

3.3.7 KOVA Aquatic Resources and Fisheries

There are approximately 25 species of fish present or probably present in KOVA. Fish present in the park include whitefish, salmon, lake trout, northern pike, and sheefish. The Kobuk River winds its way through the park for 61 miles. One amphibian, the wood frog, occurs in KOVA.

3.3.8 NOAT Aquatic Resources and Fisheries

There are approximately 24 fish species present or probably present in NOAT. The fish species include northern pike, whitefish, salmon, lake trout, and burbot. The Noatak River has been designated a National Wild and Scenic River for most of its length.

3.4 Cultural Resources

3.4.1 Introduction

Alaska in general, and Alaska's NPS lands more specifically, have often been perceived as an uninhabited wilderness and perhaps as a way to underscore that perception, more than 32 million acres of the 54 million-plus acres of NPS land in Alaska is now part of the National Wilderness Preservation System. This perception, however, is largely a political and cultural construct, because people—during both the prehistoric and historic periods—have lived and traveled throughout the vast majority of lands within Alaska's national park units. Physical evidence of this human activity is collectively known as Cultural Resources. These are found throughout Alaska parks as Archeological Sites, Cultural Landscapes, Ethnographic Resources, and Historic Structures.

3.4.2 Overview

As an integral part of their lives and travels, people—wittingly or unwittingly—brought animals, plants, and seeds with them. Animals, plants, and seeds travel in a variety of ways. Some have moved due to natural forces, such as when a new plant community emerges from a burned-out area or after a glacier's recession. Some have moved when prehistoric peoples migrated from one region to another, and still others have moved as part of trading networks.

Although Alaska's archeological data base remains both limited and incomplete, archeologists recognize that a vast array of prehistoric archeological sites resides within the park units. The earliest of these can be dated from the last part of the Pleistocene, some 11,000 years BP, and continued until the time of the first European contacts (ca. 1740 A.D.). These sites document the diverse and changing adaptations of Alaska's major Native groups—Aleut, Eskimo, and Indian. The climatic range of these sites is enormous, from the rainy and forested Pacific Northwest to the arid and treeless Arctic coastal plain. As a rough generalization, the highest concentrations of prehistoric human activity have been located along rivers, particularly at river confluences or where rivers meet the sea. But human habitation, either permanent or temporary, can also be found along trails, at overview points, along lakeshores, or in any number of other geographic situations. In addition to the most obvious human habitation sites, many Alaska Natives moved seasonally in order to take best advantage of the available fish and game; as a result, trails as well as camps were important aspects of Native lifestyles. Perhaps the only places that are predictably lacking in cultural impacts are glaciated areas, although some trails wound through these areas and other evidence of past human activity has been

revealed from melting glaciers. In short, virtually no areas within Alaska's parks can be categorically excluded from consideration as potential locations for prehistoric sites.

This brief overview generalizes the process by which Alaska was populated during the historic period. Between 1741 and 1867, present-day Alaska was ostensibly a Russian colony, and most settlement and travel was along Alaska's southern shorelines. Colonies attracted adventurers from several other countries, and several inland voyages were undertaken. Resident Native populations made significant responses to the ongoing colonization, and longstanding trade patterns were modified to accommodate European needs

Beginning in the late 1870s, and continuing until the outbreak of World War I, a wave of prospectors swept over Alaska and the neighboring Yukon and discovered gold, silver, copper, and other minerals throughout the territory. Historic mining occurred at GAAR in the area of Tramway Bar on the Middle Fork of the Koyukuk River in 1893. Trading posts and riverboats began to appear on the mid-reaches of the Koyukuk, and the stage was set for the gold rushes of 1898, which overflowed from the Klondike to the Kobuk and Koyukuk rivers. Bettles, Coldfoot, and Wiseman became established mining and trading camps. There is evidence of miner or other pioneer occupation at Coal Creek Camp and Slaven's Road House in YUCH where the residents established gardens around their homes or campsites. Evidence of mining activity within the BELA includes the Fairhaven ditch, which was constructed in 1906 to divert water from Imuruk Lake for hydraulic mining operations on the Pinnell River, a tributary of the Inmachuk River.

Throughout the historic gold mining era, supplying these camps, demanded a host of infrastructure in the form of trails, roads, wood camps, roadhouses, gear caches, supply stations, Army forts, telegraph lines. In addition to the better-known towns and camps, prospectors fanned out and explored remote ledges, rock faces, and other possible mineral sites, some of which may not have been visited in more recent years. Thousands of small prospects and test pits bear silent witness to their past activities.

In the late 1860s the commercial fishing and packing industry began. At first, ships sailed from San Francisco to the islands off the Alaska Peninsula and to the Aleutian Islands to fish for cod. Cod were salted for preservation, and cod-liver oil was extracted. Commercial canning began in 1878 with the first canneries located in southeast Alaska. Fish processing sites (which also included salteries, trap sites, floating canneries, and other facilities) were soon found along shorelines and near river mouths from Metlakatla all the way north to Bristol Bay. As with mining and prospecting, the fish packing industry also had a marked effect on the lives of existing residents; many moved to sites adjacent to the canneries to take advantage of work opportunities, and others adjusted their lifestyles to one in which summertime fish cannery work complemented winters spent at trapping cabins and on trap lines, with remains of these buildings, structures and sites found in several parks including KATM and LACL.

A few large-scale ventures drew people to Alaska, including the Kennecott Copper Mine complex and company town, now part of WRST. In more recent years, new settlement

forms in Alaska have been related to agriculture, the military, the petroleum industry, and tourism. All of these new sites and areas supported ancillary facilities as well as support facilities, such as roads and airfields.

Because of the many economic activities that have taken place in Alaska, particularly since 1867, and because each of these has increased migration of people into, and out of, a variety of previously undisturbed sites, a large number of areas in Alaska have been subjected to many years—sometimes a century or more—of impacts from Outside visitors.

3.4.3 Archeological Resources

All NPS units in Alaska contain archeological sites. Archeological sites in Alaska document a range of occupation periods from the late Pleistocene era to the Mid-Twentieth century embracing broad range of themes including early migrations to the new world to the development of profitable mining technology. The distribution of known archeological sites is skewed by the size, remoteness, rugged terrain and harsh climate of Alaska. Permafrost, loess deposition, volcanism, sea level change and glaciation may preserve sites while making many of them almost impossible to find. Funding, permitting and management policies have restricted unfettered archeological investigation. Despite these obstacles, each year archeologists find new sites; sites which are significant in terms of their capacity to enhance our understanding of past cultures by contributing unique, new information.

Archeological information involves site age, function, community structure and organization, cultural identity, material culture, relationships with sites in other geographic areas, mode of abandonment and preservation status. The common feature of archeological sites is that many of the things that humans transported, modified, constructed or produced are preserved and available to be recovered and studied today. In some cases phenomena that can be seen or experienced by visitors such as rock art, ruins or landscape modifications are preserved at archeological sites, but in most cases the value of archeological sites is the information preserved within them. Archeological sites are not exclusive of historic sites or ethnographic sites. A building or industrial facility can deteriorate until only piles of debris or landscape modifications are visible on the surface, but subsurface objects, features (pits, fire places, graves, occupation surfaces), and human-produced sediments are preserved. An ethnographic site used by contemporary people to conduct traditional activities as part of their cultural system or way of life may include an archeological record of this activity in the past; or contemporary people may conduct traditional activities on an archeological site to which they have no direct lineal affiliation. Archeological sites can be contributing elements to Cultural Landscapes whether visible at the surface or not. Management of archeological sites requires balance between preservation of the information preserved in them, and making the knowledge within the site available to the public.

Archeological sites do not occur randomly - they are located in the most advantageous locations for efficiently exploiting various aspects of the local environment. The spatial

distribution of archeological sites produced by a human group's paleo-ecological adaptation to its environment is called a subsistence/settlement pattern. Archeological sites within a settlement pattern have differing functions. A single culture may produce villages, hunting camps, kill sites, graves, caves, territorial markers, and rock art which all differ in environmental setting, size, length of occupation and what is preserved at them. Archeological sites in Alaska include winter villages where populations gather at a permanent settlement that is strategically positioned for access to resources and travel routes such as Brooks Camp, Anaktuvuk Pass, and Cape Krusenstern to name a few. Winter settlements may be at the mouths or confluences of larger rivers, spits or points with access to marine mammals, protected in the heads of bays or at locations for intercepting migrating herds of animals.

Distributed around winter settlements are smaller sites used by individuals, clans and families for temporary camps such as fish camps and hunting camps. Deep round pits that served as caches for dried or smoked fish occur along salmon streams sometimes far from camps or settlements. Hunting camps may be ephemeral single term occupations that may be surrounded by smaller kill sites. The lack of Pleistocene kill sites that preserve the remains of mammoth or other extinct megafauna may be due to the difficulty of locating the sites in the vast landscape overlying permafrost. Pleistocene hunting camps with the remains of extinct species such as horse, wapiti and bison have been found throughout Alaska.

Widespread across Alaska are surface lithic scatters on exposed ridges and hill tops, glacial moraines, ancient river bars, beach ridges and terraces. These have in common exposed stone artifacts and debris from producing and maintaining stone tools, and absent or thin archeological sediments that are usually churned by frost action. Occasionally stone rings or hearths are found with lithic scatters. Sometimes lithic scatters are found in the vicinity of hunting blinds and stone alignments related to caribou hunting. Organic materials are rarely present due to exposure to the elements meaning that no charcoal or bone is available for radiocarbon age determinations. Artifacts that are diagnostic of various cultures are sometimes found in lithic scatters, but more often they are enigmatic evidence of past land use. Often these sites are related to early (Paleoarctic) or mid (Northern Archaic) Holocene cultures either by the presence of diagnostic tool forms or judgments based on the experience and insight of the archeologist. Northern hunting cultures survived by intercepting migrating large mammal herds at predictable places and times. Prevailing interpretations of lithic scatters are that nomadic big game hunters occupied land forms positioned to have good views of migrating animal herds with wind exposure to provide relief from bugs. One interpretation is that the Northern Archaic traditions represent Athabaskan-speaking people who successfully adapted to the high latitude environment. Archeology cannot prove or disprove this theory, but it is clear that all lithic scatters cannot be attributed to early big game hunters. Many lithic scatters contain rifle cartridges and other modern debris, which provides evidence that these sites could be infested with invasive plants if modern hunters transport their seed.

From the Middle Holocene era the successive Arctic Small Tool tradition, Norton Tradition and late prehistoric Thule/Koniag traditions feature increases in numbers and

sizes of sites leading up to the historic era and Russian contact in AD 1740. After contact Alaska Native societies began to include European items and occasional structures or buildings such as the Russian Churches at Kukak and Kaguyak on the coast of Shelikof strait. Site distributions began to show response to Russian settlements either abandonment of sites to avoid Russians, positioning of settlements to be near European churches, trading posts or job opportunities, or positioning of settlements and camps to be accessible to sources of marketable goods such as furs. Beginning with the Russian period and continuing after American possession of Alaska, cultural disruption and disease caused depopulation and consolidation of Native populations resulting in abandonment of settlements such as Kijik.

An important theme in Alaska prehistory and history is that people subsisted by means of a hunting/gathering economy. This means that wild food supported society rather than produced goods. Alaska Natives exploited many plants species including berries and sour dock, but these species were collected from wild populations and were not farmed. Archeological sites often support luxuriant stands of colonizing vegetation such as fireweed, sage, alder and cow parsnip to name a few, but these also occur naturally after burns or natural events. Unique plant communities at archeological sites are most important for modern archeologists who use them as indicators of the presence of archeological sites.

Russian and American archeological sites tend to be fortifications, trading posts, trap line cabins and mining sites. Historic sites may include visible features such as buildings, other structures, earthworks, excavations, grounds, routes, graves, wreckage and scatters of artifacts and machinery. Historic sites have archeological components even if the surface features are no longer present. The archeological manifestations of buildings that have disappeared include foundations, buried structural debris artifacts and a suite of associated external features. Often enough is left in the ground to determine the type and function of former structures such as cabins, shops and storage facilities. Pits remaining from cellars, out houses, hearths, and wells sometimes contain well preserve artifact assemblages that yield important knowledge about the site. Often buried foundations remain from the earliest structures at historic sites and these allow study of the development of historic sites such as communities, administrative centers, military posts, mining operations, and canneries.

Alaska Natives did not cultivate plants prehistorically; however, in historic archeological sites culturally significant exotic plant taxa may be present.

3.4.4 Cultural Landscapes

Currently there are 110 cultural landscapes identified in Alaska, 22 of which have been listed on or determined eligible for listing to the NRHP. They occur in every park and preserve in the system and vary widely from small village or camp sites associated with Alaska's earliest inhabitants, to sprawling mining sites devoted to a complex culture of historic resource extraction. Landscapes themselves encompass a wide variety of resources, which can include natural systems and features, vegetation, buildings and

structures, archeological sites, views and vistas, topography, land use and small-scale features.

3.4.5 Ethnographic Resources

Ethnographic resources are traditional sites, structures, objects, landscapes, natural resources, and other material features associated with contemporary cultural systems or ways of life. While every park has ethnographic resources, not all parks have systematically surveyed or inventoried them.

Plants used for subsistence, medicinal purposes, to make tools or buildings, or to make items such as baskets for draining and drying fish can be ethnographic resources.

3.4.6 Historic Structures

Historic structures are defined as a constructed work, usually immovable by nature or design, created to serve some human activity, such as buildings, bridges, earthworks, roads, and rock cairns. Many historic structures in the Alaska Region are constructed of wood. They range in size from one-room log houses to large wood frame or log office buildings and road houses. The structures are located in remote towns and sites throughout the state. From the functional simplicity of the trapper's cabin and cache to the weathered, austere beauty of a Russian Orthodox chapel, they give evidence of human's adaptability to a harsh and challenging environment.

3.5 Recreational and Scenic Values

Descriptions the recreational and scenic values of these areas are primarily from ANILCA Titles 1 & 2, unit general management plans (GMPs), and published foundation statements. Visitor use statistics are from the National Park Service Visitor Use Statistics (http://www.nature.nps.gov/assets/redirects/statsRedirect.cfm; NPS 2012b).

ANILCA Section 101(a) indicates all of the NPS units established by the Act are to preserve for the benefit, use, and inspiration of present and future generations the scenery and recreational values, among other values. Section 101 (b) further specifies the areas shall preserve the wilderness resource values and related recreational opportunities including but not limited to hiking, canoeing, fishing, and sport hunting within large arctic and subarctic wildlands and on free-flowing rivers.

In accordance with the 2006 Management Policies for the NPS and Director's Order 47 *Sound Preservation and Noise Management*, an important component of the NPS's mission is the preservation of natural soundscapes associated with national park units (NPS 2006). Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the combination of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. The frequencies, magnitudes, and durations of human-caused sound considered acceptable varies among NPS units, being generally greater in developed areas and less in

undeveloped areas. Impacts to the soundscape could occur from mechanical equipment (e.g., chainsaw) used for reduction of hazardous fuels.

3.5.1 GAAR Recreational and Scenic Values

For Gates of the Arctic National Park and Preserve, ANILCA Section 201(4) (a) states the area shall provide continued opportunities, including reasonable access, for mountain climbing, mountaineering, and other wilderness recreational activities. The GAAR GMP (NPS 1986) states the vast wilderness naturally constrains recreational activities to river trips, backpacking, photography, mountaineering, wildlife viewing, fishing, and sport hunting and trapping in the preserve areas. Winter recreational activities include cross-country skiing, snowshoeing, and dog sledding. The bulk of the use occurs from June to September with 97% of the visitors floating rivers, hiking and backpacking, or both. The GAAR Foundation Statement (NPS 2009a) states the park and preserve are acknowledged as the premier wilderness unit in the system with the headwaters to six Wild Rivers. This park provides visitors with opportunities for solitude and challenging wilderness adventures in a remote and vast arctic landscape. The gaunt beauty and pristine landscapes evoke the spiritual, intangible essence of a timeless arctic wilderness that inspires a sense of discovery. In 2011, there were 11,623 visitors to GAAR. The most visitations were in August and the least in October.

3.5.2 KATM Recreational and Scenic Values

ANILCA Section 202(2) enlarged Katmai National monument to establish Katmai National Park and Preserve to protect habitats and populations of fish and wildlife with emphasis on brown bear concentrations and salmon. This section also calls for protection of scenic, geological, cultural and recreational features. Most recreational visitors who enter Katmai National Preserve arrive in float planes for sport fishing and hunting. Numerous large and small lakes provide for excellent float plane access. Several visitors to these areas float down Moraine Creek, Nonvianuk, and Alagnak rivers to access fishing and hunting areas and for photography (NPS 2009b). Several local guiding operations assist fishermen and hunters with lodging and access to productive locations. There are outstanding opportunities in wide range of world-class, wilderness-based recreational activities such as floating, camping, fishing, hunting, and wildlife viewing. The Park and Preserve is known for trophy trout and salmon fishing, as well as moose and bear observations and hunting. In 2011, there were 48, 939 visitors to KATM. The most visitations were in July and the least in October, November and December when no visitors were recorded.

3.5.3 LACL Recreational and Scenic Values

ANILCA Section 201(7)(a) emphasizes Lake Clark National Park and Preserve shall maintain unimpaired the scenic beauty and quality of the Alaska Range and Aleutian Range, including active volcanoes, glaciers, wild rivers, lakes, waterfalls, and alpine meadows in their natural state. Nearly all recreational visitors to LACL arrive by airplane to ample landing strips at Port Alsworth, Nondalton, Silver Salmon Creek, or other

remote locations. Visitors stay in a dozen or so lodges at Port Alsworth, Silver Salmon Creek, Nondalton, and other locations, or they camp, raft, or backpack in remote locations. The primary recreational activities include sport hunting and fishing, river running, backcountry hiking and camping, sightseeing, and photography. Less popular activities include sailing, iceboating, mountain climbing, and cross-country skiing. LACL has wildland recreation and scenery: volcanoes, mountains, glaciers, lakes, wild rivers, large wildlife, abundant fish, large wilderness areas, wild coasts, and spectacular scenery in all directions. As stated in the LACL Foundation Statement (NPS 2009c), "Lake Clark National Park and Preserve's astonishing unimpaired scenic beauty provides excellent opportunities for solitude and to experience both wilderness and wildness." In 2011, there were 5,158 visitors. The most visitations were in July and the least in November and December.

3.5.4 WRST Recreational and Scenic Values

ANILCA Section 201(9) specifies the Wrangell-St. Elias National Park and Preserve shall maintain unimpaired the scenic beauty and quality of high mountain peaks, foothills, glacial systems, lakes, and streams, valleys, and coastal landscapes in their natural state, and will provide continued opportunities, including reasonable access, for mountain climbing, mountaineering, and other wilderness recreational activities. ANILCA Section 701(8) designated 8.7 million acres of wilderness, the largest such area in the USA. Coupled with Kluane National Park, Glacier Bay National Park and Preserve, and the Tatsenshini-Alsek Provincial Park in Canada, these areas make up the World Heritage Site, which preserves North America's, and possibly the world's, largest wilderness mountain landscape. The area's GMP (NPS 1986a) states that recreational uses include mountaineering, hunting, backpacking, trapping, fishing, river running, photography, and sight-seeing. Several tens of thousands of visitors go to WRST annually. The McCarthy and Nabesna Roads penetrate the interior of the park and some visitors go deeper by small airplane, snow machine, off-road vehicle (ORV), mountain bike, and foot. Some recreational users travel by cross-country skis, pack horses, and river boats. A few small lodges service visitors inside the park and preserve and a couple of large ones have been built near the outskirts. This park and preserve has one of the largest concentrations of mountain sheep in the world. Visitor use management objectives include preservation of natural ecosystems, scenic quality, and visitor enjoyment and appreciation along with traditional uses of the area. The Foundation Statement for WRST (NPS 2010a) notes the area encompasses the nation's largest protected active glacial complex, includes nine of the 16 highest peaks in North America, and contains more than 1,000 miles of scenic free-flowing glacial rivers. This park is so large and diverse, including a rugged and wild coast, that it harbors nearly all possible wildland recreational opportunities for visitors to Alaska. In 2011, there were 65,225 visitors. The most visitations were in July and the least in January.

3.5.5 BELA Recreational and Scenic Values

For Bering Land Bridge National Preserve, ANILCA Section 201(2) states the area shall provide for outdoor recreation and environmental education activities including public

access for recreational purposes to the Serpentine Hot Springs area. The BELA GMP (NPS 1986c) indicates recreational uses are sparse and expected to increase slowly, with a focus on the Serpentine area. Recreational uses in the preserve include bathing, hiking, sport hunting, sport fishing, photography, snowmobiling, mushing and the occasional sled dog race. The BELA Foundation Statement (NPS 2009d) states the preserve provides visitors with opportunities to form their own emotional connections with Serpentine Hot Springs. With its granite tors the area has provided inspiration to people who have visited the place for thousands of years. In 2011, there were 1,890 visitors to BELA. The most visitations were in March and the least in May that year.

3.5.6 CAKR Recreational and Scenic Values

ANILCA 201(3) established CAKR primarily to protect archeological resources dating back thousands of years, to protect habitat for seals and other wildlife, and the viability of subsistence resources and uses. Shelter cabins are now present in two locations for travelers between Kivalina and Kotzebue at Kotlik Lagoon and Tukrok River, but these are used mostly by residents traveling between villages and not for recreational purposes. Sport hunting is not allowed in CAKR. In 2011, there were 8,668 visitors to CAKR. The most visitations were in October and the least in January.

3.5.7 KOVA Recreational and Scenic Values

ANILCA Section 201(6) established Kobuk Valley National Park to maintain the environmental integrity of the Kobuk Valley boreal forest, Kobuk, Salmon, and other rivers and the Great Kobuk Sand Dunes. The area also harbors archeological sites dating back thousands of years and ancient caribou migration routes. Most of the small numbers of nonlocal recreational users float the Kobuk River and visit the Kobuk Sand Dunes. Far fewer visitors fly to the headwaters of the Salmon Wild River to float down it to the Kobuk River and out usually to Kiana. Some visitors make a special trip to the Kobuk River to photograph migrations of the large, free-ranging Western Arctic Caribou Herd. A few local guides take chartered boat trips into the park for sport fishing of sheefish, salmon, and other fish. Sport hunting is not allowed in this unit. A few local residents fish with hook and line for fish at the mouths of streams feeding into the Kobuk. The park's Foundation Statement (NPS 2010b) states the Kobuk Valley area is among the largest, wildest, and most free from human influences and intrusions of all NPS units. The area includes designated Wilderness contiguous with the Selawik National Wildlife Refuge Wilderness and the clear and remote Salmon Wild River, both which provide opportunities for solitude, inspiration, and exploration. In 2011, there were 11,485 visitors. The most visitations were in October and the least in January.

3.5.8 NOAT Recreational and Scenic Values

ANILCA Section 201(8) established Noatak National Preserve to maintain the environmental integrity of the Noatak River and adjacent uplands to assure the continuation of geological and biological processes unimpaired by adverse human activity. ANILCA Section 601 designated the Noatak Wild River from its headwaters in

GAAR to its confluence with the Kelly River. The park's GMP (NPS 1986d) indicated recreational users number a few thousand each year and most arrive to float the river, sport fish, or sport hunt. A few commercial operators provide air charters and guiding services; there are three concessions for hunting guides. Up to half of the visitors put down or take out at the gravel bar near the Kelly River, which has created conflict with local subsistence users. The area's Foundation Statement (NPS 2009e) states, "Noatak National Preserve protects a dynamic, vast, and sweeping landscape of arctic and subarctic terrain, features, landforms, and wildlife. The Noatak Wilderness constitutes the western half of a 13-million-acre designated arctic wilderness that limits development and protects the nation's largest unaltered river basin and free-flowing wild river. The Noatak Wild River provides an excellent opportunity for a lengthy wilderness float experience." In 2011, there were 11,722 visitors. The most visitations were in July and the least in January.

3.6 Socioeconomics and Local Businesses

The State of Alaska Department of Commerce, Community, & Economic Development has produced reports on the Economic Impact of Alaska's Visitor Rural communities are often dependent upon seasonal and short –term employment to supplement their income throughout the year. Alaska Community Database Community information summaries from the Alaska Department of Commerce, Community, and Economic Development were used in developing the regional summaries Alaska Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs. Community Database Online at http://www.commerce.state.ak.us/dca/commdb/CF_COMDB.htm.

3.6.1 GARR Socioeconomics and Local Businesses

Economic conditions of the resident zone communities are described below (see Table 3.1).

Ambler: Economic conditions in this community are described below under section 3.6.6 for WEAR parks.

Alatna: The economy is seasonal and subsistence-based. Salmon, whitefish, moose, bear, small game, and berries provide most food sources. Caribou are taken when available. A few earn income from trapping or selling traditional Native handicrafts. Construction and Bureau of Land Management (BLM) emergency firefighting also provide summer jobs.

Allakaket: Most cash jobs are part-time or seasonal. The primary year-round employers are the school, city, tribe, and village corporation store. Construction and BLM emergency firefighting provide summer jobs. A few earn income from trapping or selling traditional Native handicrafts. Subsistence is the focus of the local economy. Salmon, whitefish, moose, bear, small game, and berries provide most food sources. Caribou are taken when available.

Anaktuvuk Pass: Economic and employment opportunities are limited in Anaktuvuk Pass, due to its isolation. Hunting and trapping for the sale of skins, guiding hunters, or making traditional caribou skin masks or clothing provides income. Some residents have seasonal employment outside of the community. Caribou is the primary source of meat; other subsistence foods include trout, grayling, moose, sheep, brown bear, ptarmigan, and water fowl.

Bettles/Evansville: The economy of Bettles is linked to air transportation, visitor services, and government. In Bettles, one hundred percent of the heads of household are employed, most full-time, which is unique for a rural community. The community is accessible by road during winter months, which dramatically reduces the cost of goods and supplies. The Federal Aviation Administration, National Park Service, school, city, general store, and lodging provide year-round employment. During the summer, tourist-oriented businesses and guides for the Brooks Range provide seasonal employment, as well as a BLM firefighting station. The economy is similar for Evansville, except that ninety percent of the heads of household are employed, most full-time. Subsistence activities are important to the Native residents; however subsistence use by the non-Natives is substantially lower. Salmon, moose, bear, caribou, and sheep are utilized. The tribe provides a tribal office and operates a clinic.

Hughes: Subsistence is the focus of the local economy. Salmon, freshwater fish, moose, black bears, rabbits, waterfowl, and berries are utilized. Caribou are also sought when available. Most cash is earned from part-time jobs with the city, school, tribal clinic, or store. BLM emergency firefighting, construction work, skin sewing, beadwork, sled building, and trapping also provide seasonal income.

Kobuk: Economic conditions in this community are described below under section 3.6.6 for WEAR parks.

Nuiqsut: Unemployment is high in Nuiqsut. The Kuukpik Native Corporation, school, borough services, and store provide most of the year-round employment in the village. Trapping and craft-making provide some income. Caribou, bowhead and beluga whale, seal, moose, and fish are staples of the diet. Polar bears are also hunted.

Shungnak: Economic conditions in this community are described below under section 3.6.6 for WEAR parks.

Wiseman: Subsistence hunting, fishing, and trapping sustain year-round residents. Roadside services and transportation of materials for the North Slope Borough provide a few positions in Wiseman. In 2009, one resident held a commercial fishing permit. Several residents sell handcrafted items and furs. Self-employment, seasonal visitor service jobs, seasonal highway maintenance jobs, and the National Park Service provide income.

Table 3.1. Economic Characteristics of GAAR Resident Zone Communities (Alaska Department of Commerce, Community, and Economic Development (DCCED) 2013)

Community	Population	Median Household Income ($)	Per Capita Income ($)	% Unemployed	% Below Poverty
Alatna	27	N/A	N/A	60.0	0.0
Allakaket	106	18,929	15,611	53.1	40.0
Ambler	271	57,625	14,767	40.0	41.2
Anaktuvuk Pass	344	46,250	18,946	30.4	8.1
Bettles	15	92,188	47,560	0.0	0.0
Evansville	5	51,250	53,057	0.0	0.0
Hughes	87	39,583	17,396	32.6	15.0
Kobuk	141	31,250	11,184	15.4	62.1
Nuiqsut	428	93,750	27,356	23.4	0.4
Shungnak	269	47,656	10,261	38.3	25.0
Wiseman	14	N/A	N/A	0.0	0.0

3.6.2 KATM Socioeconomics and Local Businesses

Table 3.2 summarizes the economic conditions of communities within 50 miles of Katmai National Preserve. The descriptions below give more context for these communities.

Igiugig: Commercial salmon fishing is the mainstay of Igiugig's economy and four residents held commercial fishing permits in 2009. Many residents travel to Naknek each summer to fish or work in fish processing plants. Lake Iliamna is the eighth largest lake in the U.S. and is well known for its trophy rainbow trout which attract sport anglers from around the world. There are seven commercial lodges in Igiugig that serve sport fishermen and hunters and provide some seasonal employment opportunities. Subsistence is an important part of the residents' lifestyle and people rely on a variety of fish and animals for food. Igiugig is accessible by water and air. The state owns and maintains a 3,000' long by 75' wide gravel runway and charter air service is available from Iliamna and King Salmon. Barges travel up the Kvichak River and deliver goods from Naknek or Dillingham in the fall. The Igiugig Corporation also operates a barge system on Lake Iliamna.

Iliamna: Commercial fishing, sport fishing, and tourism are the primary sources of income in Iliamna. Many residents participate in the Bristol Bay sockeye salmon fishery and 19 residents held commercial fishing permits in 2009. Iliamna has a history of tourism based on guided hunting and fishing and the area is famous for trophy rainbow trout. There are several hunting and fishing lodges in the community, but most lodge employees are hired from outside Alaska. Iliamna is accessible by air and water. There

are two state-owned gravel airstrips—one 5,086' long by 100' wide, the other 4,800' long by 100' wide—with daily commercial flights to and from Anchorage and surrounding villages. Barge services are available during the summer months via the Kvichak River and small boats are used to commute between villages on Iliamna Lake.

Mineral exploration activities by Northern Dynasty Minerals Ltd. currently provide a variety of support service employment opportunities in Iliamna; however development of the Pebble Mine is in the planning and permitting stage, and controversial due to environmental concerns.

King Salmon: The King Salmon economy is relatively diverse with employment opportunities in government, transportation, commercial fishing and tourism. The Bristol Bay red salmon fishery is the largest in the world and 32 residents held commercial fishing permits in 2009. Opportunities for guided sport hunting and fishing draw sportsmen from around the world and there are several lodges and guide and outfitting services in the community. King Salmon is a major air transportation hub for the Bristol Bay region and air services employ a large portion of the community. The King Salmon Airport is a former Air Force base currently maintained under contract with Chugach Development Corporation. The state-owned airport has an 8,901' long by 150' wide paved, lighted runway and a 4,018' long by 100' wide asphalt/gravel crosswind runway and there is regularly scheduled air service to and from Anchorage. A 4,000' stretch of the Naknek River is also designated for float planes. Bulk goods and cargo are delivered to Naknek by barge and trucked to King Salmon via a 15-mile connecting road. During winter, an ice road on the frozen Naknek River provides access to South Naknek.

Kakhonak: The school is the largest employer in Kakhonak and many residents travel to Bristol Bay each summer to fish. In 2009, nine persons held commercial fishing permits. People rely heavily on subsistence activities and utilize a variety of resources including salmon, trout, grayling, moose, bear, rabbit, porcupine, freshwater seals, berries and other plants. During the summer months, many families travel to their summer fish camps near the Gibraltar River to put up salmon. Kokhanok is accessible by air and water. A state-owned 3,300' long by 75' wide gravel airstrip and a seaplane base support scheduled and charter air services from Anchorage, Iliamna, and King Salmon. Supplies travel by barge up the Kvichak River into Iliamna Lake and are lightered to shore near Kokhanok. There are no docking facilities and skiffs, all-terrain vehicles (ATVs), and trucks are the most common forms of local transportation.

Levelock: Commercial fishing and subsistence activities are the focus of the local economy and seven residents held commercial fishing permits in 2009. Most residents travel to Naknek to commercial fish or work in fish processing plants during the summer season. Several seasonal lodges operate in the area, however most lodge employees are brought in from outside the area. Levelock is accessible by air and water. The state owns a 3,281' long by 59' wide lighted gravel runway and scheduled and charter flights are available. Cargo and bulk goods are delivered by barge up the Kvichak River during the summer.

Table 3.2. Economic Characteristics of Local Communities within 50 Statute Miles of KATM Preserve and ALAG (Alaska DCCED 2013)

Community	Population	Median Household Income ($)	Per Capita Income ($)	% Unemployed	% Below Poverty
Igiugig	52	14,643	11,427	0.0	35.1
Iliamna	111	80,750	36,400	0.0	14.6
King Salmon	357	90,313	40,064	9.6	4.0
Kokhanok	170	46,250	16,992	4.6	32.2
Levelock	88	49,375	16,173	25.0	34.8
Naknek	550	89,167	34,790	7.6	5.5
Newhalen	178	56,250	17,981	19.4	15.6
Nondalton	169	39,286	14,880	19.6	49.3
Pedro Bay	42	43,125	23,539	0.0	0.0
South Naknek	80	62,750	23,372	17.5	22.1

Naknek: The economy is based on government employment, commercial salmon fishing, and fish processing. In 2009, 105 residents held commercial fishing permits. Several thousand people come from other Alaska communities and out-of-state during the fishing season to commercial fish and work in fish processing plants. Millions of pounds of salmon are trucked from Naknek to the King Salmon airport each summer where jets transport fish to markets in the lower 48 states. Naknek is accessible by air and water and is connected to King Salmon by a 15.5-mile road. There are two airfields in Naknek. The Tibbetts Airport has a lighted 1,700' long by 60' wide gravel runway. The state-owned Naknek Airport is located one mile north of Naknek and has a 1,950' long by 50' wide lighted gravel runway, a 1,850' long and 45' wide gravel runway, and 2,000' float plane landing area. The Bristol Bay Borough operates a cargo dock at Naknek that has 800' of berthing space, a concrete surface, and two cranes.

Newhalen: Most employment in Newhalen is seasonal and many residents work in Bristol Bay salmon fishery or in Iliamna. In 2009, 10 residents held commercial fishing permits. Residents rely heavily on subsistence activities and most families travel to fish camps along the Newhalen River during the summer to harvest sockeye salmon. Salmon, trout, grayling, moose, caribou, rabbit, porcupine, freshwater seal and berries are the primary sources of subsistence harvested food. Air transportation is available at the same

state-owned airstrips that serve Iliamna and fuel and bulk goods are delivered to the community by barges via the Kvichak River.

Nondalton: Commercial fishing in Bristol Bay is an important income source in Nondalton and in 2009, five residents held commercial fishing permits. Wildland firefighting is a primary source of summer employment and the community is well known for its well-trained and experienced firefighting crews. Nondalton is accessible by air and water. A state-owned 2,800' long by 75' wide gravel runway serves the community and scheduled and charter air services are available from Iliamna and Port Alsworth. Bulk goods are received in Iliamna then taken by a cat-trail to Fish Camp, located across from Nondalton on the east side of the lake, then ferried by skiff or barge to the west side. Nondalton relies heavily on subsistence hunting and fishing and many families travel to fish camp at the outlet of Six Mile Lake each summer to harvest sockeye salmon. Residents utilize a variety of resources including salmon, whitefish, grayling, moose, caribou, bear, Dall sheep, rabbit, porcupine, waterfowl, upland birds and berries.

Pedro Bay: Most Pedro Bay residents obtain summer employment in the Bristol Bay fishery and three area residents held commercial fishing permits in 2009. The community also relies on tourism and seasonal jobs available through local wilderness lodges catering to sport hunters and anglers. There is a state-owned 3,000' long by 60' wide gravel airstrip and scheduled and charter air services are available to access Anchorage and other communities in the region. Fuel, building materials and bulk goods are transported by barge from Naknek via the Kvichak River and up Iliamna Lake. Goods are also sent by barge from Homer to Iliamna Bay on Cook Inlet then portaged over a 14-mile road to Pile Bay, 10 miles to the east. Most families depend heavily on subsistence resources and utilize salmon, trout, moose, bear, rabbit, and freshwater seals.

South Naknek: Commercial fishing and salmon processing are the mainstays of the South Naknek economy and 28 residents held commercial fishing permits in 2009. Trident Seafoods operates a fish processing plant in South Naknek which provides seasonal employment for local residents and people from other parts of the state and outside. Local government and public services provide other employment opportunities. South Naknek is accessible by air and water. There are two state-owned lighted gravel runways. One is 2,264' long by 60' wide, and the other is 3,314' long by 60' wide. The PAF Cannery airport lies three miles to the southeast. It has a 750' long by 30' wide dirt strip and a 650' long by 75' wide crosswind strip. Scheduled and charter air services are available. The frozen Naknek River serves as an ice road to Naknek and King Salmon in winter. The Bristol Bay Borough operates a mid- and high-tide cargo dock at South Naknek with 200' of berth space to accommodate barges.

3.6.3 LACL Socioeconomics and Local Businesses

Table 3.3 summarizes economic conditions for LACL resident zone communities.

Iliamna: Economic conditions in this community are described above under section 3.6.2 for KATM Preserve.

Lime Village: Lime Village has a minimal commercial economy and subsistence hunting, fishing, trapping and gathering activities are the primary sources of food, shelter and heating fuel. There is no store in Lime Village. Some seasonal work is found through BLM wildland firefighting or trapping. Cash income is primarily derived from public assistance programs. Lime Village is dependent on small riverboats and airplanes for transportation, but shallow water prevents the use of barges which greatly increases the costs of fuel, heating oil and bulk goods. When the river freezes, residents use dog teams and snow machine for ground travel. There is a 1,500' long by 55' wide gravel runway just north of the village that is owned and maintained by the state.

Newhalen: Economic conditions in this community are described above under section 3.6.2 for KATM Preserve.

Nondalton: Economic conditions in this community are described above under section 3.6.2 for KATM Preserve.

Pedro Bay: Economic conditions in this community are described above under section 3.6.2 for KATM Preserve.

Table 3.3. Economic Characteristics of LACL Resident Zone Communities (Alaska DCCED 2013).

Community	Population	Median Household Income ($)	Per Capita Income ($)	% Unemployed	% Below Poverty
Iliamna	111	80,750	36,400	0.0	14.6
Lime Village	27	72,500	21,214	0.0	31.8
Newhalen	178	56,250	17,981	19.4	15.6
Nondalton	169	39,286	14,880	19.6	49.3
Pedro Bay	42	43,125	23,539	0.0	0.0
Port Alsworth	167	61,806	18,043	4.6	2.5

Port Alsworth: Port Alsworth has several commercial lodges that provide outfitter/guide services for recreational hunters and anglers during the summer months. Most residents are either self-employed, employed by one of the commercial lodges or air services based in Port Alsworth or by Lake Clark National Park and Preserve. In 2009, two residents

held commercial fishing permits. There are two privately-owned and operated airstrips: a 4,200' and 100' wide gravel airstrip owned by Dave Wilder and a 3,000' long by 100' wide dirt/gravel airstrip operated by Glen Alsworth and The Farm Lodge. Daily air service from Anchorage provides easy access to groceries and other goods and residents supplement their diets with salmon, moose, caribou, bear, and Dall sheep.

3.6.4 WRST Socioeconomics and Local Businesses

The park's 23 resident zone communities fall within three regions, the Alaska Highway/Upper Tanana area, the Copper Basin, and the Gulf of Alaska. See Table 3.4 for a summary of these communities.

***Alaska Highway/Upper Tanana*:** Six of the park's resident zone communities are located north of the park on or near the Alaska Highway. The area is traditionally Upper Tanana Athabascan. Tok, the hub community for the region, is the first major community encountered by travelers entering the state by highway. About 20 percent of Tok residents are Alaska Native. Northway, Tetlin, Tanacross, Healy Lake, and Dot Lake are small, predominantly Alaska Native villages with federally recognized tribal governments. There is no borough in the area. Healy Lake is only accessibly by plane, boat or winter ice road. Local economies are affected by the continental climate zone with long cold winters, relatively warm summers, and low precipitation. The economy is based on government, tourism, services and transportation. Employment opportunities in the villages are often limited. Firefighting for the Bureau of Land Management is an important source of summer employment in the villages. Many residents engage in subsistence activities, and some also make handicrafts for sale.

Copper Basin: Thirteen of the park's resident zone communities are located on or near the Richardson and Edgerton Highways between Mentasta Lake Village on the north and Chitina and Tonsina on the south. Nabesna and McCarthy are located within the park and preserve boundary, along roads of the same name, and Chisana is a small remote community located in north of the Wrangell Mountains near the Chisana River. There is no borough in the area and no local governments. Glennallen is the supply hub of the Copper Basin, although more limited supplies and services are available in some of the other communities. The region is traditionally Ahtna Athabascan. Some of the smaller villages are predominantly Alaska Native, while the larger communities tend to have a mixture of Alaska Native and non-native residents. The villages of Chistochina (Cheesh'na), Chitina, Copper Center (Kluti-Kaah), Gakona, Gulkana, Mentasta Lake, and Tazlina have federally recognized tribal governments. There are no Alaska Native residents in McCarthy and Chisana. In McCarthy, the local businesses include lodges, a museum, small store, gift shop, and guide services. Local economies are affected by the continental climate with long, cold winters, relatively warm summers, and low precipitation. Residents are employed in local services, retail businesses, government agencies, schools, and tourism. Tourism-related tourism is often seasonal. Many residents depend on subsistence hunting, fishing, trapping, and gathering. The Copper River salmon fishery is a particularly important subsistence resource in the region.

Table 3.4. Summary Figure Community Conditions for Local Communities near WRST (Alaska DCCED 2013)

Community	Population	Median Household Income ($)	Per Capita Income ($)	Unemployed (%)	Below Poverty (%)
Chistochina	95	24,783	19,396	0.0	11.3
Chitina	139	16,964	18,316	10.2	16.8
Copper Center	321	44,792	22,708	16.5	23.8
Dot Lake Village	54	43,333	12,899	38.5	53.6
Gakona	214	110,167	32,160	10.2	3.9
Glennallen	491	72,716	20,231	6.0	0.0
Gulkana	122	50,625	17,838	0.0	0.0
Silver Springs	114	89,464	35,507	41.0	0.0
Kenny Lake	358	60,861	30,152	26.5	0.0
McCarthy*	31	143,125	35,845	0.0	0.0
Mentasta Lake	125	26,250	9,355	50.0	50.3
Northway	77	21,607	18,503	44.4	51.9
Northway Junction	58	38,750	10,052	0.0	44.8
Northway Village	91	22,500	8,376	17.7	72.0
Slana	156	28,542	22,552	50.0	23.1
Tanacross	130	53,125	14,801	27.5	13.1
Tazlina	287	58,750	29,960	13.0	14.8
Tetlin	118	50,972	15,383	18.2	10.9
Tok	1,278	48,309	22,355	9.6	7.9
Tonsina	89	103,405	38,388	0.0	0.0
Willow Creek	204	17,500	N/A	0.0	0.0
Yakutat	622	74,844	34,315	5.3	3.3

*Only permanent residents are included
**N/A = Data not available

Gulf of Alaska: Yakutat is an isolated coastal community at the mouth of Yakutat Bay on the Gulf of Alaska. The community has no road access; however, it does have daily jet service to Anchorage and Juneau. It is believed to have been originally settled by Eyak people from the Copper River, who were subsequently conquered by the Tlingit. About 47 percent of the community residents identify as Alaska Native. It is the only community in the park's resident zone that has a city and borough government as well as a federally recognized tribal government, the Yakutat Tlingit Tribe. Local economies are affected by the maritime climate with relatively mild and often rainy weather. Its economy is dependent on fishing and government agencies. Many residents also rely on subsistence hunting, fishing, and gathering.

3.6.5 YUCH Socioeconomics and Local Businesses

Economic opportunities in communities near YUCH are limited. Table 3.5 provides a summary of economic conditions of local area communities.

Central: Central provides services to area residents, including Circle Hot Springs. Central has a cash economy based on providing seasonal support for mining operations in the area. The Circle District Museum attracts seasonal visitors, although Circle Hot Springs closed in October 2002. A number of individuals live in the area only seasonally. Subsistence and recreational activities provide food sources for the year-round residents. In 2009, one resident held a commercial fishing permit.

Circle: Recreation attracts visitors to Circle seasonally. Circle Hot Springs was closed in October 2002. Some persons live in the community only during summer months. Major employers include the school, clinic, village corporation, trading post, and post office. In 2009, two residents held commercial fishing permits. Almost all residents are involved in subsistence. Salmon, freshwater fish, moose, and bear are the major sources of meat. Trapping and making handicrafts contribute to family incomes.

Eagle: Retail businesses, the school, mining, and seasonal employment, such as tourism and BLM firefighting, provide the majority of employment. Year-round earning opportunities are limited. Subsistence activities provide food sources.

Eagle Village: Nearly all employment in Eagle Village is seasonal. Subsistence activities provide the majority of food items.

Table 3.5. Summary Figure Community Conditions for Local Communities near YUCH (Alaska DCCED 2013)

Community	Population	Median Household Income ($)	Per Capita Income ($)	% Unemployed	% Below Poverty
Central	92	31,750	21,110	16.0	10.4
Circle	113	17,500	8,502	0.0	60.7
Eagle	87	33,393	19,079	22.6	16.9
Eagle Village	74	20,417	13,515	21.4	39.0

3.6.6 WEAR Socioeconomics and Local Businesses

A summary of economic conditions in local rural communities near WEAR NPS areas is provided in table 3.6 and the brief descriptions below. A significant employer in the region is the Red Dog Mine, where over 50% of the employees are residents from regional villages who work on shifts.

Ambler: Cash employment is limited to the school, city, clinic, and local stores, though some mining occurs. In 2009, two residents held commercial fishing permits. Subsistence is a major part of the local economy. Chum salmon and caribou are the most important food sources. Freshwater fish, moose, bear, and berries are also harvested. Birch baskets, fur pelts, and jade, quartz, bone, and ivory carvings created in Ambler are sold in gift shops throughout the state. The community is interested in developing a lapidary facility for local artisans. Ambler's major means of transportation are by barge, plane, small boat, and snow machine. There are no roads linking the village to other parts of the state. A state-owned 3,000' long by 60' wide lighted gravel airstrip with a 2,400' long by 60' wide gravel crosswind airstrip is located one and a half miles from the city. In addition, daily scheduled services are provided out of Kotzebue, and air taxis provide charter flights. Crowley Marine Services barges fuel and supplies to Ambler each summer. Boats are used for inter-village travel and subsistence activities. ATVs and snow machines are commonly used in winter.

Buckland: Residents depend on a subsistence lifestyle for most food sources. Employment is primarily with the school, city, health clinic, and stores. Some mining also occurs. In 2009, one resident held a commercial fishing permit. The community is interested in developing a Native food products and crafts manufacturing facility to produce reindeer sausage, berry products, Labrador tea, and ivory and wood carving.

Buckland's major means of transportation are plane, small boat, barge, and snow machine; there are no roads outside of the village. Buckland has a state-owned 3,200' long by 75' wide gravel airstrip, which serves a number of scheduled and chartered

flights. Crowley Marine barges fuels, and various lighterage companies deliver cargo and supplies each summer.

Deering: Deering's economy is a mix of cash and subsistence activities. Moose, seal, and beluga whale provide most meat sources; pink salmon, tom cod, herring, ptarmigan, rabbit, and waterfowl are also utilized. A number of residents earn income from handicrafts and trapping. The village is interested in developing a craft production facility and cultural center to train youth in Native crafts. The school, city, Maniilaq Association, stores, and airline provide the only year-round jobs. Some mining occurs in the Seward Peninsula's interior. In 2009, two residents held commercial fishing permits. The village wants to develop eco-tourism, including a 38-mile road to Inmachuk Springs for tourists.

Deering is accessible year-round by plane. A state-owned 3,300' long by 7' wide gravel airstrip, with a 2,640' long by 75' wide gravel crosswind strip, enables flights by several Kotzebue air services. A private runway is 2,400' long and 50' wide. Crowley Marine Services barges fuel and goods from Kotzebue each summer. Small boats, ATVs, and snow machines are used for local travel. Winter trails are available to Candle and Buckland.

Kiana: The economy depends on traditional subsistence activities, augmented by a cash economy. Chum salmon, freshwater fish, moose, caribou, waterfowl, and berries are harvested. The school, city, and Maniilaq Association provide the majority of year-round jobs. The Red Dog Mine also offers area employment. Kiana is one of the more modern villages in the borough and has three general stores. In 2009, two residents held commercial fishing permits; seasonal employment also includes work on river barges, BLM firefighting, and jade mining. The major means of transportation are plane, small boat, and snow machine. The state-owned Bob Baker Memorial Airport has a 3,400' long by 100' wide lighted gravel runway. Daily scheduled flights and charter flights are provided. Crowley Marine Services barges fuel and supplies each summer, and local store owners have large boats to bring supplies upriver. Boats, ATVs, and snow machines are used for local travel, and there are a few trucks. A road extends along the river to Kobuk Camp, and a network of old trading trails exists.

Kivalina: Kivalina's economy depends on subsistence activities. Bearded seal, walrus, bowhead whale, Dolly Varden trout, tomcods, blue cods, salmon, whitefish, and caribou are utilized. The school, city, Maniilaq Association, NANA Regional Corporation, tribal council, airlines, and local stores provide year-round jobs. In 2009, two residents held commercial fishing permits. Native carvings and jewelry are produced from ivory and whalebones. The community is interested in developing an arts and crafts center that could be readily moved to the new city site. The major means of transportation into the community are plane and barge. A state-owned 3,000' long by 60' wide gravel airstrip serves daily flights from Kotzebue. Crowley Marine Services barges goods from Kotzebue during July and August. Small boats, ATVs, and snow machines are used for local travel. Two main hunting trails follow the Kivalina and Wulik Rivers.

Table 3.6. Economic Characteristics of WEAR Eligible Communities (Alaska DCCED 2013)

Community	Population	Median Household Income ($)	Per Capita Income ($)	% Unemployed	% Below Poverty
Ambler	271	57,625	14,767	40.0	41.2
Brevig Mission	417	30,625	8,873	29.6	49.7
Buckland	453	42,188	9,344	41.3	22.0
Deering	142	36,520	16,596	27.3	14.7
Diomede	121	42,500	13,285	0.0	65.6
Kiana	383	52,500	16,301	32.5	29.7
Kivalina	402	60,156	12,202	22.6	27.1
Kobuk	141	31,250	11,184	15.4	62.1
Kotzebue	3,237	71,761	23,935	19.9	15.6
Noatak	568	61,875	13,240	41.6	6.5
Nome	3,759	69,522	33,502	9.5	6.0
Noorvik	626	53,889	14,510	32.1	18.1
Selawik	856	36,875	10,973	42.3	30.6
Shishmaref	580	37,813	10,439	22.3	31.6
Shungnak	269	47,656	10,261	38.3	25.0
Wales	152	43,125	11,835	28.6	18.6

Kobuk: The economy of Kobuk is based on subsistence. Whitefish, caribou, and moose provide the majority of meat sources. Cash employment is limited to the school, city, and Maniilaq clinic. Seasonal construction and BLM firefighting provide some income. Kobuk's major means of transportation are barge, plane, small boat, and snow machine. A state-owned 4,000' long by 75' wide lighted gravel airstrip serves scheduled air carriers. Float planes land on the Kobuk River. Crowley Marine Services barges fuel and supplies during the spring and fall, when high water stages occur. There is a barge off-loading area. Boats, ATVs, and snow machines are used for local travel. There are many trails along the river for year-round inter-village travel and subsistence activities, including a 7-mile road to Shungnak.

Kotzebue: Kotzebue is the service and transportation center for all villages in the northwest region. It has a healthy cash economy, a growing private sector, and a stable public sector. Due to its location at the confluence of three river drainages, Kotzebue is the transfer point between ocean and inland shipping. It is also the air transport center for the region. Activities related to oil and minerals exploration and development have contributed to the economy. The majority of income is directly or indirectly related to government employment, such as the school district, Maniilaq Association, the city, and the borough. The Teck Alaska Red Dog Mine is a significant regional employer. Commercial fishing for chum salmon provides some seasonal employment. In 2009, 115 residents held commercial fishing permits. Most residents rely on subsistence to supplement income. Air is the primary means of transportation year-round. The state-owned Ralph Wien Memorial Airport supports daily jet service to Anchorage and several air taxis to the region's villages. It has a 5,900' long by 150' wide main paved runway and 3,876' long by 90' wide crosswind gravel runway. A seaplane base is also operated by the state. The shipping season lasts 100 days, from early July to early October, when the sound is ice-free. Due to river sediments deposited by the Noatak River four miles above Kotzebue, its harbor is shallow. Deep draft vessels must anchor 15 miles out, and cargo is lightered to shore and warehoused. Crowley Marine Services operates shallow draft barges to deliver cargo to area communities. There are 26 miles of local gravel road used by cars, trucks, and motorcycles during the summer. Snow machines are preferred in winter for local transportation.

Noatak: Noatak's economy is principally based on subsistence, although the available employment is diverse. The school district, city, Maniilaq, and retail stores are the primary employers. In 2009, six residents held commercial fishing permits. During the summer, many families travel to seasonal fish camps at Sheshalik, and others find seasonal work in Kotzebue or firefighting. Chum salmon, whitefish, caribou, moose, and waterfowl are harvested. Noatak is primarily accessed by air. The state-owned lighted gravel runway is 4,000' long by 60' wide. Six regional air services provide cargo, mail, and passenger services. There are currently no barge services to Noatak. Small boats, ATVs, and snow machine are used for local transportation. Historic trails along the Noatak River are still used for inter-village travel and subsistence activities.

Noorvik: The primary local employers are the school district, the city, the Maniilaq health clinic, and two stores. There is seasonal employment at the Red Dog Mine or firefighting with BLM, and locals also travel to work in Kotzebue. In 2009, three residents held commercial fishing permits. Caribou, fish, moose, waterfowl, and berries are utilized. Noorvik is accessible by plane and by shallow-draft vessels. There are no roads linking the village to other areas of the state. The state-owned Robert (Bob) Curtis Memorial Airport has a 4,000' long by 100' wide lighted gravel runway. Several regional air taxis provide service to Kotzebue and surrounding cities. Crowley Marine Services barges fuel and supplies during the summer. Boats, ATVs, and snow machine are common means of transportation locally.

Selawik: Inhabitants of Selawik subsist mainly on whitefish, sheefish, caribou, moose, ducks, ptarmigan, and berries. Occasionally, bartered seal and beluga whale supplement

the diet. The primary employers in the community include the school, the city, the IRA, Maniilaq, and three grocery stores. Handicrafts are made and sold locally and at gift shops in larger cities. Seasonal work is also found outside of Selawik with the Red Dog Mine, BLM firefighting, or lighterage operations. In 2009, four residents held commercial fishing permits. Selawik is accessible by plane and barge. The Roland Norton Memorial Airport provides a 3,000' long by 70' wide gravel runway owned by the city. The state also owns a 3,000' long by 60' wide gravel airstrip with a 2,659' long by 60' wide crosswind strip. Scheduled flights are available to Kotzebue and area villages. Docking facilities and a barge landing area exist. Freight is shipped upriver from Kotzebue each summer by Crowley Marine Services. Boardwalks have been constructed within the village. Boats, ATVs, and snow machine are prevalent forms of local travel.

Shungnak: Shungnak subsists mainly on fishing, seasonal employment, hunting, and trapping. Subsistence food sources include sheefish, whitefish, caribou, moose, ducks, and berries. Most full-time employment is with the school district, city, Maniilaq Association, two stores, and a lodge. BLM provides seasonal employment in firefighting, hiring over 30 residents each year. Shungnak also has a strong arts and crafts industry; residents make and sell finely-crafted baskets, masks, mukluks, parkas, hats, and mittens. The community wants to develop a visitor center, mini-mall, post office, and clinic complex at Dahl Creek. Shungnak is accessible by plane, barge, or small boat. The state-owned lighted gravel runway is 4,000' long by 60' wide and has scheduled regional air services. Fuel and supplies are barged in each summer by Crowley Marine Services of Kotzebue. Small boats, ATVs, snow machine, and dog sleds are used for local travel and subsistence activities. Trails along the river are used for inter-village travel.

Shishmaref: The Shishmaref economy is based on subsistence supplemented by part-time wage earnings. In 2009, two residents held commercial fishing permits. Year-round jobs are limited. Villagers rely on fish, walrus, seal, polar bear, rabbit, and other subsistence foods. The Friendship Center, a cultural center and carving facility, was constructed for local artisans. Shishmaref's primary link to the rest of Alaska is by air. A state-owned 5,000' long by 70' wide paved runway is available for charter and freight services from Nome. Most people use boats for trips to the mainland.

Wales: The economy of Wales is based on subsistence hunting and fishing, trapping, Native arts and crafts, and some mining. A private reindeer herd is managed out of Wales, and local residents are employed to assist in the harvest. Whales, walrus, polar bear, moose, salmon, and other fish are utilized. Wales is accessed by air and sea only. There is a state-owned 4,000' long by 75' wide gravel airstrip, and the ice on the straits is frequently used as a landing area by planes in the winter. Scheduled and charter flights are available. Cargo is delivered by barge and lightered half mile to shore. Skin boats are still a popular method of sea travel, and snow machine are used in winter. There is a 6.5-mile road to Tin City.

Brevig Mission: The people of Brevig Mission subsist upon fish, moose, reindeer, seal, walrus, and beluga whales. The primary employers are the city and school district. Year-round jobs are scarce, unemployment is high, and seasonal jobs in mining and

construction have become limited due to a depressed minerals market. Arts and crafts provide some cash income. Brevig Mission is accessible by air and sea and, in the winter, over land or ice. A cargo ship visits annually. The state-owned 2,990' long by 100' wide gravel airstrip with a 2,110' long by 75' wide gravel crosswind strip enables year-round access. Regular air service is available from Nome, and charters are provided from Nome and Teller. Teller is 5 miles away by boat. A 72-mile gravel road between Teller and Nome is maintained by the state during the summer.

Diomede: Little Diomede villagers depend almost entirely upon a subsistence economy for their livelihood. Employment is limited to the city and school. Seasonal mining, construction, and commercial fishing positions have been on the decline. The Diomede people are excellent ivory carvers; the city serves as a wholesale agent for the ivory. Seal and walrus hides are used to make parkas, hats, mukluks, furs, and skins for trade. Villagers travel to Wales by boat for supplies. Mail is delivered once per week. Due to constant winds from the north, accessibility is often limited. A state-owned heliport allows for weekly mail delivery. There is no airstrip due to the steep slopes and rocky terrain, so ski planes must land on an ice strip in winter. Few float plane pilots attempt to land on the rough and often foggy open sea during summer. Regular flights are scheduled from Nome, weather permitting. There is a breakwater and small boat harbor. Skin boats are still a popular method of sea travel to cover the 28 miles to Wales. Cargo barge stops are irregular, due to sea or ice conditions, but deliver at least annually. Lighterage services are available from Nome.

Nome: Nome is the supply, service, and transportation center of the Bering Strait region. Government services provide the majority of employment. In 2009, 42 residents held commercial fishing permits. Retail services, transportation, mining, medical, and other businesses provide year-round income. The large gold mining operation 8 miles north of Nome being developed by NovaGold Resources, Inc. is not fully operational and is in caretaker status pending sale to a new owner. Several small gold mines continue to provide some employment. Subsistence activities contribute to the local diet. Nome is a regional center of transportation for surrounding villages. There are two state-owned airports. The Nome Airport has two paved runways; one is 6,001' long and 150' wide, and the other is 5,576' by 150' wide. Scheduled jet flights are available, as well as charter and helicopter services. The city field offers a 1,950' long by 110' wide gravel airstrip. The entire seaward side of the city is protected by a 3,350-foot-long sea wall of granite boulders. A port and berthing facilities accommodate vessels up to 18 feet of draft. Lighterage services distribute cargo to area communities. Local development groups and the city fund harbor dredging, two seasonal floating docks, and a boat launch. Local roads lead to Teller, Council, and the Kougarok River.

3.7 Subsistence Resources and Uses

Subsistence uses, as defined by ANILCA, Section 803, means “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." Subsistence activities include hunting, fishing, trapping, and collecting berries, edible plants, and wood or other materials.

All ANILCA land use decisions are to include an evaluation of the effects to subsistence uses prior to making the decision. An ANILCA 810 subsistence evaluation and findings is attached as appendix A. Table 3.7 summarizes subsistence activities in Alaska NPS units as described in park general management plans and other park documents. Special Alaska park regulations at 36 CFR Part 13 provide for subsistence activities in Alaska National Park system, such as § 160 which allows the use of cabins and other structures.

Table 3.7. Summary of Subsistence Activities in Alaska NPS Units*

Park Unit	Traditional Activities and Resources Used	Primary Access Methods
BELA**	Hunting, trapping, fishing, wild plant gathering, and use of camps. Resources harvested include marine mammals (seal, walrus, whale, and polar bear), fish, game (caribou, muskoxen, and moose), birds, and wild plants and berries. Fur and natural fibers used to make clothing and handicrafts; some are sold for cash income.	Motorboat, snow machines, ORV, dog team, canoe, and kayak
CAKR**	Hunting, fishing, trapping, and wild plant gathering. Resources harvested include caribou, moose, muskoxen, seals, fish, berries, plants, and driftwood.	Motorboat, snow machines, and ORV
GAAR	Hunting, fishing, trapping, timber harvesting, and use of shelters and cabins. Resources harvested include caribou, moose, Dall's sheep, Arctic char, salmon, and trout.	Motorboat, snow machines, and ORV. Airplanes for Anaktuvuk Pass residents with a permit.
KATM	Fishing, hunting, and trapping are only allowed in the preserve part of KATM and Alagnak Wild River in the northern portion of the unit.	Motorboat
KOVA**	Hunting and fishing largely contribute to local diets. Limited trapping provides furs for personal clothing or to sale for cash income. Berries, roots, and other edible plants are gathered. Birch bark and spruce roots are gathered for the construction and sale of baskets. Wood gathered provides fuel to heat camps and homes during winter.	Motorboat, snow machines, and dog teams.

Park Unit	Traditional Activities and Resources Used	Primary Access Methods
LACL	Salmon fishing, moose and caribou hunting, berry gathering, wood gathering for firewood and house logs. Limited trapping primarily occurs on lands adjoining Lake Clark, Chulitna River, and the coast.	Motorboat, ORVs, and snow machines.
NOAT**	Hunting and fishing largely contribute to local diets. Trapping provides furs for personal clothing or to sale for cash income. Berries, roots, and other edible plants are gathered. Birch bark and spruce roots are gathered for the construction and sale of baskets. Wood gathered provides fuel to heat camps and homes during winter.	Motorboat, trucks, and ORVs. Airplanes are allowed to access subsistence resources in the Preserve.
WRST	Fishing, hunting, wild plant gathering (berries, mushrooms, and other plants), and wood gathering for firewood and house logs. Trapping occurs throughout the Park and Preserve north of Bagley Icefield. Moose, waterfowl, seal, and bear are hunted on the Malaspina Forelands. Sheep and goats are also taken, but non-subsistence take is more prevalent. Most subsistence resource use occurs adjacent to major access corridors and centers at Nabesna Road, McCarthy Road, Chisana, May Creek/Dan Creek, and Malaspina Forelands.	Motorboat, trucks, and ORVs. Airplanes are allowed to access the Malaspina Forelands pursuant to special regulation at 36 CFR 13.1902(c).
YUCH	Hunting, trapping, fishing, and wood gathering are the primary subsistence activities in the preserve. The use of cabins and shelters to support subsistence activities is allowed.	Motorboat, snow machines, and dog teams.

***Information is from General Management Plans**
****Units that make up WEAR**

3.7.1 GAAR

Our analysis of 2010 census information reveals there are approximately 1,723 people residing in the ten resident zone communities, either surrounding or located in Gates of the Arctic National Park. A population of about 16,000 rural residents, including those in the resident zone communities, have federal C&T for wildlife resources in the preserve units.

3.7.2 KATM

According to 2010 census information approximately 1,791 people live in rural communities in reasonable proximity to Katmai National Preserve with a positive customary and traditional use determination for at least one wildlife species in at least one area of the preserve or wild river corridor. About 3,472 people have a positive C&T determination for big game species, not including wolves and small game.

3.7.3 LACL

According to 2010 census information approximately 693 people live in the communities of the park's resident zone and thus are eligible to engage in subsistence in the national park as well as in the national preserve. An additional 1,666 people live in rural communities in reasonable proximity to the park and preserve with a positive customary and traditional use determination for at least one wildlife species in at least one area of the preserve, though a total of 9,337 are technically eligible, but live a long ways from the preserve.

3.7.4 WRST

According to 2010 census information, approximately 5,200 people live in the communities of the park's resident zone and thus are eligible to engage in subsistence in the national park as well as in the national preserve. An additional 7,800 people live in rural communities in reasonable proximity to the park and preserve with a positive customary and traditional use determination for at least one wildlife species in at least one area of the preserve

3.7.5 YUCH

Our analysis of 2010 census information reveals there are approximately 353 people residing in the rural communities of Central, Circle, Eagle, and Eagle Village. Residents of these communities are within proximity of the preserve and are determined to be customary and traditional users; however, a total of 5,360 people have a positive C&T for some big game species in parts of the preserve according to the Federal Subsistence Board, but live a long ways from the preserve.

3.7.6 WEAR

This alternative would have the potential to negatively impact up to eleven communities and 7,104 residents for CAKR and KOVA (the resident zone communities), up to forty communities and 24,160 residents for NOAT (based on the C&T determination for caribou), and thirty-seven communities and 16,943 residents for BELA (based on the C&T determination for caribou). The distribution of caribou, moose, brown bear, Dall sheep, muskoxen, and most plant species are not confined just to the NPS units and thus would still be available on other lands locally and in some cases regionally.

3.8 Terrestrial Vegetation

A wide variety of terrestrial vegetation exists across the project area that could be affected by hazardous vegetative fuel treatments. Ecologically, these relatively little-disturbed communities range from the boreal forests of Interior Alaska parks to arctic or alpine tundra in most Alaska parks. The majority of plant communities categorized by the Alaska Vegetation Classification (Viereck et al. 1992) are represented in at least one park, and this system provides a more thorough description of the range of plant communities in Alaska than can be effectively presented here. The vegetation types in the project area are shown in the following landcover maps: GARR (Figure 3.14), KATM (Figure 3.15), LACL (Figure 3.16), WRST (Figure 3.17), YUCH (Figure 3.18), WEAR (Figure 3.19), and BELA (Figure 3.20).

3.8.1 GAAR Terrestrial Vegetation

In GAAR, 10 to 15% of the landscape is unvegetated rock and snowfields. About 53% of the park consists of low and dwarf shrublands and herbaceous plant communities (arctic and alpine tundra), 6% supports tall shrubs, and an additional 7% is sparsely vegetated. Almost 18% of the park supports spruce forests and woodlands, and 1% supports broadleaf and mixed spruce-broadleaf forests. Vegetation types along the park's eastern boundary near the Dalton Highway include spruce and broadleaf forests, tall riparian shrubland, and dwarf shrub tundra. The Native lands near Anaktuvuk Pass border primarily dwarf shrub tundras and graminoid/herbaceous wetlands. The inholding in the southeast of the park borders a wide variety of vegetation types from boreal forest to alpine. There are also a number of inholdings scattered throughout GAAR, predominantly with riparian and alpine vegetation

Two invasive plant species, common dandelion (*Taraxacum officinale* ssp. *Officinale*) and foxtail barley (*Hordeum jubatum*), have been recorded in GAAR (Schultheis 2012).

3.8.2 KATM Terrestrial Vegetation

Roughly 10% of KATM is covered by spruce, broadleaf, and mixed forest types, 22% by tall shrublands, 32% by low and dwarf shrublands and herbaceous plant communities, and 22% is sparsely vegetated. The remaining 14% is unvegetated.

Sixteen invasive, non-native plant species have established in several human-disturbed locations throughout the KATM (Frank and Woods 2011).

3.8.3 LACL Terrestrial Vegetation

Approximately 30% of LACL is unvegetated, and an additional 19% is sparsely vegetated. The remaining land area is covered by spruce, broadleaf, and mixed forests (11%), tall shrublands (16%), low and dwarf shrublands (17%), and grasslands, marshes, and meadows (3.5%), with 3.5% unknown due to cloud cover and shadows. Areas of access in LACL are very large in the south and include a variety of vegetation types.

There are large areas of Native lands both inside and along the LACL borders in the south, and some private inholdings in the north. Vegetation ranges from spruce-hardwood forests to dwarf shrub tundras, and includes various thickets of willow and alder.

Fourteen invasive plant species have been recorded in LACL with common dandelion as the most prevalent (NPS 2013).

3.8.4 WRST Terrestrial Vegetation

Twenty-nine percent of WRST is covered by water, ice, and snow and an additional 30% by alpine barrens. Forests account for 12% of the land area, nearly all of which are conifer forests and woodlands. Low and dwarf shrublands, herbaceous, and wetland communities cover 19% of WRST (Jorgenson et al. 2008). Tall shrublands and shrub thickets cover 4% of WRST. There are two primary access roads into WRST for hazardous vegetative fuels management activities—McCarthy Road and the Nabesna Road.

Roads, trails, and facilities accessible from the McCarthy Road are on river terraces and moraines in the Kuskulana and Kotsina River drainages, alluvial fans emanating from the southern Wrangell Mountains in the Chokosna River drainage and terraces in the Crystalline Hills formed by the retreat of glacial Lake Ahtna. Most of the forested area directly adjacent to the McCarthy Road has been logged for the Kennicott railroad construction or was burned in historical fires. This area has been heavily infested by the spruce bark beetle and cutting of infested trees could cause spread of the spruce bark beetle. The following vegetation types are found near the McCarthy Road: closed white spruce forest, open white spruce forest, white spruce woodland, closed mixed aspen-white spruce forest, open mixed white spruce-poplar forest, closed mixed poplar-white spruce forest, open black spruce forest, open low willow-graminoid shrub bog and open low mixed shrub-sedge tussock bog (Jorgenson et al. 2008). The vegetation types in the upper Kotsina River drainage in the vicinity of facilities are: willow-birch shrub (90%), woodland needle leaf forest, open mixed forest and closed mixed forest (Jorgenson et al. 2008). Vegetation types near facilities in the Upper Kuskulana River drainage are alpine forb herbaceous (90%), open dwarf scrub and willow-birch shrub.

The dominant vegetation types along the Nabesna Road associated with roads and facilities are: open white spruce forest, white spruce woodland, black spruce woodland, open mixed white spruce-poplar forest, open low willow-graminoid shrub bog, open tall willow scrub and herbaceous seral communities (Jorgenson et al. 2008).

Forty-two invasive plant species have been recorded with most located along road and trail corridors and in communities within WRST (Lain 2012).

3.8.5 YUCH Terrestrial Vegetation

The dominant vegetation types of YUCH are open and woodland spruce forest, which account for 58.5% cover of its area. Other common plant communities include broadleaf and mixed forests, covering 12.5% of the land area, tall and low shrublands (14%), and dwarf shrublands, dry herbaceous communities, and wet sedge and tussock tundra communities (5%). Two percent of YUCH's area is sparsely vegetated, 3% is rock, water, or snow, 4% was unknown due to cloud shadows on the landscape, and 1% had been burned by wildfire as of 1997. Plant communities in the Coal Creek area are dominated by conifer, broadleaf, and mixed forests, much of which burned in 2004 during the Woodchopper Fire. Areas that were dredged by mining operations are covered by scattered shrublands, with substantial areas remaining unvegetated.

Seventeen invasive plant species have been recorded in YUCH with most occurring along ATV trails (Schultheis 2012).

3.8.6 BELA and CAKR Terrestrial Vegetation

The treeless plant communities of BELA and CAKR are composed primarily of low shrubs, sedges, grasses, forbs, mosses, and lichens. Approximately 55% of these park units are covered by upland and lowland dwarf birch (*Betula nana*) tussock shrub tundras dominated or with varying degrees of cottongrass tussocks (*Eriophorum vaginatum*). Twenty-five percent is covered by tall or low shrub communities dominated by willows (*Salix* spp.), and occasionally alder (*Alnus crispa*), and frequently co-dominated by dwarf birch. Other systems include: alpine systems dominated by Mountain Avens (*Dryas integrifolia),* Alpine Azalea (*Louiseularia)*, and lichens; riparian shrublands; sedge fen meadows; and coastal meadows. Areas of special concern include thermal features with cottonwoods, rare in this part of the state; and the late-successional lichen-dominated lava flows.

BELA and CAKR have not yet been surveyed extensively for invasive plant species, but no invasive plant species were found in 2004 surveys (NPS 2013).

3.8.7 KOVA Terrestrial Vegetation

Approximately 54% of KOVA consists of low and dwarf shrub, tussock and wet sedge, moist herbaceous, and lichen communities. An additional 24% is covered by tall and low shrublands, 19% by conifer forests and woodlands, and 3% by alpine tundra and barrens. The vegetation along the river consists of mixed broadleaf-conifer forest (*Betula papyrifera-Populus balsamifera-Picea glauca*), and large thickets of tall willows (e.g., *Salix alaxensis, S. lanata, S. pulchra*) and alder (*Alnus crispa*).

KOVA has not been surveyed for invasive plant species.

3.8.8 NOAT Terrestrial Vegetation

Approximately 73% of NOAT consists of low and dwarf tussock shrub, tussock and wet sedge meadows, and moist herbaceous vegetation. An additional 15% is covered by alpine tundra and barrens, 12% by tall and low shrublands, and a minor amount by conifer woodland and riparian poplars (*Populus balsamifera*).

NOAT has not been surveyed for invasive plant species.

3.8.9 Fire Ecology

The fire history of the parks and preserves are shown in the following figures: GAAR (Figure 3.21), KATM (Figure 3.22), LACL (Figure 3.23), WRST (Figure 3.24), YUCH (Figure 3.25), WEAR (Figure 3.26), and BELA (Figure 3.27).

Northern boreal ecosystems evolved with fire as a natural occurrence (Shugart et al. 1992) and recent research indicates that some regions of tundra also have frequent fires (Higuera et al. 2011). Vegetation recovers by sprouting, from seed stored in the soil organic layer (duff), or adjacent seed sources after fire. The exact response varies by fire prescription, season, moisture condition, and plant species. The amount of organic forest floor material consumed is particularly important in dictating revegetation because the roots and propagules of species are located at different depths, and some species have light, windblown seed, which can readily colonize exposed mineral soil seedbeds. Some later successional species, especially "reindeer" and beard lichens, will be scarce in post-fire stands for long periods. Lichens, especially the Cladina sp., which are important as winter forage for reindeer and caribou, typically require over 30 years to re-establish on some sites (Joly, et al. 2010).

Without fire, organic matter accumulates, the permafrost table rises, and ecosystem productivity declines. Vegetation communities become less diverse. Fire removes some of the insulating organic matter and enhances warming of the soil. Nutrients are added as a result of increased decomposition rates and combustion. Species-specific fire effects on northern vegetation, including Alaska, have been compiled and summarized into the electronic Northern Rockies Interagency Fire and Aviation Management Fire Effects Information System (http://www.fs.fed.us/database/feis). Information on fire effects in Alaska vegetation has been summarized in Wildland Fire in Ecosystems: Effects of Fire on Flora (U.S. Forest Service 2000) and reviewed in Effects of Fire in Alaska and Adjacent Canada: A Literature Review (Viereck and Schandelmeier 1980). This information on individual species effects is incorporated by reference into this analysis.

Fire regimes in forested types vary greatly between coastal and interior forest types, but in general they are characterized by low frequency/high intensity fire events. Black spruce forests can be ready to burn as early as 40 years, once a moss/lichen layer has developed, but average fire return interval for both woodland and closed spruce stands is estimated to be 80 years. The range of reported fire cycles from black spruce forests is roughly 40 to 120 years (Viereck 1983). However, much older stands are not uncommon.

The floodplain white spruce forest type is characterized by longer fire cycles, estimated at 110 years, with a range of 80–150 years.

Black spruce (*Picea mariana*) is very susceptible to crown fires due to low crown base height with branches growing to and often into the ground. This leads to crown fire initiation from very low intensities. It is easily killed by fire because it has thin bark and shallow roots. The forest floor under most black spruce stands is made up of a thick organic mat covered by mosses and/or lichens. Black spruce normally seeds in aggressively following fire, but it can be eliminated from an area if a second fire occurs before these young trees reach seed-producing age. Black spruce is persistent and abundant in areas of high frequency due to its early production of abundant seed that are released from cones after heating. White spruce, (*Picea glauca*), occurring often in floodplains, is not as well adapted to fires. The seeds mature and fall in one year; there is no reserve like black spruce. White spruce also has thin bark and shallow roots. Mature white spruce forests accumulate large amounts of organic material, which increases their susceptibility to fire.

Coastal spruce or Sitka spruce (*Picea stichensis*) have thin bark and a shallow root system which make it very susceptible to fire damage. Sitka spruce forests have a fire regime of long-interval (150 to 350+ years). Severe crown or surface fires result in total stand replacement.

Deciduous forests within Alaska may be comprised of paper birch (Betula neoalaskana), aspen (*Populus tremuloides*), or balsam poplar (*Populus balsamifera*). Aspen are most common on warm, well-drained sites, and grade into birch on colder, wetter sites. Aspen is an intermediate stage leading to white spruce, while paper birch sites may later be dominated by white or black spruce. A well-developed understory of alder, willow, highbush cranberry, and low shrubs is usually present, as well as herbaceous vegetation, mosses and lichens. Fires are infrequent in deciduous forests and generally are low intensity when they do occur. When they do occur, these fires often kill the thin-barked overstory, after which a new hardwood stand will quickly reestablish. Quaking aspen is adapted to fire. Root systems of top-killed stems send up a profusion of sprouts for several years after fire. Following a fire, a new, even-aged quaking aspen stand can develop within a decade. Quaking aspen is able to naturally regenerate without fire or cutting on some sites, but fire may be required for regeneration on others. Paper birch is well adapted to fire, recovering quickly by means of seedling establishment and vegetative regeneration (Uchytil 1991). Sprouts, and seedlings if seed trees are nearby, appear within the first year after fire. Birch is also a prolific seed producer. The fire return interval for birch is 80–230 years (Swain 1978).

Many shrubs are capable of vegetative reproduction by underground rhizomes, roots, or stems after a fire or cutting. Consequently, they are generally well adapted to fires. Many herbs and grasses within Alaska the same fire-adaptive reproductive mechanisms as the shrubs. Severe fires can kill willows (*Salix* spp.) by completely removing soil organic layers and charring the roots. Less severe fires only top-kill the plants. Scouler's willow (*Salix scouleriana*) is called fire willow because it recolonizes burned areas (U.S. Fish

and Wildlife Service 2004). Alder (*Alnus* spp.), a shrubby tree, has adaptations that can aid its post-fire recovery. It sprouts from the root crown and/or roots after top-kill. Old willows produce sprouts prolifically immediately after fire. Alder is more susceptible to complete killing by fire than is willow.

Tussock tundra is dominated by cottongrass (*Eriophorum vaginatum*). Other important species include ericaceous shrubs—such as Labrador tea, cranberry, blueberry, and Kamchatka rhododendron—dwarf birch (*Betula nana*), dwarf willows, mosses, lichens, sedges, and cloudberry. Shrub tundra is dominated by dwarf birch, blueberry, labrador tea, dryas, bearberry, cassiope, and dwarf willow. Tussock- shrub tundra has burned frequently with fire-event return intervals ranging from 30 years to 5,000 years (Higuera et al. 2011) within the Noatak region. Moderate intensity surface fires in tundra ecosystems may kill all aboveground parts but rarely destroy underground parts. Fires increase the active layer and flowering of many tundra species, especially the sedge tussocks. In most cases, all signs of fire disappear in 6 to 8 years. Caribou forage lichens are vulnerable to being consumed by fire during dry summers because of their growth form and rapid loss of moisture content in response to decreases in relative humidity that proceed a fire front. Wildfires reduce the abundance of lichens, especially the late-succession fructose lichens that are the primary winter caribou forage (Joly et al. 2009).

Dwarf shrub tundra shrub vegetation type is comprised of low shrubs in association with sedges (*Carex* spp.), ericads (*Vaccininium* spp.), *Cassiope* spp., crowberry (*Empetrum nigrum*), bearberry (*Arctostaphylos* spp.), mountain heath (*Phyllodace* sp.), and dwarf birch (*Betula nana*). Moses and lichens may be a major or minor component. Grasses and forbs may be common. Fires are less common in dwarf shrub tundra and alpine areas due to the sparse nature of fuels.

Severe fires can kill willows (*Salix* spp.) by completely removing soil organic layers and charring the roots. Less severe fires only top-kill the plants. Scouler's willow (*Salix scouleriana*) is called fire willow because it recolonizes burned areas (U.S. Fish and Wildlife Service 2004).

Alder (*Alnus* spp.), a shrubby tree, has adaptations that can aid its post fire recovery. It sprouts from the root crown and/or roots after top-kill.

Needle-leaf tamarack (*Larix larincina*) is a deciduous tree easily killed by fire. The species relies on seed from surviving trees to revegetate burned areas.

Crowberry (*Empetrum nigrum*), an evergreen shrub, generally occurs in communities with long fire intervals or in communities that lack the dry fuel to sustain a fire. Belowground parts are also very susceptible to fire damage because most of them are located near the soil. Crowberry can regenerate vegetatively following fire, but this process is slow. Crowberry burns with great intensity because of the oils in the plant (National Park Service 2010b).

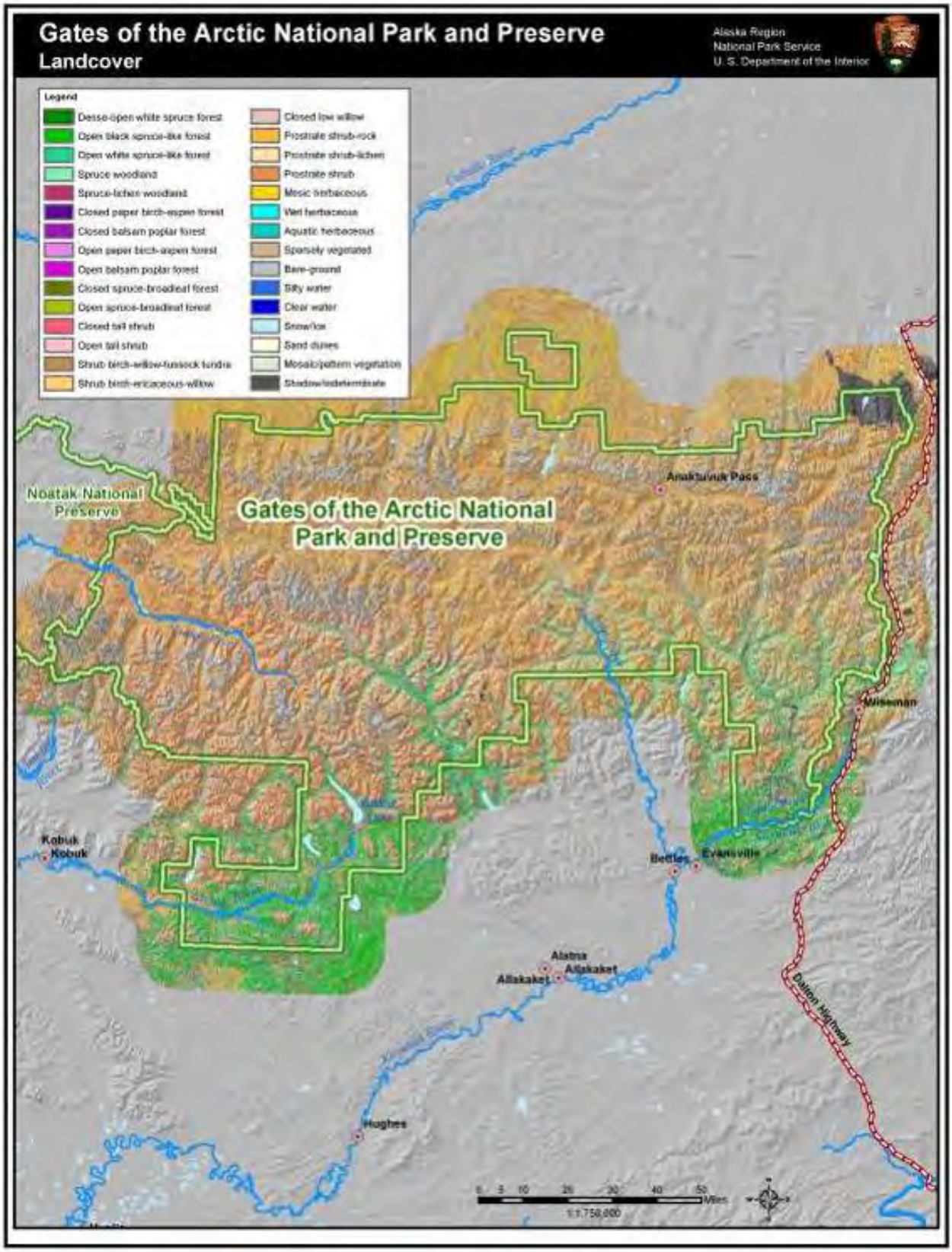

Figure 3.14. Gates of the Arctic National Park and Preserve Landcover

Figure 3.15. Katmai National Park and Preserve Landcover

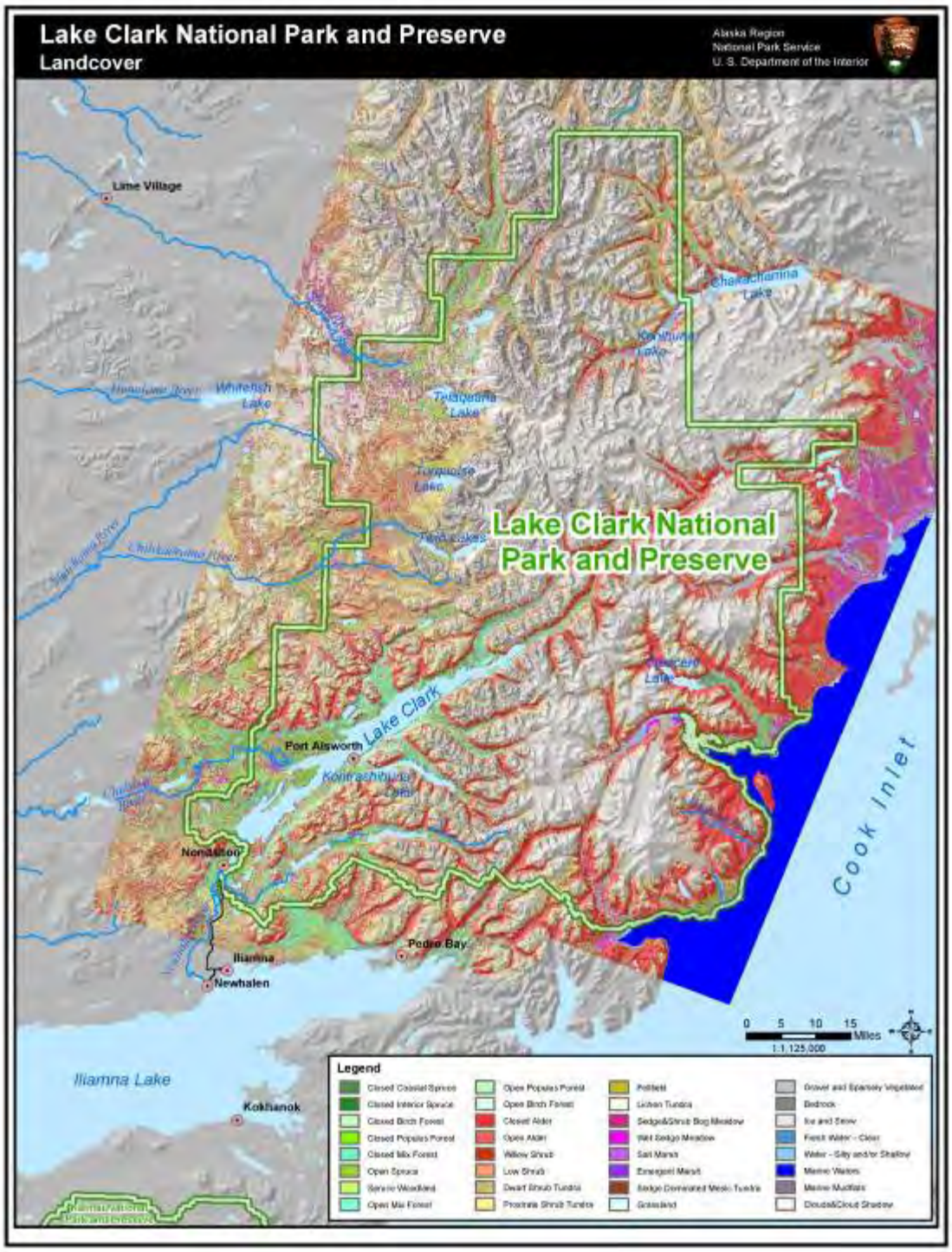

Figure 3.16. Lake Clark National Park and Preserve Landcover

Figure 3.17. Wrangell-St. Elias National Park and Preserve Landcover

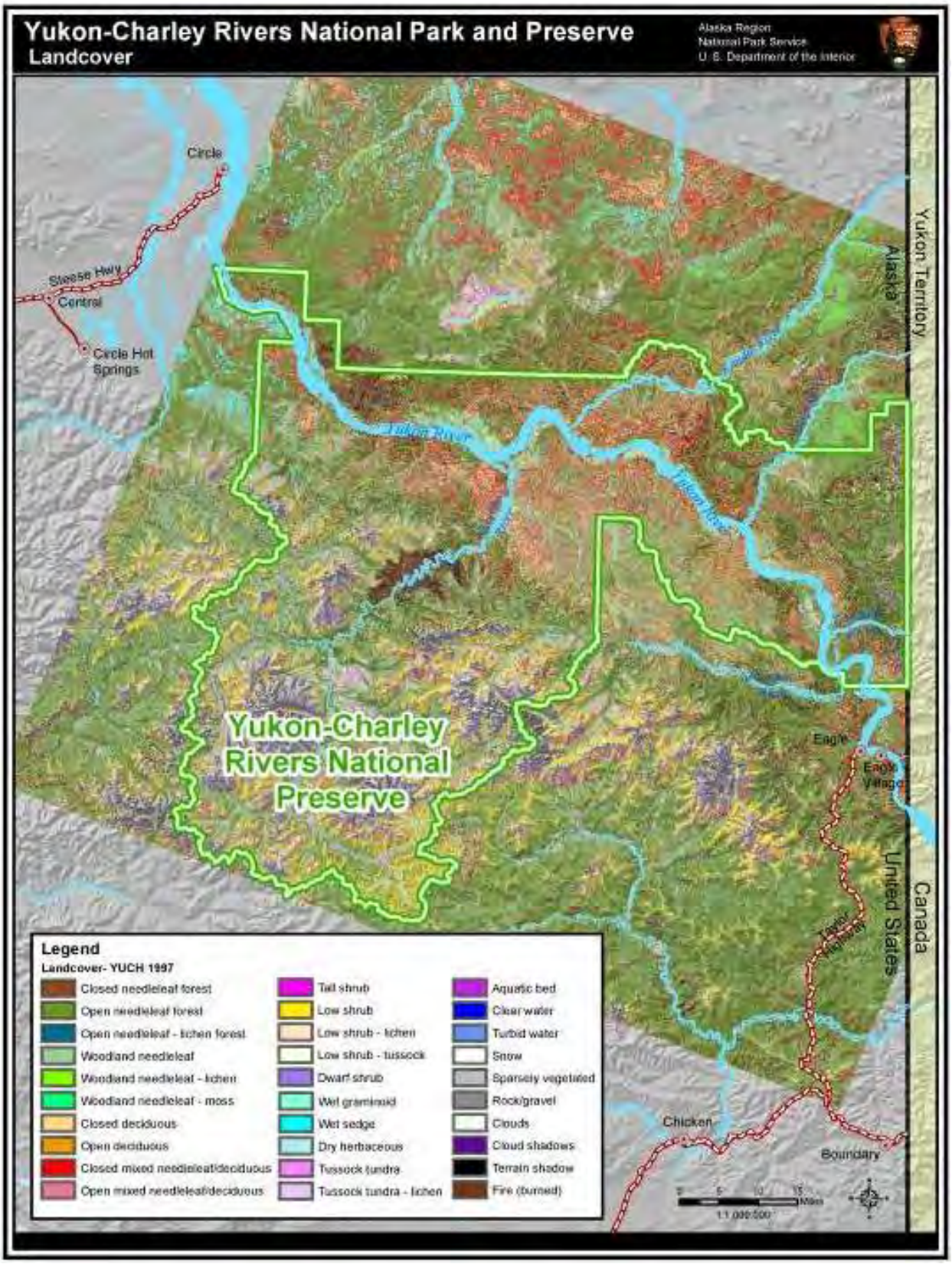

Figure 3.18. Yukon-Charley Rivers National Preserve Landcover

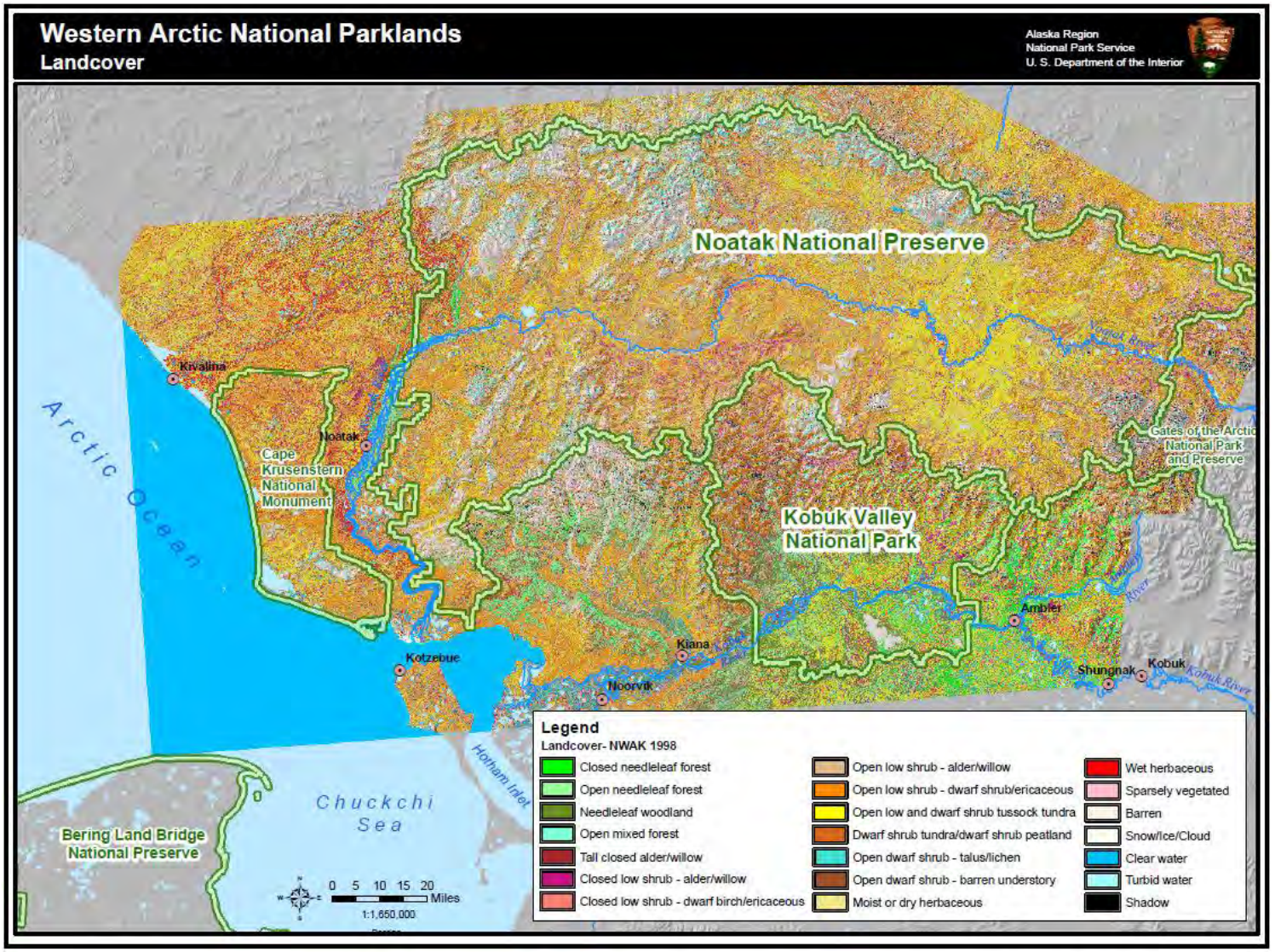

Figure 3.19. Western Arctic National Parklands Landcover

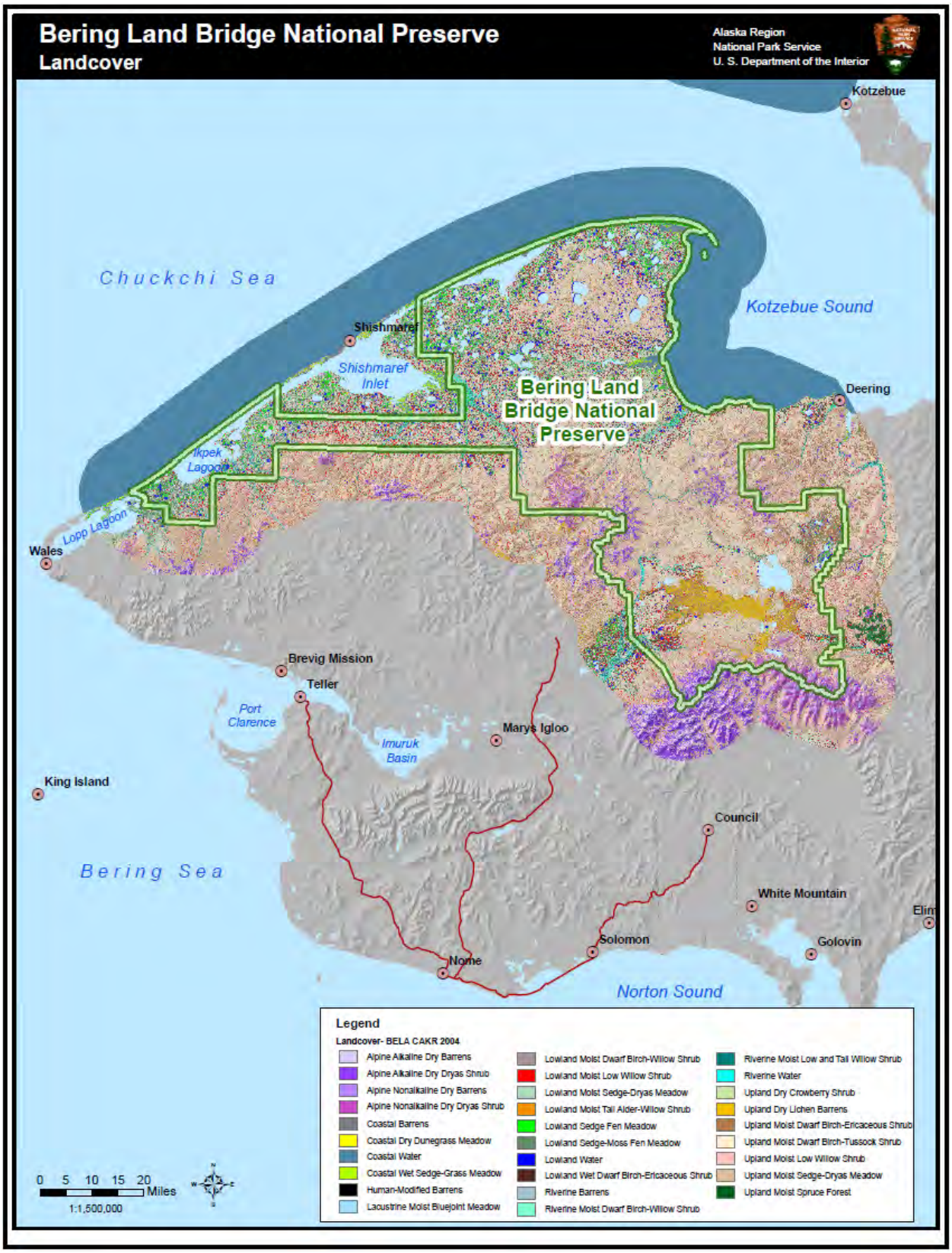

Figure 3.20. Bering Land Bridge National Preserve Landcover

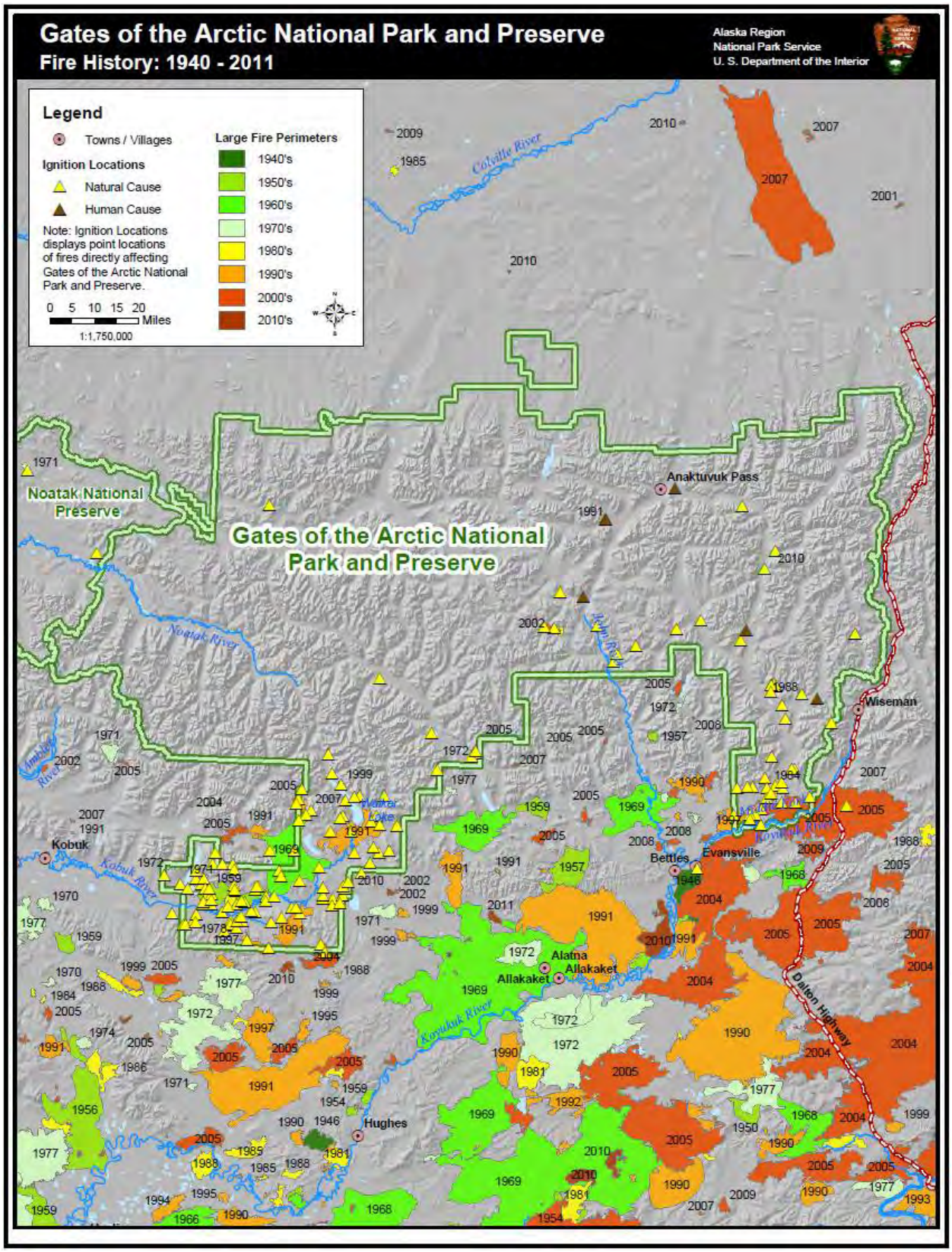

Figure 3.21. Gates of the Arctic National Park and Preserve Fire History

Figure 3.22. Katmai National Park and Preserve Fire History

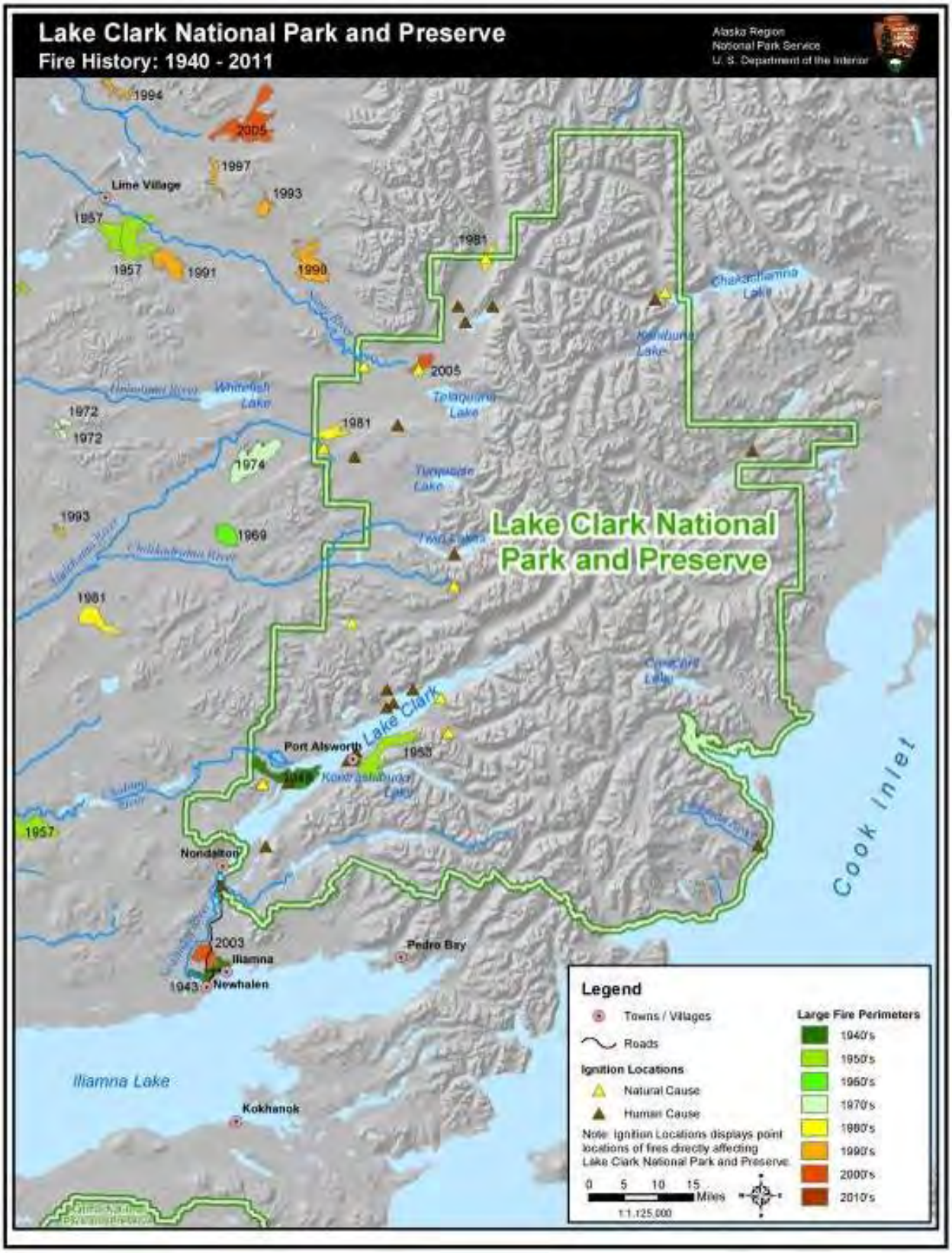

Figure 3.23. Lake Clark National Park and Preserve Fire History

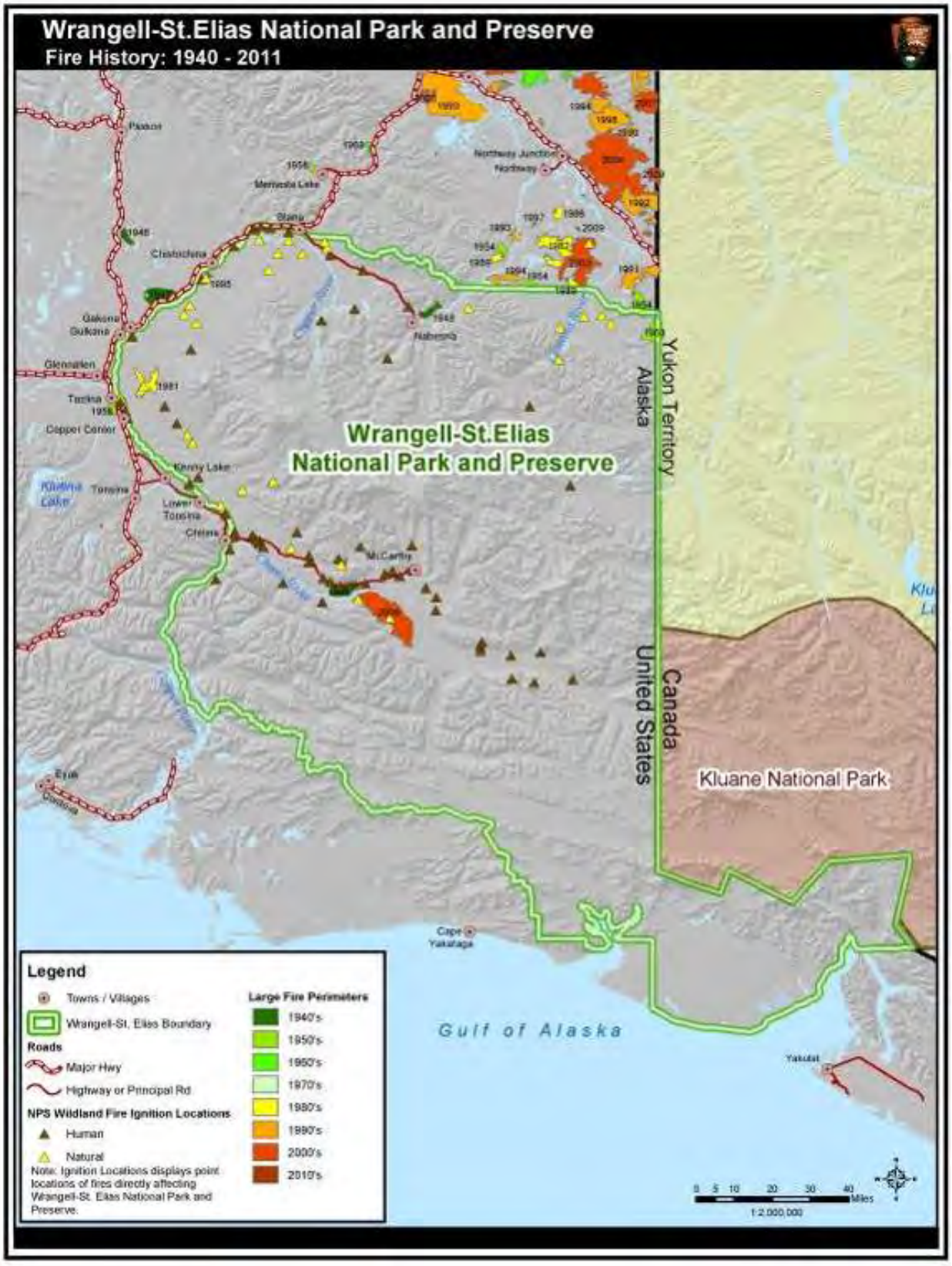

Figure 3.24. Wrangell-St. Elias National Park and Preserve Fire History

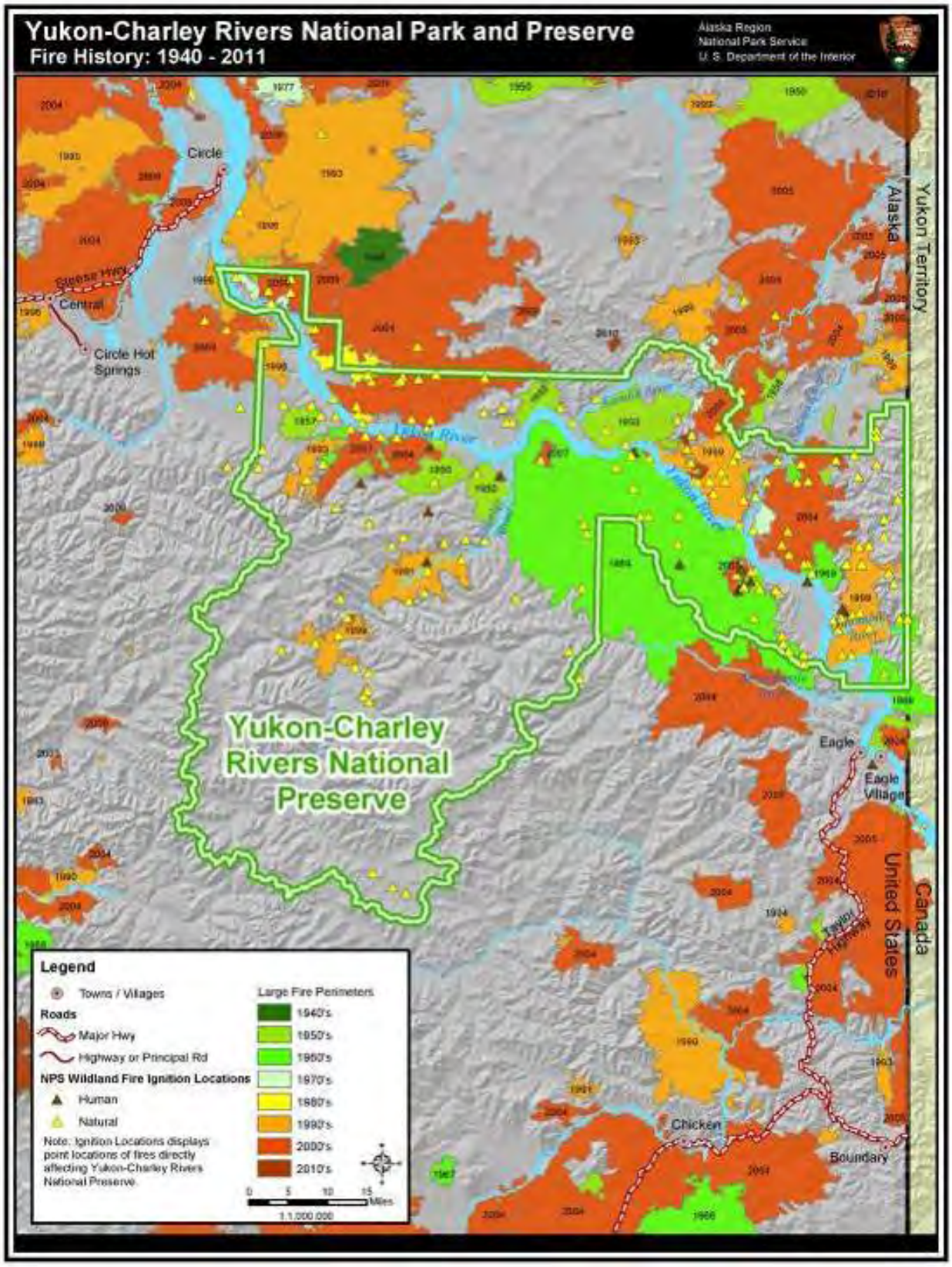

Figure 3.25. Yukon-Charley Rivers National Park and Preserve Fire History

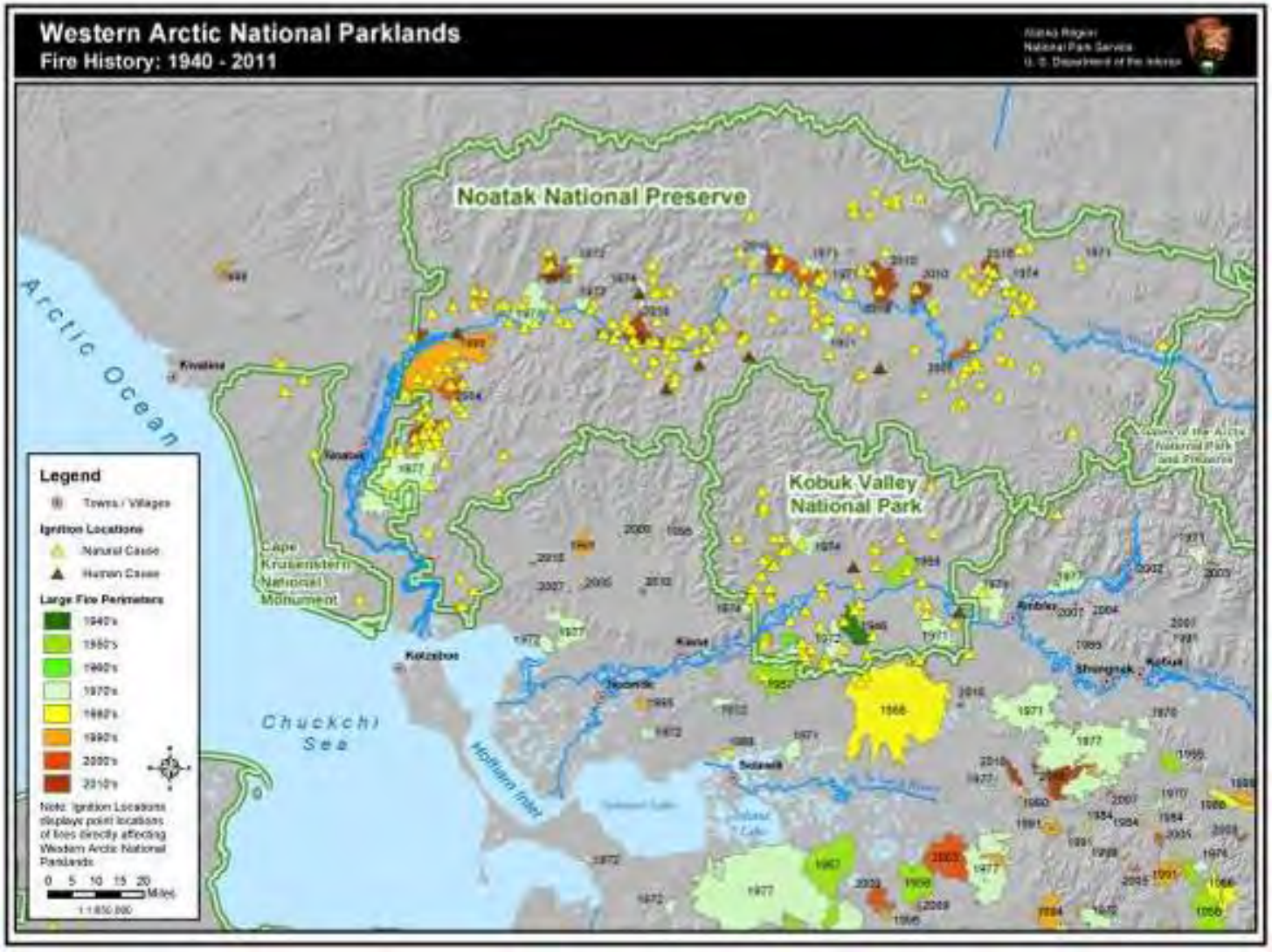

Figure 3.26. Western Arctic National Parklands Fire History

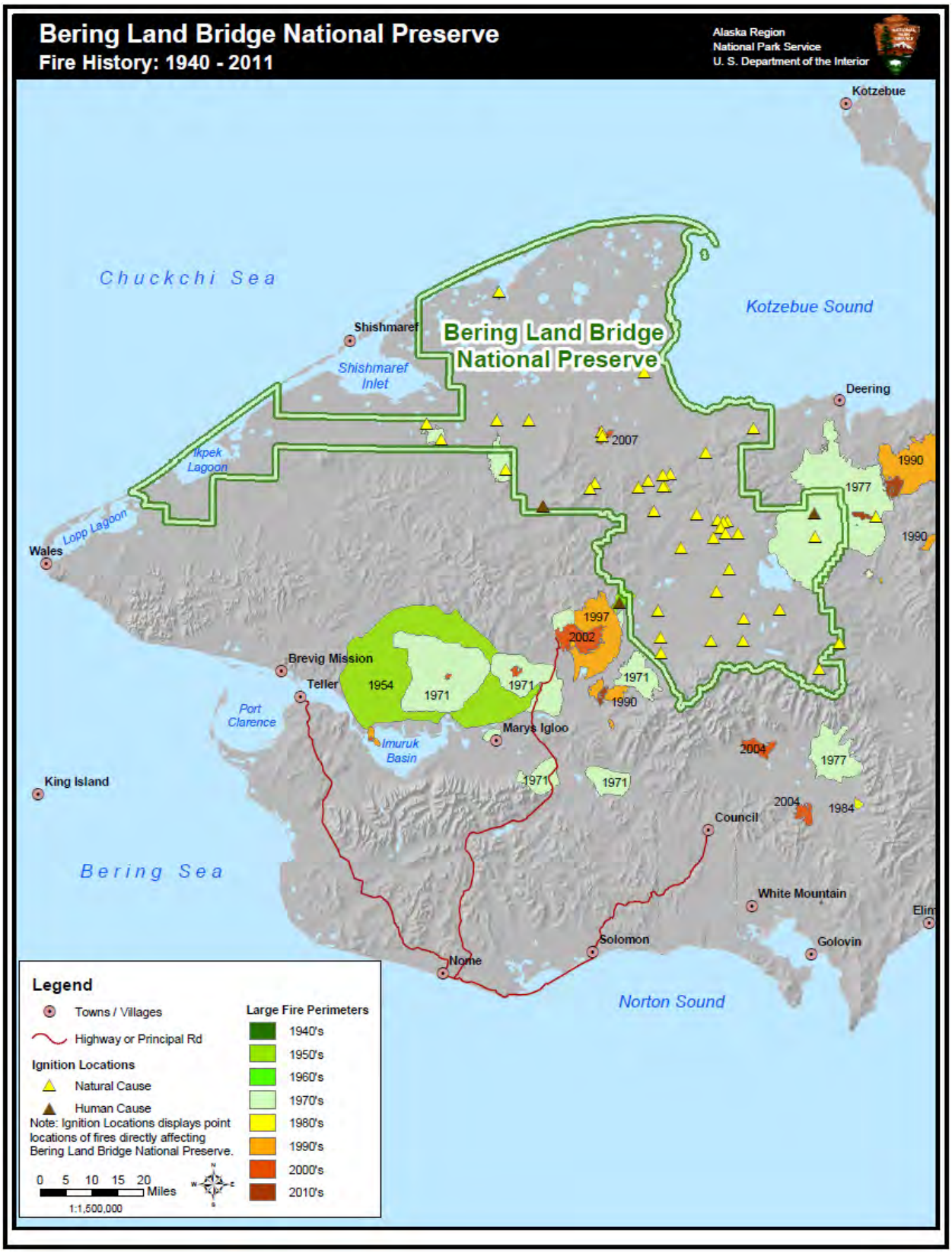

Figure 3.27. Bering Land Bridge National Preserve Fire History

Invasive plants are defined as non-native plant species whose introduction does or is likely to cause economic or environmental harm or harm to human health. Wildfire is a natural disturbance that provides habitat for invasive species.

Lichen growth on caribou antlers represent a special relationship noted in Alaska park areas. There is a distinct assemblage of lichens that colonizes older shed caribou antlers (Thomson 1984, Thomson 1988). These communities are very pronounced in the arctic parks (BELA, CAKR, GAAR, KOVA, NOAT). Lichens in general are destroyed by fire.

3.8.9. 1 Fire History

GAAR Fire History

The fire history of GAAR is shown in Figure 3.21. An annual average of 4,315 acres per year burns in GAAR and a total of roughly 626,525 acres have burned within and immediately around the park unit over the last 55 years. Climate, terrain, and vegetation strongly influence the occurrence and extent of fires in GAAR where both the boreal forest and tundra ecosystems are subject to periodic fires.

In Table 3.8, summary information is presented for; 1) fires that occurred only within the park boundary (designated "In Park") and 2) fires that have burned in the park, but were not limited to the area within the park boundary (designated "Affecting Park"). Most fire activity data is based on NPS fire records from 1950–2012 fires (Fire-NPS Alaska 2012, Alaska Regional Office (AKRO) Geographic Information System (GIS) permanent data set). Lightning strike data is from the Alaska Interagency Center (AICC) ARCIMS web page (AICC 2012).

In GAAR, thunderstorm activity, accompanied by high temperatures and low precipitation, is common during June and July. This combination of weather factors is conducive to both fire starts and continued fire activity. It follows that the vast majority of fire starts and fire activity in this region occur in June and July.

The most frequent and largest fires on record have occurred in the forested portions of Gates of the Arctic; a large proportion of these are located in the Kobuk Preserve of GAAR, also referred to as the southwestern 'boot' of the park. The 'boot' is situated at the northernmost belt of interior Alaska, just south of the Arctic Circle. The primary vegetation types in this area are black and white spruce forests; two of the more fire prone vegetation types in interior Alaska. Highly flammable spruce lichen woodlands and spruce feathermoss forest types are particularly common in the 'boot' area. Although fires are most frequent in the forested 'boot' of GAAR they also occur less frequently in alpine and lowland tundra.

The southern foothills of the Brooks Range, including the Kobuk Preserve, have been continuously dominated by black spruce boreal forest for the last ~5000 years (Higuerra et al 2009). A recent study based on lake sediment core records from this area suggests a mean fire return interval of 145 years (range 130-160; Higuerra et al 2011).

Table 3.8. Fire statistics for fires that have burned in and around GAAR from 1950–2012

Statistic	Total GAAR
Number of Fires Affecting Park 1950–2012 (Fire-NPS Alaska 2012)	166
Number of Fires Started in Park 1950–2012 (Fire-NPS Alaska 2012)	152
Total Acres Burned - Affecting Park 1950–2012 (Fire-NPS Alaska 2012)	631,279
Total NPS Acres Burned *	278,772
Average Area Burned/Year Affecting Park (1950-2012)	10,181
Average Area Burned/Year NPS acres in Parks*)	4,496
Average Fire Size Affecting Park 1950–2012	3,803
Fire Cycle (years)*—number of years estimated to burn entire park area	1,884
Average number of lightning strikes/year (1986-2012)	1,174
Park Acreage	8,472,199

* Data based on acres from fire perimeter data set 1950–2012 clipped to park boundaries.

GAAR includes a substantial amount of altitudinal and latitudinal boreal forest to tundra transition zone, commonly referred to as treeline. In the park, and in the Brooks Range in general, highly flammable black spruce are largely absent from treeline communities, which are dominated by white spruce.

Fires are infrequent in the northernmost two-thirds of GAAR due to the lack of fuels associated with the barren or sparse alpine tundra on the Brooks Range and the increased precipitation from the arctic coastal influence of the North Slope.

KATM Fire History

The fire history of KATM is shown in Figure 3.22**Error! Reference source not found.** Fire plays a less significant role in costal parks, such as Katmai, than it does in the Alaskan interior. Although the majority of the park does contain vegetation that is certainly capable of supporting fire, weather patterns during most years keep summers in the region wet and cool. The weather regime keeps convective storms infrequent and thus a low percentage of lightening ignitions occur. Fire occurrence, although rare, does exist as seen from historic fire data. In fact when weather parameters permit, the potential for large fire growth does exist within the park/preserve.

The majority of wildland fires have historically been human-caused; these fires can happen any time conditions and human activity (burning trash, accidents, camp fires, etc.) occur, and are independent of seasonality of weather regimes. In spite of cooler, wetter conditions, fires do occur, and can mostly be attributed to human activities.

Obvious vegetative changes have been occurring in Katmai in the relatively recent past, which could have a direct effect on fire's future role in the park. Spruce beetle kill at present has affected some 70,000 acres within Katmai's Lake Country (NPS 2012c). Current research on spruce bark beetle is being conducted by the NPS SWAN Inventory and Monitoring program and will provide detailed findings to fire and resource managers regarding the health of spruce communities within Katmai. Additionally the significant die-off of alder communities has affected another 66,000 acres also concentrated in the lakes region west of the Aleutians (NPS 2012c). The die off of both species is seen to be a natural part of ecological change, although climatic stress is being investigated as a partial culprit.

Based on fire modeling, changes can be anticipated over time. With the death of the overstory, presumably biomass added to the forest floor will, for a brief period of time, increase the fuel loading as well as expected species composition change. When fire weather patterns do occur in the region, these fuels coupled with local wind events have the potential to lead to rapid large fire growth.

In Table 3.9, summary information is presented for; 1) fires that occurred only within the park boundary (designated "In Park") and 2) fires that have burned in the park, but were not limited to the area within the park boundary (designated "Affecting Park"). Most fire activity data is based on NPS fire records from 1950–2012 fires (Fire-NPS Alaska 2012, AKRO GIS permanent data set). Lightning strike data is from AICC ARCIMS web page.

LACL Fire History

The fire history of LACL is shown in Figure 3.23. Fires are infrequent occurrences in the eastern two thirds of the Park/Preserve due to the presence of the Chigmit and Neacola mountain ranges and the maritime coastal influence of Cook Inlet. The western third of LACL, however, lies on the edge of Interior Alaska, where fire plays a critical role in ecosystem sustainability. Large, high-intensity fires remain a frequent occurrence. Alaska fire management personnel feel that the fire regime of LACL is relatively unchanged from its condition prior to the development of organized suppression efforts. This opinion is based upon the recognition that large fires continue to occur and the fact that the length of time that suppression activities have occurred is less than the predicted return interval for fires in LACL. The probability exists that an area where a fire was suppressed will burn within the return interval.

In Table 3.10, summary information is presented for; 1) fires that occurred only within the park boundary (designated "In Park") and 2) fires that have burned in the park, but were not limited to the area within the park boundary (designated "Affecting Park"). Most fire activity data is based on NPS fire records from 1950–2012 fires (Fire-NPS Alaska 2012, AKRO GIS permanent data set). Lightning strike data is from AICC ARCIMS web page (AICC 2012).

Table 3.9. Fire statistics for fires that have burned in and around KATM from 1950–2012

Statistic	Total KATM
Number of Fires Affecting Park 1950–2012 (Fire-NPS Alaska 2012)	15
Number of Fires Started in Park 1950–2012 (Fire-NPS Alaska 2012)	15
Total Acres Burned—Affecting Park 1950-2012 (Fire-NPS Alaska 2012)	1,338
Total NPS Acres Burned *	1,325
Average Area Burned/Year Affecting Park (1950–2012)	22
Average Area Burned/Year NPS acres in Parks*	21
Average Fire Size Affecting Park 1950-2012	89
Fire Cycle (years)*—number of years estimated to burn entire park area	194,902
Average number of lightning strikes/year (1986–2012)	34
Park Acreage	4,029,961

* Data based on acres from fire perimeter data set 1950–2012 clipped to park boundaries.

Table 3.10. Fire statistics for fires that have burned in and around LACL from 1950–2012

Statistic	Total LACL
Number of Fires Affecting Park 1950–2012 (Fire-NPS Alaska 2012)	27
Number of Fires Started in Park 1950–2012 (Fire-NPS Alaska 2012)	27
Total Acres Burned—Affecting Park 1950–2012 (Fire-NPS Alaska 2012)	13,369
Total NPS Acres Burned*	10,099
Average Area Burned/Year Affecting Park (1950–2012)	216
Average Area Burned/Year NPS acres in Parks*	163
Average Fire Size Affecting Park 1950–2012	495
Fire Cycle (years)*—number of years estimated to burn entire park area	24,733
Average number of lightning strikes/year (1986–2012)	121
Park Acreage	4,031,439

* Data based on acres from fire perimeter data set 1950–2012 clipped to park boundaries.

WRST Fire History

The fire history of WRST is shown in Figure 3.24.**Error! Reference source not found.** Investigation of fire extent and regime in and near Wrangell-St. Elias National Park and Preserve has been fairly well studied relative to other Alaska parks.

In Table 3.11, summary information is presented for; 1) fires that occurred only within the park boundary (designated "In Park") and 2) fires that have burned in the park, but were not limited to the area within the park boundary (designated "Affecting Park"). Most fire activity data is based on NPS fire records from 1950–2012 fires (Fire-NPS Alaska 2012, AKRO GIS permanent data set). Lightning strike data is from AICC ARCIMS web page (AICC 2012).

Table 3.11. Fire statistics for fires that have burned in and around WRST from 1950–2012

Statistic	Total WRST
Number of Fires Affecting Park 1950–2012 (Fire-NPS Alaska 2012)	92
Number of Fires Started in Park 1950–2012 (Fire-NPS Alaska 2012)	91
Total Acres Burned - Affecting Park 1950–2012 (Fire-NPS Alaska 2012)	121,407
Total NPS Acres Burned 1950–2012 *	74,998
Average Area Burned/Year Affecting Park (1950–2012)	1,958
Average Area Burned/Year NPS acres in Parks* (1950–2012)	1,210
Average Fire Size Affecting Park 1950-2012	1,305
Fire Cycle (years)*—number of years estimated to burn entire park area (1950-2012)	10,893
Average number of lightning strikes/year (1986–2012)	607
Park Acreage	13,180,493

* Data based on acres from fire perimeter data set 1950–2012 clipped to park boundaries.

Fire records indicate that 72% of fires in WRST are the product of human activity, and the remaining 28% are lightning-caused. It is important to note that although the proportion of lightning caused fire starts is small, lightning-caused fires lead to >90% of the total area burned. The 1986-2008 lightning strike dataset (AICC 2010) indicates that within the WRST boundaries, and within a 100 mile wide buffer around WRST, the four highest lightning strike years have occurred within the past decade, including 2001, 2004, 2005, and 2007.

Fire records of recent history (1940–2009) indicate that the fire extent in WRST is low, relative to interior areas of Alaska. However, several large fires have occurred in WRST,

particularly the 2009 Chakina Fire, which burned 56,413 acres; more than double the area burned in WRST between 1942 and 2008.

YUCH Fire History

The fire history of YUCH is shown in Figure 3.25. In Table 3.14, summary information is presented for; 1) fires that occurred only within the park boundary (designated "In Park") and 2) fires that have burned in the park, but were not limited to the area within the park boundary (designated "Affecting Park"). Most fire activity data is based on NPS fire records from 1950–2012 fires (Fire-NPS Alaska 2012, AKRO GIS permanent data set). Lightning strike data is from AICC ARCIMS web page (AICC 2012).

Table 3.12.Fire statistics for fires that have burned in and around YUCH from 1950–2012

Statistic	Total YUCH
Number of Fires Affecting Park 1950–2012 (Fire-NPS Alaska 2012)	187
Number of Fires Started in Park 1950–2012 (Fire-NPS Alaska 2012)	175
Total Acres Burned—Affecting Park 1950–2012 (Fire-NPS Alaska 2012)	1,835,356
Total NPS Acres Burned 1950–2012*	1,226,707
Average Area Burned/Year Affecting Park (1950–2012)	29,603
Average Area Burned/Year NPS acres in Parks*	19,785
Average Fire Size Affecting Park 1950–2012	9,921
Fire Cycle (years)*—number of years estimated to burn entire park area	127
Average number of lightning strikes/year (1986–2012)	934
Park Acreage	2,520,891

*Data based on acres from fire perimeter data set 1950-2012 clipped to park boundaries.

Fire records indicate that approximately 964,785 or 44% of the consumable acres within YUCH have been burned. A total of 157 of the 167 incidents, or 94%, in which YUCH acres were consumed, may be attributed to lightning.

WEAR Fire History

The fire history of WEAR is shown in Figure 3.26 and Figure 3.27 (BELA). The subarctic boreal forests and low arctic tundra biomes in WEAR are subject to periodic fires. Over the last 55 years, greater than 1,248,506 acres have burned within and around the WEAR park units. An annual average of 13,397 acres burn per year just on NPS lands, 97% of which are caused by lightening (data from 1956–2012). In Table 3.15, data is shown for both 1) fires that occurred only within park boundaries ("In Park") and 2)

fires that have burned in the park boundaries, although not all acres are contained within the administrative boundary of the units ("Affecting Park"). Most fire data provided in the table is based on NPS fire records from 1950–2012 fires (Fire-NPS Alaska 2012, AKRO GIS permanent data set). The area burned within park boundaries is based on fire perimeter data. Lightning strike data is from AICC ARCIMS web page (AICC 2012).

Within NOAT, the lowlands of the Noatak Valley are subject to periodic large fires and frequent small fires from late May until early August. Fires commonly occur in shrub-tussock tundra, sedge/graminoid lowlands, and shrub thickets of dwarf birch/ericaceous, alder (*Alnus crispa*) or willow (*Salix spp*). Of all the parks in WEAR, Noatak has burned the most acreage and greatest number of fires over the last 55 years. Recent studies indicate that over the past 2000 years in Noatak, the fire return interval has ranged from a median of 150 years down valley to 195 years up valley in the Noatak drainage (Hu et al. 2010). However, Joly and others reported a fire cycle of 1,237 years for the preserve, based on fire perimeter records from 1950–2007. *Fire cycle* is defined as the length of time for an area equal to the entire area of interest to burn. More than 95% of Noatak's fires are caused by lightning. When ignitions are accompanied by dry windy conditions, fires in the shrub-tussock tundra and low shrub birch/ericaceous can spread rapidly and burn thousands of acres in a few days.

KOVA is in the transition zone between the interior Alaska forests and northern and western tundra. KOVA has the greatest amount of forested lands within the WEAR parks, with a majority of the needleleaf forest mapped as white spruce. Fires are most frequent in lower elevation forests south of the Baird Mountains within open and woodland spruce forests. Ninety two percent of starts occur between June and July. As is typical of boreal forest fires, the fires tend to have longer duration than tundra fires. No studies have been completed on the fire return intervals within KOVA. Fire cycles based on fire perimeters from 1950–2007 indicate that the fire cycle for Kobuk Valley is 840 years (Joly et al. 2010).

BELA is located on the northern part of the Seward Peninsula. This area is a cold, wind-swept landmass jutting out into the Bering Sea. Vegetation is primarily composed of sedge tussocks and varying densities of dwarf birch with scattered stringers of willows along riparian areas and moister upland sites. These vegetation communities are susceptible to fire, but low frequency of lightning and/or higher precipitation near coastal areas reduce the number of fires within BELA. The majority of acres burned within the preserve occurred during 1977, in which several large fires burned within and around the Preserve. Fire return intervals are not known for the preserve, however fire cycles based on fire perimeters from 1950–2007 indicate that the fire cycle for Bering Land Bridge is approximately 1,188 years (Joly et al. 2010)

Table 3.13. Fire statistics for fires that have burned in and around WEAR from 1956–2012

Statistic	BELA	CAKR	KOVA	NOAT	Total WEAR
Number of Fires Affecting Parks (Fire-NPS Alaska 2012)	45	4	68	211	327
Number of Fires Started in Park (Fire-NPS Alaska 2012)	42	3	63	209	317
Total Acres Burned—Affecting Parks (Fire-NPS Alaska 2012)	292,387	4,277	425,243	609753	1,331,958
Total NPS Acres Burned 1950–2012*	138,361	893	122,052	534,220	795,526
Average Area Burned/Year Affecting Park (1950–2012)	4,716	69	6,859	9,622	21,266
Average Area Burned/Year NPS acres in Parks*	2,232	14	1,969	8,616	12,831
Average Fire Size (Acres) Affecting Park (1950–2012)	6,497	1,069	6,254	2,841	16,661
Fire Cycle (years)*—number of years estimated to burn entire park area	1,248	47,146	889	762	—
Average number of lightning strikes/year (1986–2012)	46	12	146	399	603
Park Acreage	2,785,901	660,043	1,751,646	6,568,645	1,384,343

* Data based on acres from fire perimeter data set 1950–2012 clipped to park boundaries.

CAKR is dominated by moist dwarf shrub-tussock tundra. The number of fires in CAKR is much lower than the other park units due to the wet maritime conditions and lack of

ignition sources. Only approximately four fires have been detected in CAKR over the past 50 years. Likewise, Joly and others found that the fire cycle for Cape Krusenstern was estimated at 53,349 years. No studies have been completed on the fire return intervals within CAKR.

3.8.9.2 Climate Change

Climate change can have substantial impacts on the entire ecosystem, including wildfires (Sousanes 2006). Data from climate normal (30 year averages, 1971 to 2000) indicate that average annual and seasonal temperatures are increasing across the state. The average mean annual temperature statewide increased by 3.0 degrees Fahrenheit (F) between 1949 and 2012 (Alaska Climate National Research Center 2012; http://akclimate.org/ClimTrends/Change/TempChange.html). Due to the size and geographically diverse nature of Alaska, Park units were classified into two bioregions—Alaska Maritime and Transitional and Boreal and Arctic—for discussion of climate change. Projected climate change scenarios that demonstrate the magnitude of change (Δ) (National Park Service 2010f) in the project area are shown in Table 3.14.

Alaska Maritime and Transitional Bioregion
The Park units in the Alaska Maritime and Transitional bioregion include KATM, LACL, and southern portion of WRST. Climate changes in this bioregion include increased annual temperatures with the winter temperature increase ranging from 1.0 to 8.6ºF (Alaska Climate Research Center, Geophysical Institute et al. 2012). Spring and winter temperature increases have resulted in longer growing seasons and shifting plant distributions (Jezierski et al. 2010a). With increasing temperatures, annual and seasonal precipitations are predicted to increase from 7 to 13% in summer months and 7 to 26% in winter months (Jezierski et al. 2010a). However, summer and fall seasons are predicted to be drier due to the increased evapotranspiration from temperature increases and longer growing seasons (Rupp and Loya 2009a, b, and c).

Boreal and Arctic Bioregion
The Park units in the Boreal and arctic bioregion include WEAR, GAAR, YUCH, and WRST. Climate changes in this bioregion include increased annual and season temperatures, especially in spring and winter, which results in longer growing seasons, earlier spring budding, and increased number of snow- and frost-free days (Jezierski et al. 2010b). The average mean annual temperature for Park units in interior Alaska—YUCH and WRST—are predicted to increase up to 8.0 degrees F by 2080 with average annual precipitation increasing by 27% in YUCH and 10% in WRST (Loya et al. 2011). The average mean annual temperature in Arctic Alaska—WEAR and GAAR—are predicted to increase 3 to 5 times in the winter months by 2091 (Jezierski et al. 2010b). In this bioregion, annual precipitation is predicted to increase from 12 to 33% in the summer and 25 to 65% in the winter (Jezierski et al. 2010b). As with the Alaska Maritime and Transitional bioregion summer and fall seasons are predicted to be drier (Rupp and Loya 2009c, d, e, f, g, h, i). The mean number of frost days in the Boreal and Arctic bioregion are predicted to decrease between 20 and 40 days per year by the end of the 21st century, as compared with trends from 1961 to 1990 (Meehl et al. 2004). A reduction in density

and abundance of forbs, lichens, and mosses, and a northward shift of shrubs and forested areas, particularly evergreen forests is likely with continued warmer temperatures and increased precipitation (Kaplan et al. 2003).

Table 3.14. Magnitude of Projected Climate Change in Project Area

Projected Temperature (TEMP) Change (°F)			Projected Precipitation (PRCP Change (inches)		
Season	Time	TEMP	Season	Time	% Δ PRCP
Bering Land Bridge National Preserve					
Annual	2040	5.6	Annual	2040	24%
	2080	10.3		2080	46%
Cape Krusenstern National Monument					
Annual	2040	5.8	Annual	2040	20%
	2080	10.5		2080	38%
Gates of the Arctic National Park and Preserve					
Annual	2040	5.5	Annual	2040	15%
	2080	10.0		2080	24%
Katmai National Park and Preserve					
Annual	2040	4.6	Annual	2040	12%
	2080	8.0		2080	19%
Kobuk Valley National Park					
Annual	2040	5.7	Annual	2040	14%
	2080	10.1		2080	24%
Lake Clark National Park and Preserve					
Annual	2040	4.6	Annual	2040	9%
	2080	8.1		2080	76%
Notak National Preserve					
Annual	2040	5.8	Annual	2040	15%
	2080	10.3		2080	25%
Wrangell-St. Elias National Park and Preserve					
Annual	2040	3.8	Annual	2040	6%
	2080	7.1		2080	10%
Yukon-Charley Rivers National Preserve					
Annual	2040	4.6	Annual	2040	17%
	2080	8.4		2080	27%

Disturbances

Wildfires in Alaska have increased in frequency, size and severity; however, the data is insufficient to determine if the increase in frequency of large fires is due to climate change or natural variability (Kasichke et al. 2003). More large fires have occurred between 1961–2000 than in the preceding 20 years. Fires are occurring later in the season when the duff layers are drier resulting in deeper burning that shifts vegetation from coniferous to deciduous forest types (National Park Service 2012). Increased fire severity

and frequency reduces the quantity of lichen forage for 50–160 years after a fire (Holt et al. 2006). For both bioregions, wildfires are predicted to have a 22% increase due to increased vegetation flammability and the expansion of forested areas (Dale et al. 2001, Rupp et al. 2000).

Higher temperatures and lack of moisture stress forests, which enhances expansion of exotic insects and plant diseases and susceptibility to wildfires (Juday et al. 2004, Berg et al. 2006). Spruce mortality from bark beetles in south central Alaska is one of the largest ever documented insect outbreaks in North America (Juday 1998, Berg et al. 2006). Continued increase of temperatures will likely result in high levels of endemic spruce beetles that have the capability of perennially thinning forests as soon as size susceptible trees are present (greater than 3.9 inches in diameter; Berg et al. 2006).

Distribution of the spruce budworm (*Choristo-neura fumeriina*), a defoliating insect of white spruce, has expanded north and could continue expanding northward reaching the Boreal and Arctic bioregion with continued warmer temperatures (Juday 1998; Juday et al. 2004).

The plant disease, *Armillaria*, causes root disease in forest trees resulting in mortality or reduced growth. In temperate conifer forests, this species causes mortality throughout a stand's life (Shaw and Kile 1991). Warmer and wetter climates pose a moderate risk for increased damage to trees from this species (Kleijunas 2011).

3.9 Wilderness

The Wilderness Act and ANILCA require the NPS to preserve the wilderness character in designated wilderness areas. The NPS focuses on four "qualities" of wilderness character that are tangible and directly link stewardship decisions to the language of the 1964 Wilderness Act. These qualities are natural, solitude or primitive and unconfined recreation, undeveloped, and untrammeled. NPS Management Policies (NPS 2006, Section 6.3) require the Service to take no action that would diminish the wilderness eligibility of an area possessing wilderness characteristics until the legislative process of wilderness designation for the area has been completed.

Untrammeled means that wilderness is essentially unhindered and free from the *actions* of modern human control or manipulation.

Natural means that ecological systems are substantially free from the *effects* of modern civilization.

Undeveloped means an area that retains its primeval character and influence without permanent improvement or human habitation where man is a visitor who does not remain.

Solitude or primitive and unconfined recreation means opportunities for remoteness from sights and sounds of humans where there are few or no facilities that decrease self-reliant recreation.

The Alaska parklands tend to epitomize the natural and untrammeled qualities of wilderness character. Ecological systems are not intentionally modified by the actions of management, and parks generally resist manipulation of ecosystem components. Isolation, geography, and weather associated with Alaska parklands make human influence difficult. They contain robust intact ecosystems that play out their evolving adaptations and patterns.

ANILCA provides a number of special provisions that modify the Wilderness Act. These special provisions include

- the continuation of subsistence activities.
- the use of snow machines, motorboats, and other means of surface transportation traditionally employed for subsistence purposes.
- the use of snow machines (during periods of adequate snow cover, or frozen river conditions in the case of wild and scenic rivers), 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 home sites.
- adequate and feasible access to inholdings, maintenance and use of certain existing structures and development of new structures under certain circumstances (for example, new public use cabins and shelters are allowed if such cabins and shelters are necessary for the protection of the public health and safety. It also allows for temporary use of campsites, tent platforms, shelters, and other temporary facilities and equipment directly and necessarily related to the taking of fish and wildlife).

There are no special provisions for motorized access for administrative activities; administrative activities that propose a Wilderness Act 4(c) prohibition are subject to a minimum requirements analysis.

Designated wilderness areas are shown in the following figures: GAAR (Figure 3.28**Error! Reference source not found.**), KATM (Figure 3.29), LACL (Figure 3.30), WRST (Figure 3.31), and WEAR (Figure 3.32). There are no designated wilderness areas in YUCH or BELA.

An additional 18 million acres are considered eligible for wilderness designation by the Congress based on the wilderness suitability reviews conducted in compliance with ANILCA section 1317(a) and included in the park General Management Plans published in the mid 1980's. The full wilderness review process required under ANILCA section 1317(b) has not yet been completed on those eligible lands. Although EISs were completed there was no final action taken in the Secretary of the Interior's office and no

record of decision was published in the Federal Register. This leaves the entire Alaska eligible wilderness acreage managed under NPS policies that protect wilderness character until Congress can act.

3.10 Wildlife/Habitat

Wildlife species have been summarized in eleven animal categories in parks; these are amphibians, bats, furbearers, game birds, large mammals, raptors (hunting birds), seabirds, shorebirds, small mammals, songbirds, and waterfowl (Table 3.15). Complete species lists for these parks may be obtained through NPSpecies (http://science.nature.nps.gov/im/apps/npspp/index.cfm; NPS 2012a). Important avian breeding seasons as defined by the USFWS are located in Appendix E; all vegetation removal and prescribed burns would avoid these periods to minimize impacts to avian wildlife. Breeding and rearing seasons for amphibians, wood frog and boreal toad, late April to early May and July to August, respectively (Pyare et al. 2005, Alaska Game and Fish 2008).

Table 3.15. Vertebrate Terrestrial Wildlife by Alaska National Park Unit and Animal Category

Park	Amphi-bian	Bat	Fur-bearer	Large Mammal	Small Mammal	Upland Game Birds	Raptorial Birds	Sea-birds	Shore-birds	Song-birds	Water-fowl
BELA			10	4	14	2	16	12	22	65	33
CAKR			10	5	17	3	17	9	21	63	29
GAAR	1		11	7	20	3	22		16	65	24
KATM	1	1	10	5	19	4	21	16	22	78	34
KOVA	1		11	7	19	3	21		16	61	23
LACL	1	1	10	6	20	4	22	9	27	72	34
NOAT	1		10	7	18	3	21		20	67	24
WRST	2	1	9	8	21	6	25	22	30	104	40
YUCH	1		9	6	22	6	20		21	92	28

3.10.1 GAAR Wildlife and Habitat

Many birds that migrate to the park breed in the mountains—a dominant feature that covers more than 50% of the park. These montane birds include song birds (passerines, e.g. robins), near-passerines (e.g. woodpeckers), birds of prey (raptors, e.g. golden-eagle), and heavy-bodied, ground-feeding birds (galliformes, e.g. ptarmigan). Several species have a large part of their breeding range within the park. The northern wheatear, American pipit, gray-crowned rosy finch, and Smith's longspur, breed exclusively in montane habitats. Only a few birds live in the park all year such as ravens, chickadees, American dippers, and ptarmigan.

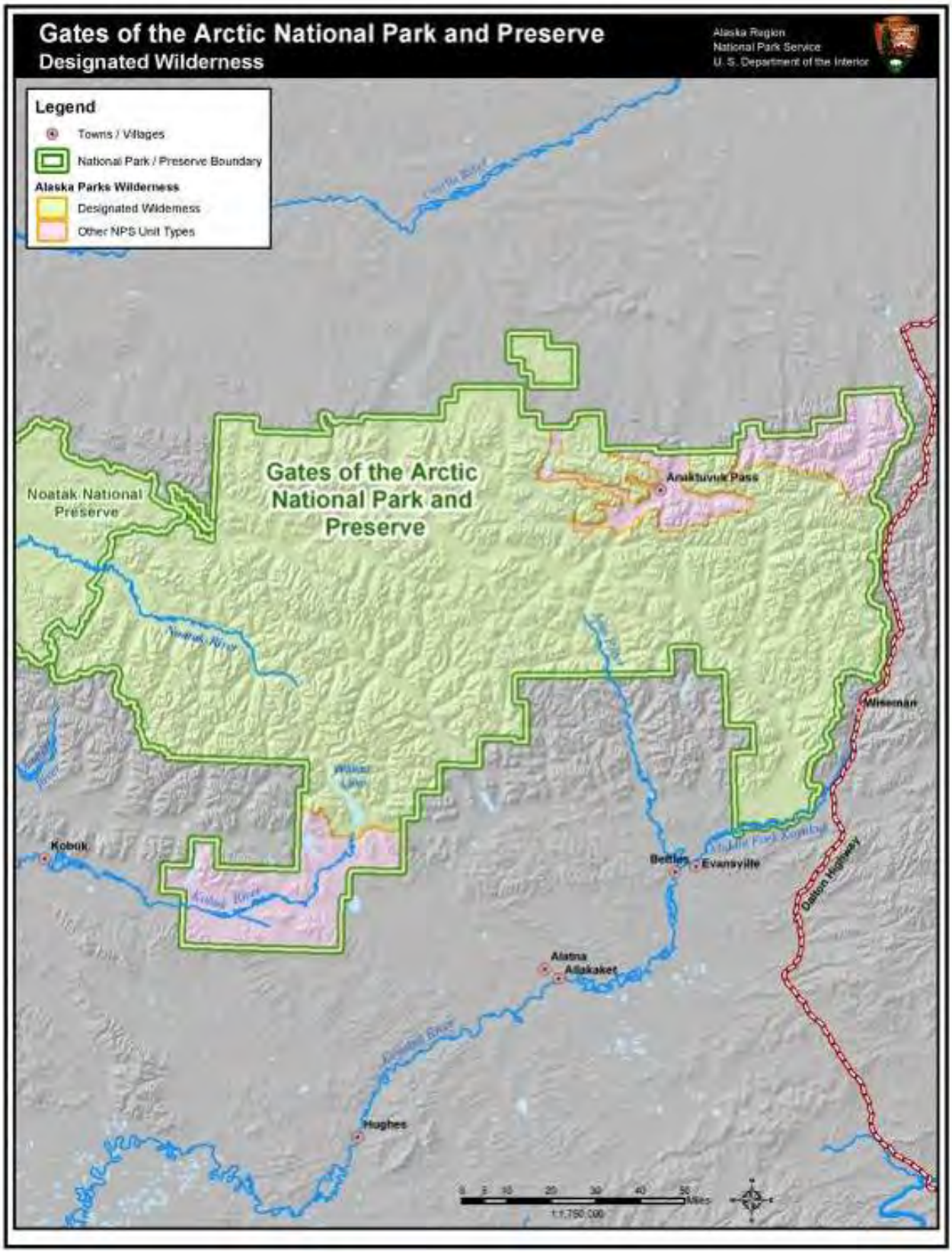

Figure 3.28. Gates of the Arctic National Park and Preserve Designated Wilderness

Figure 3.29. Katmai National Park and Preserve Designated Wilderness

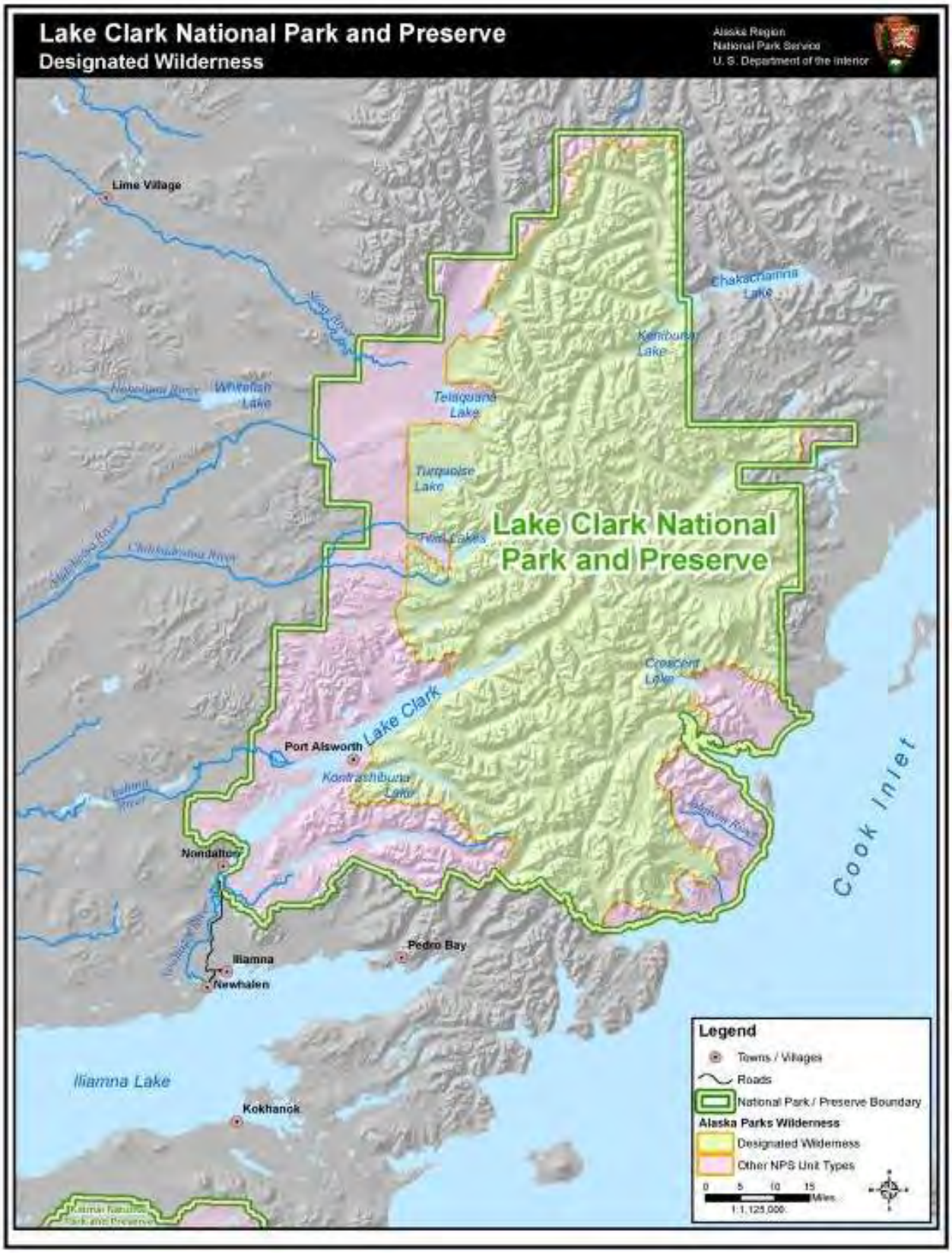

Figure 3.30. Lake Clark National Park and Preserve Designated Wilderness

Figure 3.31. Wrangell-St. Elias National Park and Preserve Designated Wilderness

Figure 3.32. Western Arctic National Parklands Designated Wilderness

3.10.2 KATM Wildlife and Habitat

KATM was created to "protect habitats for, and populations of fish and wildlife including, but not limited to, high concentrations of brown/grizzly bears and their denning areas" according to the Alaska National Interest Lands Conservation Act of 1980. The park and preserve include one of the largest protected populations of brown bears in the world (NPS 2009).

Besides brown bear, Katmai provides a protected home to moose, caribou, red fox, wolf, lynx, wolverine, river otter, mink, marten, weasel, porcupine, snowshoe hare, red squirrel, and beaver. Marine mammals include; sea lions, sea otters, and hair seals. Beluga, killer, and gray whales can also be seen along the coast of the park.

Brown bears and moose live throughout the coastal and lake regions of Katmai National Park and Preserve. The moose feed on willows, water plants, and grasses. Other mammals include caribou, red fox, wolf, lynx, wolverine, river otter, mink, marten, weasel, porcupine, snowshoe hare, red squirrel, and beaver. Along the coast are sea lions, sea otters, and hair seals, porpoise, with beluga, killer, and gray whales sometimes using the Shelikof Strait.

In an avian inventory of montane regions of KATM conducted in 2004-2006, 92 species were detected. The most commonly detected species were the Golden-crowned sparrow (*Zonotrichia atricapilla*), Fox Sparrow (*Passarella iliaca*) and American Pipit (*Anthus rubescens*; Ruthrauff et al. 2007).

3.10.3 LACL Wildlife and Habitat

Black bears are present throughout the park and preserve except at higher elevations. Brown (grizzly) bears occur in all habitats, but the area along the park's Cook Inlet coast supports the most sizable concentrations. Caribou remain primarily in the hills around Turquoise, Twin and Snipe lakes and westward to the Bonanza hills. Moose, the largest members of the deer family, are found below timberline throughout the park. Dall Sheep range at higher elevations all along the western flank of the Chigmit Mountains.

Lake Clark is also home to many less conspicuous mammals. Coyotes are found in grassy as well as brushy or boulder-strewn areas of the park. Wolves are primarily in the park's mountainous areas, generally below 5,000 feet in coniferous forests, and in open tundra. Both red fox and lynx are found throughout the park at almost any elevation, primarily in coniferous-hardwood forests and open tundra. Other mammals include marten, river otter, wolverine, weasels, mink, hares and beaver.

Both Chinitna Bay and Tuxedni Bay support a variety of marine mammals. Some of these mammals include sea lions, beluga whales, harbor seals and porpoises. Other whales may also be seen occasionally in the area.

Over 125 species of birds are found in the Lake Clark region. In an avian inventory of montane regions of LACL conducted in 2004-2006, 104 species were detected. The most commonly detected species were the Golden-crowned sparrow (*Zonotrichia atricapilla*), Fox Sparrow (*Passarella iliaca*) and American Pipit (*Anthus rubescens*; Ruthrauff et al. 2007).

3.10.4 WRST Wildlife and Habitat

WRST has documented 209 species of birds in the interior regions of the park (Danby 2003, WRST Park files). Breeding bird surveys along the McCarthy and Nabesna roads have recorded the following species: pacific loon, horned grebe, northern shoveler, American wigeon, green-winged teal, mallard, lesser scaup, bufflehead, trumpeter swan, white-winged scoter, Barrow's goldeneye, merlin, willow ptarmigan, common snipe, lesser yellowlegs, Bonaparte's gull, arctic tern, belted kingfisher, downy woodpecker, alder flycatcher, Say's phoebe, violet-green swallow, common raven, black-billed magpie, black-capped chickadee, Swainson's thrush, American robin, varied thrush, blackpoll warbler, myrtle warbler, Wilson's warbler, savannah sparrow, white-crowned sparrow, dark-eyed junco, pine grosbeak, and pine siskin. Additional species include raptors (bald and golden eagle, gyrfalcon, peregrine falcon, sharp-shinned hawk, red tailed hawk, northern harrier, great gray owl, great horned owl, northern hawk owl, boreal owl, and short-eared owl), and galliformes (spruce, ruffed and sharp-tailed grouse; willow, rock, and white-tailed ptarmigan).

Fifty-one species of terrestrial mammals have been recorded in WRST, from the pygmy shrew to the plains bison (Cook and MacDonald 2003, Danby 2003, WRST Park files). Ungulates include moose, bison, caribou, Dall's sheep, and mountain goat. Mule deer have recently expanded into the Chisana area. Carnivores include black and brown bear, wolf, coyote, fox, mustelids (wolverine, marten, ermine, mink, river otter), lynx, and possibly cougar. Rodents include a variety of voles, arctic ground and red tree squirrels, beaver, porcupine, and muskrat. Snowshoe hare are common throughout the lower elevations, and collared pika are found in alpine areas. Little brown bats use hollow trees such as trees killed by spruce beetles, as summer roost sites.

One amphibian, the wood frog, is found in the study area, and is common along Nabesna and McCarthy roads. The boreal toad is found only in the coastal areas of WRST.

The primary wildlife habitat types associated with areas potentially subject to treatment include: low elevation river corridors; spruce-dominated boreal forests along roadways and low elevation airstrips; scrub-shrub vegetation along mid-elevation airstrips; and tussock/tundra vegetation along parts of the Nabesna Road and higher elevation airstrips. River corridors provide important foraging and breeding habitat for numerous passerine bird species, bald eagle, trumpeter swan, moose, bison, caribou, coyote, wolf, beaver, and black and brown bear. The boreal forests provide habitat for numerous passerines; ruffed, sharp-tailed and spruce grouse; moose; coyote; wolf; black and brown bear; wolverine; marten; snowshoe hare; lynx; microtine rodents (esp. red-backed vole); red squirrels, porcupine, and wood frogs. Road corridors and maintained airstrips in this habitat

provide important grit sources for spruce, ruffed, and sharp-tailed grouse, which are commonly found along roadways ingesting grit for aid in digestion. Additionally, willows associated with disturbance along roadsides are sometimes heavily used by snowshoe hares. The scrub-shrub areas occur around timberline, and are comprised mostly of alder, birch and willow thickets. These provide habitat for moose (especially winter), black and brown bears, wolves, coyote, caribou, willow and rock ptarmigan and wolverine. The higher elevation tussock/tundra areas contain caribou, Dall's sheep, brown bear, wolf, wolverine, pika, willow and rock ptarmigan, and Arctic ground squirrel.

3.10.5 YUCH Wildlife and Habitat

Dall sheep are found in several alpine areas. Moose occupy shrublands along streams and other sub-alpine habitats. The Fortymile and Porcupine caribou herds utilize YUCH. Grizzly and black bears range across many habitats. Grizzly bears are most often found in open country. Black bears prefer forests and shrublands. Wolves, primary predators of moose, range widely. The Yukon valley is a primary migrator corridor for waterfowl that summer in the Yukon flats. Raptors found in YUCH include bald and golden eagles, rough-legged hawks, and gyrfalcons. YUCH is home to the largest nesting habitat of American Peregrine Falcons in all of North America. During a 2 year inventory 1999-2000, the most commonly detected avian species by count were Dark-eyed Junco, White-crowned Sparrow, Yellow-rumped Warbler, Swainson's Thrush, Varied Thrush, Common Redpoll, and White-winged Crossbill, respectively (Swanson and Nigro 2000).

3.10.6 BELA Wildlife and Habitat

More than 170 species of birds migrate as far as 20,000 miles to Bering Land Bridge on a yearly basis to nest at BELA. The Preserve is at the crossroad of the Asiatic-North American flyway. Part of the reason that Bering Land Bridge National Preserve was created was to "protect habitat for internationally significant populations of migratory birds." It is one of the main nesting locations for Yellow-Billed Loons, and numerous other waterfowl. The Preserve also has a large population of terns, sandpipers, plovers and colonies of seabirds. The majority of BELA's passerine birds and raptors are found on the tundra. Grizzlies use river valleys or coastal areas after emerging from their upland dens. Muskoxen, reintroduced to BELA, range widely. Other wildlife found in BELA include caribou, red fox, and beaver. Reindeer grazing allotments are authorized within the Preserve under ANILCA. A private reindeer herd is managed near BELA Preserve in the Wales Community.

3.10.7 CAKR Wildlife and Habitat

Caribou are the most common large mammal. The ones in the monument are part of the Western Artic Caribou herd. The herd, nearly 500,000 animals, ranges over the entire northwest Alaska region. The movement varies substantially from year to year. Moose are most abundant in areas of mixed willow and spruce forest. Grizzly bears are found along streams and shoreline near mountainous terrain. Black bears inhabit the forested

Kobuk drainage. Wolves inhabit major drainages. Dall sheep are present in the Baird and DeLong mountains where they forage on grasses, forbs, lichens and willows. Other mammals present in CAKR include the red fox, arctic fox, snowshoe hare, and arctic hare. Most birds are summer nesters or migrants. The tundra lowlands and wet sedge meadows are important habitat for birds. Bird species include the mallard duck, Canada goose, snow goose, horned and red-necked grebes, and arctic loons. Seabirds present include the common murre, long-tailed jaeger, and arctic tern.

3.10.8 KOVA Wildlife and Habitat

There are approximately 119 bird species, and 32 mammal species known to occur in KOVA. Mammal species include the gray wolf, American mink, wolverine, caribou, moose, brown lemming, Arctic ground squirrel, red squirrel, tundra shrew, singing vole, taiga vole and tundra vole. The largest caribou herd in Alaska, approximately 490,000 animals, travels through this area during its migration.

3.10.9 NOAT Wildlife and Habitat

Thirty-seven mammal species are known or believed to inhabit the Noatak valley. These species include caribou, grizzly bear, moose, Dall's sheep, wolf, fox, lynx, marten, and muskrat, Grizzly bears are found in tundra and shrub associations and riverbanks. Bird species found in NOAT include the golden eagle, northern pintail, rough-legged hawk, osprey, and willow ptarmigan.

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4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This chapter provides an evaluation of the potential impacts of the alternatives (chapter 2.0) on the resources presented in Section 1.3 (Issues).

4.2 Impact Criteria and Assessment

For each issue selected for detailed analysis (see section 1.3) and for which the subject resources are described in chapter 3, the direct, indirect, and cumulative effects are analyzed. The effects to the subject resources are analyzed based on the duration, context, and intensity of the impacts. Summary impact levels (characterized as negligible, minor, moderate, or major) are given for each issue topic in the analyses. Definitions of impact terms are provided below. Table 4-1 presents a summary of impact level thresholds.

Duration:
Temporary: Impacts would last no more than a season, or for the duration of the discreet activity, such as maintenance of a road or trail segment.
Long-Term: Impacts would extend for several years up to the life of the project.
Permanent: Impacts are a permanent change to the resource that would last beyond the life of the project even if the actions causing the impacts were to cease.

Context:
Common: The affected resource is widespread, and is not identified in enabling legislation as important to the park, nor is it rare within or outside the park. The portion of the affected resource impacted by the action does not fill a unique role within the park or its region of the park.
Important: The affected resource is identified by enabling legislation, or is rare either within or outside the park. The portion of the affected resource does not fill a unique role within the park or its region of the park.
Unique: The affected resource is identified by enabling legislation, and the portion of the affected resource uniquely fills a role within the park and its region of the park.

Intensity
Low: A change in resource condition is perceptible, but does not measurably alter the resource function in the park ecosystem, cultural context, or visitor opportunity.
Medium: A change in a resource condition is measurable or observable, and an alteration is detectable to the resource function in the park ecosystem, cultural context, or visitor opportunity.
High: A change in a resource condition is measurable or observable, and an alteration to the resource function in the park ecosystem, cultural context, or visitor opportunity is clearly and consistently observable.

Table 4.1. Impact Levels

Minor	Moderate	Major
Effects would tend to be low intensity and short duration, but common resources may sustain medium intensity and long-term effects.	Effects on common resources would tend to be medium to high intensity and long-term, while important and unique resources would tend to be affected by medium to low intensity and short-term to temporary impacts, respectively.	Effects would tend to be medium to high intensity, long-term to permanent, and affect important to unique resources.

4.2.1 Cumulative Impacts

As defined by NEPA regulations (40 CFR 1508.7), "Cumulative impacts result from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." Cumulative effects on affected resources would be from fire management activities in all the affected parks, ongoing activities other than fire management activities, and future planned developments and activities. Examples of prominent human activities that could impact fire hazardous vegetative fuels activities are noted below.

Cumulative Impacts of Mining: The NPS completed environmental impacts statements in 1990 to address the cumulative effects of mining in Wrangell-St. Elias National Park and Preserve (USDOI-NPS 1990a) and Yukon-Charley Rivers National Preserve (USDOI-NPS 1990b). These documents addressed the acres of mining effects on park resources like aquatic resources, wetlands, wildlife resources, subsistence, recreation and visitor use, visual quality, wilderness resources, cultural resources and local economies.

Katmai National Park and Preserve Brooks Camp Development Concept Plan EIS: This 1996 plan addressed the goal to move the existing Brooks Camp facilities with problems associated with fuel leaks and sewage treatment limitations in an archeological district and high use bear habitat to an upland area with fewer of these issues (NPS 1996). This project has not been implemented due to lack of funding and political reasons, however, the park is planning to move maintenance and fueling functions from the margin of Brooks Lake to the road leading to the Valley of Ten Thousand Smokes.

Gates of the Arctic National Park and Preserve All-Terrain Vehicle for Subsistence Use EIS: The NPS allows ATV access rights on 126,632 acres of park lands and conveys 30,642 acres of park lands in fee to Native Corporations. The non-federal offering provides public access across 148,484 acres of Native Corporation lands, forgoes development rights on 116,949 acres of Native corporation lands, and conveys 38,840 acres to the NPS. About 74,000 acres of Wilderness was de-authorized in GAAR and

57,000 acres were designated in GAAR and another 17,000 acres were added to NOAT Preserve (NPS 1992).

Commercial Lodges and Concession Contracts: There are two commercial lodges operated by Katmailand, Inc. in KATM, which provide lodging, meals, and visitor services that cover about 6 acres. Many other lodges on inholdings surrounded by park lands or on adjacent area lands provide visitor services within parks. In 2006, the NPS issued 106 concession contracts to various providers for recreational guiding, sport hunting and outfitting, recreational equipment rentals, air taxi and air charters, cruise ships, vessel charters, dog sledding, food and lodging, and convenience sales.

Roads: There are six primary roads traversing 149 miles across CAKR, LACL, KATM, and WRST Alaska NPS units. To date approximately 323 miles of off-highway vehicle (OHV) trails traverse the Alaska NPS units covered in this EA (Table 4.2). Most are not being actively managed as OHV trails (such as BELA) and some (i.e., CAKR) are largely on state tide lands.

Airstrips: Five maintained airstrips exist in or are surrounded by Alaska NPS units (Table 4.3). A list of park and Federal Aviation Administration (FAA) identified airstrips is provided below. Many additional seasonal and unofficial landing strips and seaplane landing areas exist throughout the parks in Alaska, which are used by air taxi operators and NPS personnel.

Table 4.2. Miles of OHV Trail by NPS Unit in Alaska

NPS Unit	OHV Trail Miles
BELA*	5.4
CAKR*	49.1
GAAR	22
KATM	0
KOVA*	0
LACL	17
NOAT*	0
WRST	199.6
YUCH	30.7
Total	323.8

*WEAR Park Units

Table 4.3. FAA and NPS Documented Airstrips by NPS Unit

NPS Unit	Location/Name	Runway 1—NPS-Owned 2—Private
GAAR	Anaktuvuk Pass	2
LACL	Port Alsworth	2
LACL	Wilder/Natwick Airstrip at Port Alsworth	2
WRST	Chisana	1
WRST	May Creek	1
WRST	Jakes Bar	
WRST	Young Creek	
WRST	Swift Creek	
WRST	Unnamed (5 mi W. Swift Creek)	
WRST	McCarthy	1
WRST	Glacier Creek	
WRST	Devil's Mountain Lodge	2
WRST	Sportsman's Paradise	2
WRST	Orange Hill	
WRST	Horsefeld	
WRST	Unnamed at Ptarmigan Lake	
YUCH	Coal Creek	1

4.3 Effects to Air Quality

4.3.1 Impacts from Alternative A (No Action)

4.3.1.1 Direct and Indirect Effects of Alternative A on Air Quality

There would be no direct effects on the existing condition of air quality from this alternative because no prescribed burning and mechanical fuels reduction activities would occur. No particulate matter would be produced and visibility would not be impaired. No fugitive dust from mechanical treatments would be produced.

Overall, adverse air quality impacts would be minimal. While fewer direct air quality impacts would occur under the No Action Alternative, adverse indirect air quality impacts over the long term would occur. The absence of management would increase the risk of large and/or severe fires. Fires of this scale are unpredictable, often producing large quantities of smoke over large areas of land and creating ambient air quality that is poor. High, instantaneous volumes of smoke may settle and concentrate, or be blown into sensitive areas, producing adverse impacts to human health and safety. Indirect, local, short-term, minor, adverse effects from emissions would include reduced visibility along roads, and temporary reduction of scenic values.

Wildfires are not planned around other wildfire events or meteorological conditions that would allow for dispersion and transport away from impact zones. Wildfire occurrence without previous fuel reduction is likely to produce two to four times greater particulate matter emissions than would be generated by prescribed fire (Quigley and Arbelbide 1997).

4.3.1.2 Cumulative Effects

Cumulative impacts to air quality in Alaska NPS areas occur from industrial (oil and coal developments and use), dust from transportation corridors, Arctic Haze, remote wilderness fires (including from Russia), and volcanic eruptions. The No Action alternative in combination with the past, present, and foreseeable future actions would result in minor, short-term, adverse, localized cumulative impacts to air quality. Contribution to cumulative air quality impacts resulting from the No Action alternative would have no discernible effect, as most air quality impacts are from other sources.

4.3.1.3 Conclusion

Past and on-going routine maintenance of park roads, wildfires, and ORV trail use could result in moderate, adverse impacts on the regional airshed Under the No Action alternative, adverse impacts to air quality would be local, short-term, no more than moderate and adverse as a result of wildfire and associated suppression activities. The buildup of hazardous fuels near and distant from fire protection points would increase the risk of wildfire events over time, which would result in adverse impacts on air quality.

4.3.2 Impacts from Alternative B: Mechanical Fuels Reduction

4.3.2.1 Direct and Indirect Effects of Alternative B on Air Quality

Air pollutants would be generated by use of gasoline-powered equipment in mechanical fuel reduction projects. The direct adverse effect of these pollutants on air quality, given the small size of the projects and infrequency of activity, would be localized, short-term, generally not measurable, and therefore negligible. The indirect and longer-term adverse impacts would be negligible.

4.3.2.2 Cumulative Effects

Within parks, routine maintenance of park roads, and public recreational activities such as boating, off-road vehicle use, and camp fires could contribute to air quality impacts.

Activities that could contribute to air quality impacts outside the park boundaries include oil and gas operations, public utilities, wildland fires, Arctic Haze, volcanic eruptions, dust from roads, and urbanization that could result in short-term severe air quality impacts from particulates and other pollution which would be up to moderate, adverse impacts on the park or regional airsheds.

Alternative B in combination with the past, present, and foreseeable future actions would result in minor, short-term, adverse, localized additional impacts to air quality from the use of mechanized equipment for access and fuels reduction activities near protection points. Contribution to cumulative air quality impacts resulting from Mechanical Fuels Reduction Alternative B would be minor, because most air quality impacts are from other sources.

4.3.2.3 Conclusion

Under this alternative, impacts to air quality would be local, short-term, minor and adverse as a result of hazardous fuels treatment activities and indirect effects of wildfires.

4.3.3 Impacts from Alternative C: Mechanical Fuels Reduction & Prescribed Fire

4.3.3.1 Direct and Indirect Effects of Alternative C on Air Quality

Direct, minor, adverse, short-term, localized impacts to air quality would occur from particulate matter and smoke produced from prescribed burns. Prescribed fires are planned to be implemented under favorable atmospheric conditions for smoke dispersion. Fugitive dust generated from suppression activities and increased aircraft, motor vehicle, and vehicle traffic associated with fire crews would also temporarily affect air quality. Those impacts are temporary. Smoke, particulate matter, and dust emissions impact visibility in the park and surrounding area. There may be an intermittent and short-term exceedance of air quality standards (especially particulates) resulting in short-term, localized, and negligible to minor adverse impacts to air quality and visibility.

Indirect adverse effects from these air emissions would include reduced visibility along roadways, reductions in recreation values due to visibility limitations, smoke and odors, and possible health effects to sensitive receptors, such as residents and visitors. These adverse indirect effects would be short-term, localized, and minor.

Indirect long-term, beneficial effects would result from a decrease in fuel loading following implementation of prescribed burning. Therefore, there would be a decrease in particulate matter emissions and the impairment of visibility from wildfires when they occur. These beneficial indirect effects would be long-term, localized, and up to moderate.

Air pollutants would be generated by use of gasoline-powered equipment in mechanical and manual fuel reduction projects. The direct adverse effect of these pollutants on air quality, given the small size of the projects and infrequency of activity, would be localized, short-term, and no more than minor. The indirect and longer-term adverse impacts would be negligible.

4.3.3.2 Cumulative Effects

Within parks, routine maintenance of park roads, and public recreational activities such as boating, snowmobiling, airplane use, and camp fires could contribute to air quality impacts.

Activities that could contribute to air quality impacts outside the park boundaries include oil and gas operations, public utilities, prescribed burns, wildland fires, Arctic Haze, volcanic eruptions, dust from roads, and urbanization that could result in short-term severe air quality impacts from particulates and other pollution which would be up to moderate, adverse impacts on the park or regional airsheds.

Alternative C in combination with the past, present, and foreseeable future actions would result in minor to moderate, short-term, adverse, localized cumulative impacts to air quality. Contribution to cumulative air quality impacts resulting from Alternative C would be minor, as most air quality impacts are from other sources.

4.3.3.3 Conclusion

Alternative C would result in direct, short-term, localized, and minor adverse impacts from prescribed burns to air quality.

4.4 Effects to Aquatic Resources and Fish

4.4.1 Impacts from Alternative A (No Action)

4.4.1.1 Direct and Indirect Effects of Alternative A on Aquatic Resources and Fish

Under this alternative, the vegetative fuels treatments would be limited to presently approved and occurring fire management activities. The inability to utilize mechanical treatments as a management tool would continue the accumulation of vegetation around structures. This would lead to a buildup of hazardous fuels, which would lead to more intense wildfires during dry conditions that are difficult to suppress/manage and increased soil erosion due to removal of most vegetation during wildfires. Potential increased erosion could result in increased turbidity, sedimentation, and debris flushes with reduced water quality, and potentially large pulses of water delivered to water bodies within the park units. The degree of impacts would depend on the severity and extent of the wildfire and rain events. Indirect effects would be adverse, up to moderate, localized, long-term impacts due to increased soil erosion, turbidity, and sedimentation, reduced water quality, and potential pulses of water. However, impacts from soil erosion would only be direct, minor, adverse, short-term, and localized.

In wildland fire suppression tactics, fire engines and other equipment are often driven off-road to control the fire perimeter. With an appropriate response, there would be less fireline constructed and a less off-road use of engines, as natural barriers are more likely to be used to confine wildland fires. The direct adverse effect of fire suppression efforts

would be negligible unless water was drawn from rivers for firefighting. If this occurred, the direct adverse effects of reduced flow would be localized, short-term (hours), and minor. Indirect adverse effects could include destabilizing riverbanks or pond shores due to off-road travel with fire engines and other equipment.

Fire can indirectly influence fish populations or their prey through increased siltation, increased water temperature, altered water quality, and changes in permafrost status that can lead to altered hydrology. Lakes are also potentially vulnerable to the effects of concentration of nutrients, sedimentation and erosion of shorelines. Best management practices to minimize sediment delivery into water bodies includes but is not limited to planting of seeds or seedlings and using weed-free straw bales as erosion barriers on exposed soils until vegetation is established. Generally fish populations have shown a positive response after wildfire where populations exhibit good connectivity with key refugia throughout the watershed (Greswell 1999).

4.4.1.2 Cumulative Effects

Substantial effects from past mining activity continue to impact streams in Alaskan NPS units, especially WRST and YUCH. The major impacts in YUCH occurred along Coal Creek and Woodchopper Creek where dredging and mining impacted about 900 acres. There are more than 400 abandoned mine sites in WRST. Although many of these were upland hard-rock mines, mining activity in WRST has had substantial impacts to stream ecosystems, including altered channel morphology, increased sedimentation, elevated metal concentrations and low pH. The areas with the most mining-related impacts to streams are Nabesna, Chisana, Nizina and Kennicott (Weeks 2003).

There are over 275 miles of roads in parks, with the majority located in WRST. Most of these roads are unpaved, and consequently can lead to increased turbidity and sedimentation in streams that cross or parallel the roadbed. These effects are generally more severe when the road crosses the stream bed itself, rather than being located on a culvert or bridge. While these effects can sometimes be observed for substantial distances downstream, in general the impacts tend to be relatively localized. During heavy precipitation events, the increase in turbidity and sedimentation may be substantial and propagate for considerable distances downstream. Alaska NPS units also contain many hundreds of miles of ORV trails, including over 600 miles of trails in WRST (NPS 2008). An ORV study along the Nabesna Road corridor in WRST found overall adverse effects of ORV trails on stream ecosystems would be minor because of the trail repair or bridge crossing construction at or near potential salmon spawning areas (NPS 2011).

Numerous airstrips and helicopter landing pads exist in Alaska NPS units, and some of these are located on riverine gravel bars or near riparian areas (e.g., on floodplain terraces). Most airstrips have been located on well-drained dry land because landing wheel planes on soft wet ground is unsafe. The effects of airstrips on floodplains are negligible because flood events would simply run over or around the gravel airstrips.

Visitation to Alaskan NPS units remains fairly low. Localized impacts due to recreational activities do occur. These impacts can include disturbances in riparian zones (e.g., trampling of vegetation and stream banks, increased sedimentation due to runoff from trail erosion) and alterations of water quality (e.g., *E. coli* or Giardia contamination). In WRST, Copper, Tanada, and Ptarmigan Lakes have seasonally high recreational use (NPS 2008).

The cumulative effects of past, present, and expected future human activities are substantial and significant. The incremental increase from the no-action alternative to manage hazardous vegetative fuels would result in a minor additional impact on aquatic resources and water quality in the parks. However, there is the potential for indirect impacts to water quality from future severe wildfires, which would be minor to moderate, long-term, adverse, and localized due to limited vegetative fuels treated in areas adjacent to structures, resulting in continued and increased fuel buildup of accumulated vegetation.

4.4.1.3 Conclusion

The No Action Alternative would result in minor impacts. Impacts to water quality from the inability to treat the hazardous vegetative fuels could also be moderate, long-term, and localized due to future severe wildfires from potential fuel buildup.

4.4.2 Impacts from Alternative B: Mechanical Fuels Reduction

4.4.2.1 Direct and Indirect Effects of Alternative B on Aquatic Resources and Fish

Under this alternative, hazardous vegetative fuel treatments would be limited to mechanical treatments and occurring fire management activities around structures and sensitive sites. This could lead to a buildup of hazardous fuels, which could lead to more intense wildfires during dry conditions that are difficult to suppress/manage and increased soil erosion due to removal of most vegetation during wildfires. Potential increased erosion could result in increased turbidity, sedimentation, and debris flushes with reduced water quality, and potentially large pulses of water delivered to water bodies within the parks. The degree of impacts would depend on the severity and extent of the wildfire and rain events. Indirect effects would be adverse, minor to moderate, localized, long-term impacts due to increased soil erosion, turbidity, and sedimentation, reduced water quality, and potential pulses of water.

Turbidity and sedimentation can alter the hydrologic regime of surface waters and adversely affect aquatic habitats, invertebrates, and fish. The potential for an increase in turbidity and sediment delivery in water bodies within the parks as a result of soil erosion following suppression activities could occur. However, impacts from soil erosion would only be direct, minor, adverse, short-term, and localized.

In wildland fire suppression tactics, fire engines and other equipment are often driven off-road to control the fire perimeter. With an appropriate response, there would be less

fireline constructed and a less off-road use of engines, as natural barriers are more likely to be used to confine wildland fires. The direct adverse effect of fire suppression efforts would be negligible unless water was drawn from rivers for firefighting. If this occurred, the direct adverse effects of reduced flow would be localized, short-term (hours), and minor. Indirect adverse effects could include destabilizing riverbanks or pond shores due to off-road travel with fire engines and other equipment. They would be mitigated by reduced off-road travel and rehabilitation of any damaged riverbanks.

Direct impacts from mechanical and manual fuel reduction treatments to water resources would be adverse, localized, short-term, and minor due to trampling of riverbanks or similar disturbances by felled trees. These effects could be mitigated by avoidance, where possible, and immediate rehabilitation using the appropriate mitigation measures (e.g., cut vegetation along banks). Indirect impacts to water resources from slightly increased streamflow would be localized, short-term, adverse, and negligible due to a reduction in vegetation and thus less transpiration on the treated area.

4.4.2.2 Cumulative Effects

The incremental increase from the Alternative B to manage hazardous vegetative fuels would result in a minor additional impact on aquatic resources and water quality in the parks. However, there is the potential for indirect impacts to water quality from future severe wildfires, which would be adverse, up to moderate, long-term, and localized due to limited vegetative fuels treated in areas adjacent to structures, resulting in continued and increased fuel buildup of accumulated vegetation.

4.4.2.3 Conclusion

Alternative B would result in minor impacts to aquatic resources and fish.

4.4.3 Impacts from Alternative C: Mechanical Fuels Reduction & Prescribed Fire

4.4.3.1 Direct and Indirect Effects of Alternative C on Aquatic Resources and Fish

Impacts to aquatic resources and fish under this alternative would be similar to Alternative B; however, targeted prescribed fire would be added as a management tool. Prescribed fire can have adverse and beneficial impacts to fish and aquatic habitat. Areas treated with prescribed fire may produce runoff, but the amount, timing, and duration would depend upon the timing and intensity of the first major runoff-producing event before vegetation is re-established. Increases in sediment runoff could eliminate aquatic insect habitat, reduce the permeability of spawning gravels, and degrade pools and rearing areas (Chamberlin et al. 1991) or could be beneficial to key components of aquatic habitat. Key physical components of an aquatic ecosystem include floodplains, banks, channel structure (i.e., pools and riffles), and subsurface water and may be maintained by upslope disturbance processes. Fire is one of the disturbance processes that can provide nutrients, woody debris, debris flow (e.g., gravel), and water to an aquatic ecosystem. Best management practices would be used to avoid sediment delivery into

streams from any activity needed during and for rehabilitation of burned areas after suppression of wildfires. Best management practices for avoiding sediment delivery into streams that the park could implement include: the use of silt screens, restricting working during dry periods or when the soils are not saturated, no refueling of construction equipment within 150 feet of a stream, fuel spill prevention plan for fueling and use of on-site equipment, use of weed-free straw on exposed soils if needed until revegetation is complete, and stabilization of any structures within the stream channel to prevent bank erosion. The use of prescribed fire would reduce fuel availability as it advances across the landscape and consequently reduce the intensity of a fire. This would benefit water resources with lower intensity ground fires that have less impact on soil runoff when compared to more intense wildfires and are easier to manage/suppress. Thus, Alternative C would have indirect, up to moderate, beneficial, long-term and localized impacts by increasing the potential for lower intensity ground fires.

4.4.3.2 Cumulative Effects

The cumulative effects would be similar to Alternative B. The incremental increase from Alternative C to manage hazardous vegetative fuels would result in a minor additional impact on aquatic resources and water quality in the parks. However, there is the potential for indirect impacts to water quality from future severe wildfires, which would be minor to moderate, long-term, adverse, and localized due to limited vegetative fuels treated in areas adjacent to structures, resulting in continued and increased fuel buildup of accumulated vegetation.

4.4.3.3 Conclusion

Alternative C would result in minor impacts. The reduction in severe wildfires would benefit aquatic resources and fish.

4.5 Effects to Cultural Resources

Direction for cultural resource management is provided in law, regulation, policy, and NPS Director's Order #28. Some of these regulations include the National Historic Preservation Act (NHPA) which requires federal agencies to consider the effects of projects on "historic properties" and to consult with potentially affected tribes on the areas of effect of undertakings, on the identification of properties, on whether an undertaking will affect a historic or cultural property, and on plans for avoiding or reducing adverse effects to cultural resources. NEPA established national policies for the protection and enhancement of the environment, including the preservation of "important historic, cultural, and natural aspects of our national heritage." NEPA also requires federal agencies to communicate with tribes on the significance of the impacts of projects and programs on tribal lands and communities. Other federal legislation that requires consideration and consultation of cultural resources includes the American Indian Religious Freedom Act, the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, EO 13007 (5-24-96)—Indian Sacred Sites, and EO 13175 (11-06-00)—Consultation and Coordination with Indian Tribal

Governments. The historic and cultural properties referenced herein will be referred to collectively as "cultural resources".

Federal land managers can mitigate the effects to cultural resources by taking an active planning approach. This approach consists of identification, evaluation, and mitigation of the impacts of fire and fire management activities on cultural resources. The most critical point of this approach is the need to identify the values at risk.

4.5.1 Impacts from Alternative A (No Action)

4.5.1.1 Direct and Indirect Effects of Alternative A on Cultural Resources

Direct effects to cultural resources vary and are dependent on a number of factors including fuel loads, burn temperatures and burn duration, and materials found in cultural resources sites. Cracking, crazing, spalling, pot-lidding, melting, smudging, and sooting are all direct effects that result from combustion, combustion byproducts, and heat transfer mechanisms acting upon various material artifacts, features, sites, or landscapes.

There are two types of indirect affects; biophysical processes acting on the fire-altered environment and human responses. Indirect effects occur when wildland fire or associated fire management actions change the context in which a cultural resource is found, leaving it vulnerable to impacts such as post-fire erosion, carbon contamination in archaeological deposits, disturbances from fire killed tree-fall, and vandalism/looting.

Some materials may be more resilient than others to fire effects. Materials lying on the ground surface are more at risk to direct effects from fires than those that are buried, although buried material can be affected through the underground movement of fire via root systems and stumps. These materials are generally comprised of ceramic, stone, wood, glass, and metal. All of these cultural materials possess some information value that would be inhibited or destroyed through fire damage. Elevated temperature during wildland fire is the issue of greatest concern. However, buried sites located in unstable soils may be indirectly affected when a fire occurs and exposes the site to increased soil erosion or to unauthorized artifact collecting after a fire has gone out.

Previous application of NHPA and NEPA has focused on consideration of tangible cultural resources, i.e. artifacts and built features. Legal, ethical, and practical developments have made it clear that intangible cultural resources deserve and require consideration as well. Intangible cultural resources are defined as conceptual, oral, and behavioral traditions that provide the social context for artifacts and sites. Often derived from time-tested associations between ecosystems and human communities, intangibles are the fragile and often threatened or neglected linkages among geography, cultures, forests, trees, and people. Thus, intangible cultural resources warrant careful consideration in all stages of forest and cultural policy and practice, including wildland fire.

Fires may damage ethnographic resources by destroying traditionally-used plants, or impeding access to harvesting areas. The effects to cultural resources would be direct, long-term, minor to moderate, adverse, and localized due to potential fuel build up and the increased risk for severe wildfires.

Erosion caused by severe wildfires could also affect the structural integrity of historic roads and trails.

Historic buildings and structures are often components of cultural landscapes. Impairing the integrity of the characteristics of those structures could compromise the cultural landscape.

Fire suppression tactics could also result in direct, long-term, adverse, localized impacts due to displaced surface materials; exposure of materials due to ground disturbance associated with the activities; or to disturb materials immediately below the surface with vehicle use due to earth moving or compaction. Indirect adverse impacts would include exposure of artifacts to erosion. With avoidance of known archeological resources and implementation of mitigation actions, the direct and indirect adverse impacts of fire suppression tactics would be localized, short-term, and minor.

Based upon current information, the No Action Alternative impacts would be direct, up to moderate, long-term, adverse, and localized.

4.5.1.2 Cumulative Effects

Existing development, road construction, maintenance and management practices (e.g., visitor activities), within and outside of the Park units could contribute to cumulative impacts. Vandalism and looting have typically been past and ongoing adverse impacts to cultural resources in National Parks. Less than 1% of NPS lands in Alaska have been surveyed for cultural resources, according to the Alaska SHPO. This is probably the most challenging past and ongoing adverse impact to cultural resources in Alaska NPS lands. The current lack of inventory and documentation has led, in some cases, to outright neglect. Due to this lack of inventory and documentation, it is impossible to state what cultural resources may be impacted and how.

It is generally concluded that fire suppression activities during wildland fires and post-fire site rehabilitation treatments present the most consistent adverse impacts and pose the greatest risk to cultural properties (Ryan et al 2012). Cultural resources may be directly affected by suppression activities such as hand and mechanical fire line construction, retardant use, and rehabilitation activities.

Application of NHPA Section 106 has resulted in diminished adverse effects from NPS actions as a whole. The NHPA Section 106 regulations require federal agencies to consider the potential effects of their actions on cultural resources that are listed and determined to be eligible for listing on the NRHP, once the identification and evaluation

process is completed. NEPA regulations require the consideration of all types of cultural resources regardless of the NRHP status. Under Alternative A, Section 106 and NEPA considerations will occur after the direct and indirect effects of wildland fire.

Alternative A in combination with the past, present, and foreseeable future actions would result in indirect, up to moderate, long-term, adverse, site-specific impacts as well as direct, up to moderate, adverse, long-term, and localized effects due to potential future severe wildfires from continued increase of vegetation and potential fuel buildup in areas adjacent to cultural resources. Section 106 of the NHPA would be considered after the wildfire occurrence, effectively leaving cultural resources vulnerable to both wildfire and suppression activities.

Due to the magnitude of the past and proposed new infrastructure in the Alaska NPS units, the associated public access and potential for vandalism and looting, and the lack of documentation of cultural resources, the overall effects to cultural resources is judged to be up to moderate. The up to moderate additive effects from the past and ongoing NPS fire management activities would not change the overall cumulative effects on known cultural resources in the Alaska Region.

4.5.1.3 Conclusion

Under Alternative A, no coordinated program for clearing or thinning vegetation around existing historic structures would occur. Vegetation would continue to grow and accumulate around structures leading to potential direct and indirect effects to cultural resources. Current fire management plans would be followed and fire suppression tactics in response to wildfire would continue.

Because of the past and future actions and the NHPA Section 106 reviews to consider archaeological and historical resources, the potential impacts from the No Action Alternative would be up to moderate on known cultural resources.

4.5.2 Impacts from Alternative B: Mechanical Fuels Reduction

4.5.2.1 Direct and Indirect Effects of Alternative B on Cultural Resources

Under this alternative, mechanical treatments would reduce or remove vegetation that surrounds structures in developed areas and at remote backcountry locations. Mechanical treatments would be conducted within a 100-foot radius of structures. Mechanical treatments under this alternative consist of removing hazardous vegetation through the use of power saws, cross-cut saws, mowers, hand tools, or similar devices. Specifically, conifers, shrubs and Black spruce would be removed from areas up to 100 feet from known cultural resources.

Under Alternative B, approximately 10 acres or less would be treated each year for a period of 15 years with mechanical methods in each Park unit (Table 2.1). Consequently, the areas treated would be small relative to the size of the Park units.

The removal of tree stumps presents a particular challenge to protecting cultural resources. Physical removal of a stump by mechanical means could have as much or more impact on subsurface cultural resources than the fire itself. In areas of known cultural resources, other removal methods should be employed. Some examples include wrapping the stumps with fire resistant-reflective fabric, application of water, retardant, or foam, or burying of the stumps with soil, rocks, or similar material to prevent ignition during a fire. Accelerating stump decomposition with substances designed to accelerate decomposition, or mechanical treatment of stumps by drilling or scoring may also be helpful.

The use of power saws, cross-cut saws, hand tools, and mowers would have an up to moderate impact on cultural resources depending on the stump removal methodology employed. Indirect adverse impacts could include exposure of artifacts to erosion. The creation of defensible space around historic structures could protect the structures from catastrophic wildfires. Areas outside the mechanical treatments would have increased potential for more intense fires, increasing the potential for adverse impacts to cultural landscapes, ethnographic resources, and historic structures similar to those effects of the No Action Alternative.

4.5.2.2 Cumulative Effects

Existing development, road construction, maintenance and management practices (e.g., visitor activities), within and outside of the Park units could contribute to cumulative impacts. Vandalism and looting have typically been past and ongoing adverse impacts to cultural resources in National Parks. Less than 1% of NPS lands in Alaska have been surveyed for cultural resources, according to the Alaska SHPO. This is probably the most challenging past and ongoing adverse impact to cultural resources in Alaska NPS lands. The current lack of inventory and documentation has, in some cases, led to outright neglect. Due to this lack of inventory and documentation, it is impossible to state what cultural resources may be impacted and how.

Application of NHPA Section 106 has resulted in diminished adverse effects from NPS actions. However, it is important to note that these regulations do not protect cultural resources, but rather consider the effects to a very small subset of cultural resources- those that are listed or eligible for listing on the NRHP. NEPA regulations require the consideration of all types of cultural resources regardless of the NRHP status.

Alternative B in combination with past, present, and foreseeable future actions would result in direct, beneficial, up to moderate, long-term, beneficial, site-specific impacts by minimizing the potential for future severe wildfires that could adversely impact cultural resources.

4.5.2.3 Conclusion

AS long as mechanical treatments employed consider protection of subsurface cultural resources, the potential impacts from Alternative B would be mild on known cultural resources. Because of the relatively small Firewise treatment areas in the park units and the use of NHPA Section 106 reviews to consider archaeological and historical resources, the potential impacts from Alternative B would be minor.

4.5.3 Impacts from Alternative C: Mechanical Fuels Reduction & Prescribed Fire

4.5.3.1 Direct and Indirect Effects of Alternative C on Cultural Resources

Alternative C includes the mechanical treatments from Alternative B in addition to broadcast burning (prescribed fire used as a clearing tool to create a protected buffer around a resource). This alternative would seem the most responsible and proactive on public lands, however, Alternative C is also the alternative that could present the most adverse impacts to cultural resources if poorly implemented.

As discussed in Alternative B, mechanical treatments employed at cultural resource locations must be specifically tailored to avoid the destruction of subsurface cultural resources. The addition of prescribed fire under Alternative C presents another set of challenges in the consideration of cultural resources as fire is extremely damaging to tangible cultural resources on the ground surface. Cultural resources at the subsurface level can also be damaged, but there is less area affected and the heat is less intensive than on the ground surface.

Losses can be anticipated to be the greatest for prescribed burns planned in areas that have not had prior fuels management projects. However, if fuels can be reduced on sites prior to burning impacts to known cultural resources can be minimized. Collecting surface samples prior to burning would secure the data that would be potentially impacted by the prescribed burn. Burn prescriptions can also be designed to reduce potential effects on cultural resources. For example, a head fire might cause fewer effects to cultural materials on the ground surface than a cooler, slower-moving backing fire, due to the increased fire residence time of the latter.

The best consideration of cultural resources in prescribed burning locations is documentation, consultation, analysis, and planning. This should be accomplished through a combined effort of cultural resource managers and fire managers. Most importantly, fire managers should brief all fire support personnel on the objectives of the burn and engage the cultural specialists to discuss the proper protection of cultural properties and materials.

Under Alternative C, effects to cultural resources would be similar to Alternative B. Broadcast burning would be used as an additional tool to reduce the fuel availability to a wildfire as it advances and thus greatly reduce the intensity of a future wildfire. The broadcast burning could potentially impact cultural resources. However, planning efforts

between the cultural resource managers and the fire managers should minimize the direct and indirect effects of Alternative C to cultural resources.

No more than 8,000 acres would be broadcast burned in a single NPS unit over 15 years or a total of no more than an estimated maximum 25,500 acres over the life of the plan (Table 2.1). The creation of defensible space around historic structures would protect the historic structures from future severe wildfires.

4.5.3.2 Cumulative Effects

See the Cumulative Effects Section under Alternative A for a description of past impacts. Application of NHPA Section 106 has resulted in diminished adverse effects from NPS actions. However, it is important to note that these regulations do not protect cultural resources, but rather consider the effects to a very small subset of cultural resources- those that are listed or eligible for listing on the NRHP. NEPA regulations require the consideration of all types of cultural resources regardless of the NRHP status.

Alternative C in combination with the past, present, and foreseeable future actions would result in direct, up to moderate, long-term, beneficial, site-specific impacts by minimizing the potential for future severe wildfires that would adversely impact cultural resources.

4.5.3.3 Conclusion

Because relatively small areas would be affected with Firewise treatments and NHPA Section 106 reviews would be used to identify and avoid adverse effects around structures and sites, impacts to cultural resources from this element of Alternative C would be minor as in Alternative B. The addition of broadcast burns could adversely affect unknown sites in surrounding areas within the estimated 25,500 acres in the affected NPS units, therefore the potential impacts to archaeological and historical resources from Alternative C would be up to moderate.

4.6 Effects to Recreational and Scenic Values

4.6.1 Impacts from Alternative A (No Action)

4.6.1.1 Direct and Indirect Effects of Alternative A on Recreational and Scenic Values

Under this alternative, the fire management program would be limited to presently approved fire management activities. Hazardous fuel buildup around park structures or private inholdings would continue to increase, reducing the ability (i.e., reduced acreage) and efficiency (i.e., increased timeframe) to maintain defensible space. This could lead to increased potential for more intense wildfires that are difficult to suppress/manage. Due to potential fuel build up, the potential for a catastrophic accident would be higher and could require more frequent public use restrictions while fires are being suppressed and smoke generated by those fires would negatively impact the enjoyment of visitors using

areas of the parks or surrounding lands. Depending on the wildfire severity and size, this could remove large tracts of vegetation reducing the quality of scenery. Direct adverse impacts from wildfires include temporary displacement of visitors from areas near structures during fire management activities, temporary odors from smoke near burned areas, and temporary quality reduction of scenic views from presence of blackened areas within natural areas and smoke. Suppression responses to wildfires could also cause notification and possible evacuation of visitors . In the event of a wildfire, rangers would attempt to locate any visitors in areas that may be affected by the wildfire. However, these adverse impacts would be localized, short-term, and minor. This effect would be direct, short- to long-term, minor to moderate, adverse, and localized due to potential increased fuel build up and risk for severe wildfires.

In addition, allowing the accumulation of vegetation could also restrict access to areas within the Park Development Zones. Trees that present a physical hazard to personnel, structures, or equipment would not be removed, jeopardizing the physical safety of visitors and employees.

4.6.1.2 Cumulative Effects

Past impacts that could contribute to recreational and scenic values include group size in the backcountry, recreational access—small airplanes and ATVs—, sport hunting and fishing. All past impacts could locally displace or deplete wildlife, air and water pollution that degrade enjoyment of natural features, artificial lighting that reduces nighttime scenic values, noise from planes and motors that disturb the natural soundscape, and unnatural features added to the landscape such as radio transmitter facilities, weather stations, and collared wildlife. Cumulative impacts to recreational and scenic values under the No Action Alternative in combination with the past, present, and foreseeable future actions would be adverse, long-term, and minor due to increased potential for wildfires as fuels continue to increase. This would also result in increased potential for public use closures or smoke impacts due to fire or fire suppression activities.

4.6.1.3 Conclusion

Impacts to visitor use and enjoyment would be minor due to public use closures from fire potential and associated fire suppression tactics. In addition, indirect effects of this alternative would be localized, short-term, and minor.

4.6.2 Impacts from Alternative B: Mechanical Fuels Reduction

4.6.2.1 Direct and Indirect Effects of Alternative B on Recreational and Scenic Values

Visitor use impacts under this alternative would be the similar to the No Action Alternative; however, power saws, cross-cut saws, mowers, hand tools, or similar devices would be used to clear or thin vegetation around structures and sites. There would be temporary visitor use restrictions in the fuel treatment areas to assure that there are no

visitors (including hunters) where vegetation is being cleared and thinned. Short-term, such restrictions would negatively impact visitor opportunities for those people who are prevented from accessing the area; however, areas adjacent to the closures would still be open to visitor use**.** Noise from treatment tools would disturb the natural soundscape visitors enjoy; however, this effect would be short-term and temporary.

Overall, this alternative would have direct, short-term minor adverse impacts in the immediate area of treatment during the treatment period and is expected to have direct, up to moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires as the amount of hazardous vegetative fuel reduction increases. Structures important in visitor use and enjoyment would be better protected from catastrophic fires.

4.6.2.2 Cumulative Effects

See Cumulative Effects of Alternative A for a description of past impacts to recreation and scenic values. Alternative B in combination with the past, present, and foreseeable future actions would result in short-term, adverse, and up to moderate cumulative impacts to recreational and scenic values from disruptions in recreational opportunities and cleared vegetation reducing scenic quality and long-term, minor, beneficial cumulative impacts from reduced potential for future severe wildfires and the protection of sensitive sites and structures that visitors can enjoy.

4.6.2.3 Conclusion

Impacts to visitor use and enjoyment would be minor and adverse due to short-term, localized public use closures and beneficial in the long term due to the reduced potential for future severe wildfires to adversely affect treated locations around structures and sites that visitors enjoy.

4.6.3 Impacts from Alternative C: Mechanical Fuels Reduction & Prescribed Fire

4.6.3.1 Direct and Indirect Effects of Alternative C on Recreational and Scenic Values

Visitor use impacts under this alternative would be the similar to Alternative B; however, broadcast burning would be used as a management tool with mechanical tools.

There would be temporary visitor use restrictions in various sections of the parks/preserves/monument to assure that there are no visitors (including hunters) where areas are being treated. Short-term, such restrictions would negatively impact the visitor uses and enjoyment by those who are prevented from accessing the area. Furthermore, areas adjacent to the closures would still be open to visitor use**.** The presence of fire, smoke, and blackened areas may present an opportunity for education and interpretation of natural values and processes of prescribed fire, which may provide a minor, long-term, beneficial impact.

Smoke from broadcast burning could affect the visibility and irritate the eyes and breathing of some visitors. However, this would be short term and temporary.

Overall, this alternative would have direct, short-term negligible adverse impacts in the immediate area of treatment during the treatment period and is expected to have direct, minor to moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires as the amount of hazard reduction increases. Structures important in the visitor experience would be better protected from catastrophic fires.

4.6.3.2 Cumulative Effects

See Cumulative Effects of Alternative A for a description of past impacts to recreation and scenic values. Alternative C in combination with the past, present, and foreseeable future actions would result in short-term, adverse, and up to moderate cumulative impacts to recreational and scenic values from disruptions in recreational opportunities and blackened areas reducing scenic quality. In addition to long-term, minor, beneficial cumulative impacts from reduced potential for future severe wildfires and the protection of sensitive sites and structures that visitors can enjoy.

Impacts to visitor use and enjoyment would be short-term, minor, and negative due to public use closures and long-term, minor beneficial effects due to the reduced potential for future severe wildfires and the protection of structures and sites that visitors enjoy.

4.6.3.3 Conclusion

Impacts to visitor use and enjoyment would be minor and adverse due to public use closures and moderately beneficial in the long term due to the reduced potential for future severe wildfires to adversely affect sensitive sites and structures that visitors enjoy.

4.7 Effects to Socioeconomics and Local Business

4.7.1 Impacts from Alternative A (No Action)

4.7.1.1 Direct and Indirect Effects of Alternative A on Socioeconomics and Local Business

Under this alternative, the fire management program would be limited to presently approved fire management activities. The inability to clear or thin vegetation around structures would reduce the ability (i.e., reduced acreage) and efficiency (i.e., increased timeframe) to maintain defensible space, resulting in increased fuel buildup around park structures or private inholdings. This could lead to increased potential for more intense wildfires that are difficult to suppress/manage. Large wildfires could result in unpredictable, temporary closures of roads and reduced visibility from smoke to adjacent landowners and surrounding communities.

Depending on the severity, size, and location of the wildfire, ground and air transport could be closed due to reduced visibility from smoke, residential and commercial buildings could be destroyed, and the local economy could be reduced. Losses to the local economy could include expenditures associated with park visitation and tourism such as food and lodging, fees, rentals, guide and outfitting services, transportation, and other retail purchases. Additional spending for materials and equipment for fighting fires could offset these losses. The labor and materials required to rebuild structures and rehabilitation efforts may also offset any losses experienced in the local economy by reduced tourism. This effect would be indirect, short-term, adverse, minor, and localized. Any wildfire posing a threat to life or property would be immediately suppressed and hopefully of short duration, thereby reducing the potential for adverse socioeconomic impacts.

4.7.1.2 Cumulative Effects

Past projects that could impact socioeconomic resources include construction of roads, landing strips, trails, NPS and private structures, commercial lodges, utilities, and mining operations. Services related to visitor enjoyment and tourism provides the majority of income for the local economy of the Alaska NPS units. For example, services related to visitation and tourism in KATM provided approximately $30 million/year to the regional economy and nearly $50 million/year to the state economy with about $10 million/year expended within the boundaries of KATM (Fay and Christensen 2010). An NPS sponsored nationwide and peer-reviewed study in 2011 showed that 2.33 million visitors spent $238 million in communities surrounding NPS areas in Alaska, which supported 4,154 jobs (Cui et al. 2013). Past improvements to transportation options, recreation opportunities, and retail services (e.g., lodging) helps to improve overall visitor enjoyment of the NPS units which could beneficially impact the local economy. The No Action Alternative would contribute minor, temporary benefits to socioeconomic resources with potential for moderate, adverse effects. The No Action Alternative in combination with the past, present, and foreseeable future actions would have up to moderate, short to long-term, adverse, localized impacts where valued structures and sites supporting businesses are lost to wildfires; however, some communities and individuals could benefit from fire-fighting and reconstruction employment opportunities.

4.7.1.3 Conclusion

Visitation rates and associated visitor spending would not be expected to change perceptibly under this alternative. The additional spending for materials and equipment for fighting fires and labor and materials to rebuild structures and rehabilitation efforts may offset losses experienced in the local economy from reduced tourism. Socioeconomic impacts would be short-term, adverse, minor and localized impacts associated with temporary disruption of visitor activity and corresponding business activity inside the Park and in adjacent communities.

4.7.2 Impacts from Alternative B: Mechanical Fuels Reduction

4.7.2.1 Direct and Indirect Effects of Alternative B on Socioeconomics and Local Business

Impacts to socioeconomics and local businesses under this alternative would be similar to those under the No Action Alternative; however, power saws, cross-cut saws, mowers, hand tools, or similar devices would be used to clear or thin vegetation around structures and sites. There would be temporary visitor use restrictions in the fuel treatment areas to assure that there are no visitors where treatments are being applied. Short-term, such restrictions could negatively impact the businesses as people who are prevented from accessing the area. Furthermore, areas adjacent to the closures would still be open to business use**.** The impacts would be short term and temporary.

Overall, this alternative would have direct, short-term negligible adverse impacts in the immediate area of treatment during the treatment period and is expected to have direct, minor to moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires as the amount of hazard reduction increases. Temporary disturbances to visitor activities in treatment areas would occur, but would not be expected to impact visitation rates or associated visitor spending. Local businesses catering to tourism that depend on visitors to NPS park units would be better protected from catastrophic fires, decreasing potential disturbances to local businesses from wildfires.

4.7.2.2 Cumulative Effects

As noted under Alternative A, No Action, construction of roads, landing strips, trails, NPS and private structures, commercial lodges, utilities, and mining operations could impact the socioeconomic resources. Past improvements to transportation options, recreation opportunities, and retail services (e.g., lodging) helps to improve overall visitor enjoyment of the NPS units which could beneficially impact the local economy. Alternative B in combination with the past, present, and foreseeable future actions would result in minor, beneficial, long-term, and localized impacts by minimizing the potential for future severe wildfires to adversely affect structures and sites important to local businesses and economies.

4.7.2.3 Conclusion

Temporary disturbances to visitor-related business activities in treatment areas would occur, but would not be expected to impact visitation rates or associated visitor spending. Socioeconomic impacts would be beneficial, up to moderate, long-term, localized impacts to local businesses and job opportunities by minimizing the potential for future severe wildfires as hazardous vegetative fuel density decreases around structures and sites important to local businesses and economies.

4.7.3 Impacts from Alternative C: Mechanical Fuels Reduction & Prescribed Fire

4.7.3.1 Direct and Indirect Effects of Alternative C on Socioeconomics and Local Business

Impacts to socioeconomics and local businesses under this alternative would be similar to those under Alternative B; however, broadcast burning would be used as a management tool with mechanical tools. Broadcast burning would reduce the risk of more intense fires that could result in more adverse impacts to socioeconomics and local businesses.

There would be temporary use restrictions in the project area to assure that there are no visitors where areas are being treated. Short-term, such restrictions would negatively impact the local businesses where customers prevented from accessing business services. Furthermore, areas adjacent to the closures would still be open to visitor use**.**

Smoke from broadcast burning could affect the visibility and irritate the eyes and breathing of some customers and business staff. However, this would be short term and temporary.

Overall, this alternative would have direct, short-term minor adverse impacts in the immediate area of treatment during the treatment period and is expected to have direct, up to moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires as the amount of hazard reduction increases. Structures important in the local economy would be better protected from catastrophic fires.

4.7.3.2 Cumulative Effects

As noted under the No Action Alternative, construction of roads, landing strips, trails, NPS and private structures, commercial lodges, utilities, and mining operations could impact the socioeconomic resources. Past improvements to transportation options, recreation opportunities, and retail services (e.g., lodging) helps to improve overall visitor enjoyment of the NPS units which could beneficially impact the local economy. Alternative C in combination with the past, present, and foreseeable future actions would result in minor, beneficial, long-term, and localized impacts by minimizing the potential for future severe wildfires as fuels and increasing defensible space created

4.7.3.3 Conclusion

Temporary disturbances to visitor-related business activities in treatment areas would occur, but would not be expected to impact visitation rates or associated visitor spending. Socioeconomic impacts would be beneficial, up to moderate, long-term, localized impacts to local businesses and job opportunities by minimizing the potential for future severe wildfires to affect valued structures and sites as hazardous vegetative fuel density is greatly decreased.

4.8 Effects toSubsistence Resources and Uses

For a summary evaluation and findings to subsistence resources and uses in the project area from the alternatives considered for vegetative fuels treatments, see the ANILCA Section 810(a) review in appendix A. The analyses of impacts to subsistence resources and uses draws heavily upon the analyses of effects to aquatic resources and fish (section 4.4), terrestrial vegetation (section 4.9), and wildlife/habitat (section 4.10). The analyses of effects focus on park areas where subsistence activities are authorized and where fuels management activities are expected to take place. It must be kept in mind, however, that fuels management methods in one location could have an indirect effect to subsistence uses and resources in an adjacent or distant location. For example, a migratory fish or animal resource could be adversely affected (population reduction) from habitat loss due to severe wildfire.

4.8.1 Impacts from Alternative A (No Action)

4.8.1.1 Direct and Indirect Effects of Alternative A on Subsistence Resources/Uses

The effects of fire cycles and fire management initiatives upon subsistence derives from the impacts on plant community successional cycles and associated wildlife communities. Vulnerability to, and impacts of, fire differ between tundra and boreal forest communities. Intermittent fire frequency, with low intensity, would have moderate impacts, leaving patchy habitats and resetting successional cycles. For example, moose populations grow when fire displaces climax stage forests and willow thickets emerge with better browse. However, tundra fires can damage lichen, which takes many decades before returning to a stage of productive browse for caribou.

Traditional use areas are also adapted to take into account localized declines or displacements of key species. These traditional ranges were large enough that community members would not hunt all portions of a unit in a year, so if some portion was subject to short-term impacts from fire, alternative zones were available within the overall traditional use area. Subsistence harvest practices were adapted to ecological dynamics, including fire. If fire management over-suppresses natural fire frequencies to the extent that fuel loads accumulate resulting in fewer, but more intense fire, fire management initiatives could have adverse impacts on subsistence harvest.

Alternative A could adversely affect subsistence resources and use areas by inadequately managing wildland fire hazardous fuel conditions around structures and sites important to subsistence users. Vegetation would continue to grow and accumulate around structures. This could lead to increased potential for more intense wildfires in key locations that are difficult to suppress/manage. This effect would be direct, short- to long-term, minor to moderate, adverse, localized impacts to important subsistence sites and associated structures due to potential fuel build up and the increased risk from severe wildfires.

4.8.1.2 Cumulative Effects

Past projects that could impact subsistence resources (timber, vegetation, berries, medicinal plants, wildlife habitat and distributions) include construction of roads, OHV trails, past and on-going mining, commercial lodges and associated activities, airstrips, NPS administrative activities and developments, and competing sport hunting and fishing. Many of the existing facilities are used by subsistence and recreational users.

The McCarthy and Nabesna Roads and ORV trails in WRST are used extensively by local rural residents for access to subsistence resources.

The GAAR ATV Subsistence Use Legislative EIS authorized a land exchange between the NPS and Anaktuvuk Pass to allow ATV access to hunting grounds while unaffected lands would be provided to the NPS, including an equal exchange of lands for wilderness designation. This agreement affected over 300,000 acres of land near Anaktuvuk Pass and removed about 30 miles of ATV trails from NPS management. The Dry Bay ORV EA (NPS 2007a) has resulted in a decision to close about 20 of 80 miles of ORV trails, including reclamation of widened areas along ORV trails to remain in use. The Cantwell Subsistence ORV EA (NPS 2007b) has resulted in a decision to allow continued uses of ORVs for subsistence hunting and gathering in the traditional use area on the south side of the Alaska Range, but trails are to be closed or hardened where they traverse wetlands or other sensitive areas. Short segments of ORV trails or primitive roads are used for access to subsistence resources in YUCH at Coal and Woodchopper creeks.

Commercial lodges occur in or near subsistence use areas of Alaska NPS units KATM Preserve at Nonvianuk Lake, WRST along Nabesna and McCarthy roads and Chisana and other remote locations, LACL Port Alsworth area, GAAR at Walker and Takahula lakes. Guided hunts from these facilities could compete with local rural residents for subsistence resources in these ANILCA conservation system units.

In preserves where general hunting, guided hunts, and outfitter-guided trips occur, competition for subsistence resources may occur. This is a sensitive issue in the Western Arctic National Parklands.

The impacts to subsistence resources from various past and ongoing uses and developments has been widespread, extensive, displaces vegetation and wildlife habitat, and fractures wildlife distributions, and may result in reduction of and competition for resources with subsistence users. Because ANILCA Title VIII recognizes a preference for subsistence uses of these resources, the larger impacts should be reduced by closures to general uses. These impacts to subsistence resources and uses could be construed as moderate overall. The impacts of the no action (status quo) alternative involving minimal vegetative fuels management for fire suppression would contribute a minor additional impact to subsistence resources and uses, resulting in no more than the overall moderate cumulative effect on subsistence resources and uses.

4.8.1.3 Conclusion

Impacts to subsistence resources and uses from limiting the fire program to presently approved emergency firefighting tools could have direct, up to moderate, long-term, adverse, localized effects due to increased potential for future severe wildfires and to destroy important subsistence-related structures and sites including loss of associated vegetation and wildlife habitat important to subsistence uses (e.g., destruction of caribou habitat, fish habitat degradation). As hazardous fire fuels continue to build up within and adjacent to subsistence use sites the potential for wildland fires to destroy them increases. The No Action Alternative would result in minor, adverse, short-term, and localized impacts.

4.8.2 Impacts from Alternative B: Mechanical Fuels Reduction

4.8.2.1 Direct and Indirect Effects of Alternative B on Subsistence Resources/Uses

Impacts to subsistence resources and uses under this alternative would be the similar to the No Action Alternative; however, power saws, cross-cut saws, mowers, hand tools, or similar devices would be used to clear or thin vegetation around structures and sensitive sites. There would be temporary subsistence use restrictions in the fuel treatment areas to assure that there are no users there during vegetation treatments to protect their health and safety. Most subsistence activities in parks take place in late summer (berry-picking) and fall (hunting), but fishing, egging, and plant gathering occur during mid-summer. Short-term, such restrictions would negatively impact the subsistence user opportunities for those people who are prevented from accessing the area; however, areas adjacent to the temporary closures would still be open to subsistence uses**.**

Overall, this alternative would have direct, short-term minor adverse impacts in the immediate area of treatment during the treatment period and is expected to have direct, up to moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires to destroy subsistence-related structures and sites as the reduction of hazardous fire fuels increases. Subsistence resources would be better protected from catastrophic fires.

4.8.2.2 Cumulative Effects

See Cumulative Effects section under Alternative A for a description of past cumulative impacts. Alternative B in combination with the past, present, and foreseeable future actions would result in direct, minor, beneficial, long-term, and localized impacts by protecting structures and preferred sites for key subsistence resources and minimizing potential adverse impacts from future severe wildfires where Firewise treatments are completed

4.8.2.3 Conclusion

This alternative would result in beneficial, long-term, up to moderate, localized impacts to subsistence uses and resources by minimizing the potential for future severe wildfires to adversely affect subsistence-related structures and sites as defensible spaces are created.

4.8.3 Impacts from Alternative C: Mechanical Fuels Reduction & Prescribed Fire

4.8.3.1 Direct and Indirect Effects of Alternative C on Subsistence Resources/Uses

Impacts to subsistence resources/uses under this alternative would be the similar to Alternative B; however, broadcast burning would be used as a management tool with mechanical tools.

Subsistence resources that could be impacted by broadcast burning include temporary displacement of wildlife from treated areas, removal of 25,500 acres of vegetation throughout Alaska NPS units, including road corridors, and temporary closures of areas to protect subsistence users and public from temporary smoke emissions. Timing and locations of burns would be selected to maximize effectiveness and safety to remove hazardous fuels while avoiding public and subsistence use periods. Most subsistence activities in parks take place in late summer (berry-picking) and fall (hunting), but fishing, egging, and vegetable gathering occur during mid-summer. There would be temporary use restrictions in the project area to assure that there are no people where areas are being treated. Short-term, such restrictions would negatively impact the access to subsistence resources in the project area. Furthermore, areas adjacent to the closures would still be open to subsistence uses**.**

Smoke from broadcast burning could affect the visibility and irritate the eyes and breathing of some subsistence users. However, this would be short term, localized, and temporary.

The use of prescribed fire in addition to mechanical treatments would better maintain the ecological dynamics of the plant and wildlife communities. Consequently, subsistence resources and uses would be enhanced.

Overall, this alternative would have direct, short-term negligible adverse impacts in the immediate area of treatment during the treatment period and is expected to have direct, minor to moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires as the amount of hazard reduction increases. Subsistence resources would be better protected from severe fires.

4.8.3.2 Cumulative Effects

See Cumulative Effects section under Alternative A for a description of past cumulative impacts. Cumulative effects would be similar to Alternative B. Management practices

(e.g., prescribed burns), within and outside of the project area, could contribute to cumulative impacts. Alternative C in combination with the past, present, and foreseeable future actions would result in direct, minor, beneficial, long-term, and localized impacts by improving vegetation communities and associated wildlife and minimizing the potential for future severe wildfires to destroy structures and sites important to subsistence users and associated resources.

4.8.3.3 Conclusion

This alternative would result in direct, up to moderate, beneficial, long-term, localized impacts to subsistence uses and resources by minimizing the potential for future severe wildfires to adversely impact subsistence-related structures and sites as defensible spaces are created.

4.9 Effects to Terrestrial Vegetation

4.9.1 Impacts from Alternative A (No Action)

4.9.1.1 Direct and Indirect Effects of Alternative A on Terrestrial Vegetation

Under this alternative, the hazardous vegetative fuels management in the project area would be limited to presently approved and occurring fire management activities. Potential spread of invasive weeds could occur from equipment used by fire crews on wildfire work (i.e., carried in on equipment from outside the area and fireline construction equipment).

The vegetation would continue to accumulate around structures with the retention and buildup of potentially increasing hazardous fuel loads. This would increase the potential for wildfires that would be more difficult to control around protection points. Indirect effects to vegetation would be adverse, minor, localized, and long-term due to increased potential for locally severe fire effects on vegetation around protection points, including physical alteration of vegetation structure, composition, and function and increased susceptibility to spread of invasive weeds (Vitousek et al. 1996, Mulder et al. 2007, Cortés-Burns et al. 2008).

The lack of broadcast burning under prescribed conditions would increase the probability of intense fires that would be more destructive to vegetation around protection points. Broadcast burning can produce favorable conditions for conifers or deciduous forests depending on the initial condition. Burning spruce forests increases shrubs, forbs and top-kills shrubs such as willow, shrub birch and alder, which often sprout the next year. Broadcast burning can also return forest stands to less hazardous early regenerative stages, create seedbed for white spruce stands, and rejuvenate old stands of deciduous trees. Without the benefits of mechanical treatments or broadcast burning, the ultimate result would be a loss of stand diversity and more contiguous areas of flammable fuels.

This would increase risk to forest health due to insect outbreaks in areas around identified protection points.

The effects of fire on plants are species-specific. Fire may either increase or reduce germination and vigor of plants. In extreme drought, fires in tundra can burn very deeply into the organic mat and enhance rapid melting of the permafrost, which can produce mass wasting, subsidence and erosion. Wildfires could be of high enough intensity that would cause physical alteration of soil structure, development of hydrophobic layers, and soil sterilization, which leads to degradation of soil (e.g., productivity). Vegetative communities would be adversely impacted by soil degradation.

Temperatures and precipitation are projected to increase in the Park units due to climate change and/or natural variability (Alaska Climate National Research Center 2012, Jezierski eta al. 2010a and 2010b, Loya et al. 2010,). The number and intensity of wildfires in Alaska has increased during the period of observed climate change in recent history (Kasichke et al. 2003). It is likely that vegetation types that have experienced fuel accumulations and increased vegetation density are more sensitive to climatic variability (i.e., less resilient to fires during drought and warmer years). However, based on the current information available for climate change and associated vegetation changes and because interactions between climate change, fire, and vegetation are complex and uncertain, it is unknown whether the same or different vegetation would grow back following a large, severe fire.

In addition, there are potential future changes in plant communities from predicted climate change, as individual plant species respond to large and small-scale changes in temperature and precipitation, the fertilizing effect of increased carbon dioxide, and changing patterns of inter-specific competition (Jezierski eta al. 2010a and 2010b).

The limited options of full suppression and fire-fighting around identified protection points under this alternative, could limit the NPS in its ability to adapt fire management procedures to climate change. Vegetation could have increased probability of senescent forest growth with greater potential of insect outbreaks and intense wildfires. The potential for more intense wildfires could shift boreal forest vegetation from spruce-dominated to deciduous dominated (Loya et al. 2010) with the majority of trees and vegetation classes shifting northward and upward in elevation (Jezierski eta al. 2010a).

4.9.1.2 Cumulative Effects

The primary anthropogenic impacts to terrestrial parks are the clearing of native vegetation for facilities and transportation corridors and the maintenance of pioneer plant communities where trees and shrubs would inhibit an area's administrative use. Additional impacts include irregular disturbance by visitors and park staff through trampling and camping-associated activities. Another impact to terrestrial plants is fire management practices within and outside of the Park units.

Alternative A in combination with the past, present, and foreseeable future actions would have moderate, long-term, beneficial, localized cumulative impacts to vegetation through the return of a natural fire regime and an increased trend of resilience to future stress from hurricanes, drought, pest outbreaks, wildfire, and climate warming. However, these positive changes would be less effective in reducing hazardous vegetative fuels and require a longer timeframe to achieve the desired conditions of reduced fuels due to the NPS inability to use mechanical tools and broadcast burning as fire management tools. Potential impacts to vegetation would be minor to moderate, long-term, adverse, and localized through future severe wildfires from potential fuel buildup in critical areas immediately adjacent to structures and roads.

4.9.1.3 Conclusion

Alternative A would result in up to moderate, adverse, long-term, and localized impacts to terrestrial vegetation around valued structures and sites in affected Alaska NPS units. Impacts to vegetation from limiting the fire management program to presently approved and occurring fire management activities could also be minor to moderate, long-term, adverse, and localized due to future severe wildfires from potential fuel buildup.

4.9.2 Impacts from Alternative B: Mechanical Fuels Reduction

4.9.2.1 Direct and Indirect Effects of Alternative B on Terrestrial Vegetation

Under Alternative B, effects to terrestrial vegetation would be similar to those under Alternative A. However, hazardous vegetative fuels would be thinned or cleared in small areas surrounding structures or adjacent to roads. The area that would be treated over 15 years is very small relative to the large size of the Park units (Table 2.1). Consequently, the direct loss of plant communities would not be discernible.

Mechanical fuel reduction treatments would reduce potential for intense fires within 100-feet of the structures, but would not reduce potential for intense fires outside the treatment radius. Thus, this alternative could result in more intense fires outside the 100-foot treatment radius resulting in long-term, moderate impacts on terrestrial vegetation.

Effects to vegetation that requires a shaded overstory, such as lichens and mosses, would have an adverse, long-term, but localized impact. This alternative could also increase melting of permafrost due to increased sun exposure, which could change the local vegetation composition.

4.9.2.2 Cumulative Effects

The primary past impact is clearing of native terrestrial vegetation for construction of structures, transportation corridors, and maintenance of trees and shrubs that would inhibit an area's administrative use. Additional impacts include irregular disturbance by visitors and park staff through trampling and camping-associated activities.

Approximately 149 miles of road exist in the affected Alaska NPS units with an average disturbance width of 30 feet (~10 meters) would indicate overall vegetation impact of about 541 acres. Approximately 323 miles of OHV trails traverse the Alaska NPS units with an average disturbance width of 10 feet (3 meters), which totals 352 acres of vegetation impacts. Seven FAA-recognized airstrips exist in or are surrounded by Alaska NPS units. While there is no standard size for these areas, a rough estimate of 10 acres per landing strip would indicate 70 acres of vegetation impact. There are 2 commercial lodges in KATM that cover about 7 acres. There are approximately 900 acres of land that have been impacted by past mining operations in YUCH and 400 abandoned mine sites in KATM. Additional impacts include construction of NPS structures, campgrounds, and other facilities.

The impacts of mechanical fuels reduction treatments under Alternative B to terrestrial vegetation would be minor (1,485 acres over 15 years) when compared to over 40 million acres covered by the Alaska NPS units and comparable to the scale of the past human impacts existing within the affected NPS lands.

Alternative B in combination with the past, present, and foreseeable future actions would result in direct, minor, beneficial, long-term, and localized impacts by minimizing the potential for future severe wildfires as fuels are decreased where defensible spaces are created.

4.9.2.3 Conclusion

This alternative would result in direct, minor, beneficial, long-term, localized impacts to vegetation by minimizing the potential for future severe wildfires around identified protection points.

4.9.3 Impacts from Alternative C: Mechanical Fuels Reduction & Prescribed Fire

4.9.3.1 Direct and Indirect Effects of Alternative C on Terrestrial Vegetation:

Impacts under this alternative would be similar to those under Alternative B. Under Alternative C, broadcast burning would be utilized as an additional tool to manage hazardous vegetative fuels around identified protection points in affected NPS areas. The area that would be treated over 15 years would be small relative to the large size of the NPS units (Table 2.1). Consequently, the direct loss of existing plant communities would be minor. The ability to use broadcast burning would decrease the probability of intense fires that would be more destructive to vegetation and adjacent structures and sites.

Effects of climate change under Alternative C could be less adverse as broadcast burning would be another vegetation management tool in addition to mechanical treatments and thereby reduce the frequency and severity of wildfires around structures and sensitive sites in the affected Alaska NPS units.

4.9.3.2 Cumulative Effects

See Cumulative Effects of Alternative B for a description of past impacts to terrestrial vegetation. The impacts of mechanical fuels reduction treatments (1,485 acres over 15 years) and broadcast prescribed burns (25,500 acres over 15 years) under Alternative C to terrestrial vegetation would be minor when compared to over 40 million acres covered by the Alaska NPS units and the scale of the past impacts.

Alternative C in combination with the past, present, and foreseeable future actions would result in moderate, beneficial, long-term, and localized impacts to vegetation by minimizing the potential for future severe wildfires around identified protection points.

4.9.3.3 Conclusion

This alternative would result in up to moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires as defensible spaces are created around structures and sensitive sites.

4.10 Effects to Wilderness

4.10.1 Impacts from Alternative A (No Action)

4.10.1.1 Direct and Indirect Effects of Alternative A on Wilderness

There would be no direct impacts to wilderness character (untrammeled, natural, opportunities for solitude and unconfined resources, and undeveloped) under Alternative A because there would be no active hazardous vegetative fuel treatments around structures/sites. Indirect impacts to wilderness character could occur from wildfire suppression events. The continued retention and build-up of hazardous vegetative fuels around the 76 structures/sites, increases the potential for wildfires that could be more difficult to control around these high priority structures/sites.

Untrammeled: Wildfire suppression tactics, including but not limited to creating fire lines, clearing vegetation, and creating backfires around high priority structures/sites would manipulate the wilderness, degrading the untrammeled quality of wilderness character. The amount of degradation around high priority structures/sites would depend on the size, intensity, and severity of the wildfire.

Natural: The occurrence of naturally ignited wildfires around structures/sites in the wilderness would likely create dispersed wildfire patches. Wildfire has played a role in shaping and maintaining ecological systems and natural fire is considered a fundamental component of the wilderness environment. Potential dispersed, low intensity, wildfire patches around structures/sites could help to restore and/or maintain natural habitat around these areas. Impacts would be site-specific and would not likely constitute a large area of the wilderness or affect ecological processes on a large-scale.

Opportunities for solitude and unconfined resources: An increased human presence, use of airplanes and helicopters to access the areas, and use of motorized mechanical tools and equipment would occur to suppress wildfires at and around high priority structures/sites. Noise associated with wildfire suppression activities would temporarily degrade opportunities for solitude in the wilderness at and adjacent to the high priority structures/sites. Adverse impacts to opportunities for solitude from motorized access would be short-term, up to minor, and site-specific. The use of motorized tools would also have adverse, short-term, up to minor, and localized impacts on opportunities for solitude. Noise impacts would be lower than the other alternatives, but could take longer to complete, so crews could disturb opportunities for solitude for a longer amount of time at or adjacent to the high priority structures/sites in the wilderness.

Undeveloped: An increased human presence, use of aircrafts and motorboats to access the areas, and use of motorized mechanical tools and equipment to suppress wildfires at and around high priority structures/sites would degrade the undeveloped quality of wilderness character. However, the introduction of motorized forms of access, the increased human presence, and use of motorized tools would likely be short-term occurring until the wildfire was suppressed.

4.10.1.2 Cumulative Effects

Cumulative effects from authorized motorized access include the use of helicopters, small airplanes, motorboats, snow machines, trucks, and ORVs. Overall, authorized motorized access has a moderate effect on wilderness resources throughout the Alaska NPS units. Helicopters are used for research (conducted by NPS or conducted by permittees), the NPS Inventory and Monitoring program, mineral evaluations (under ANILCA 1010), fire monitoring, and other park management activities. Subsistence users use small airplanes, motorboats, snow machines, trucks, and ORVs to access Wilderness areas. The use of motorized transportation within Wilderness areas affects the opportunity for solitude and the undeveloped character of the wilderness. In 2005, there were 1,267 rotor wing flight hours flown by the Alaska region of the NPS (Ken Barnes, pers. comm.); these hours do not include those hours flown by permittees. This number is expected to stay about the same or increase slightly during the foreseeable future. The cost of fuel and rental costs for helicopters and small airplanes will likely continue to increase and could reduce the number of helicopters and small airplanes used. Even with multiple means of access, there are large areas of the Alaska NPS units that see little if any subsistence use due to limitations on the use of aircraft for subsistence and the difficulty of overland access (e.g., the area south of the Chitina River drainage but north of Icy Bay and the Malaspina Forelands). The addition of flight hours flown by helicopters or small airplanes or using motorboats to access Wilderness areas from implementing this alternative would have a minor effect. The total effect of this alternative with other ongoing and future effects from motorized access would have a moderate effect on wilderness character and associated resources.

The use of motorized tools, including chainsaws, brush cutters and mowers in wilderness is rare at the present time. There is some use of these tools in parks for trail maintenance

or clearing, or for maintenance on airstrips or at public use cabins. Chainsaws may be permitted for use by subsistence users or by commercial services providers, but these uses are uncommon and are not expected to increase in the foreseeable future. Although there may be some localized minor effects, the overall regional effect of these uses on the opportunity for solitude and for undeveloped wilderness character at the present time is minor. The additional effect from implementing this alternative is also minor. The total cumulative effect is minor at the regional scale.

The cumulative effect of motorized access, use of mechanical tools, clearing of vegetation, and associated noise from fire crews to wilderness character is minor.

4.10.1.3 Conclusion

There would be no direct impacts to wilderness character (untrammeled, natural, opportunities for solitude and unconfined resources, and undeveloped) under Alternative A. However, indirect impacts could occur from wildfire suppression events. Wildfire suppression tactics would degrade the untrammeled quality of wilderness character. The amount of degradation at and adjacent to high priority structures/sites would depend on the size, intensity, and severity of the wildfire. The increased human presence, use of airplanes and helicopters to access the areas, and use of motorized mechanical tools and equipment at and around high priority structures/sites would cause degradation of opportunities for solitude and undeveloped qualities of wilderness character. Degradation would be short-term, adverse, up to minor, and site-specific for motorized access to sites and short-term, adverse, up to minor, and local for the use of motorized tools. Noise impacts would be lower than the other alternatives, but could take longer to complete, so degradation of opportunities for solitude quality could be impacted for a longer amount of time at or adjacent to the structures/sites in the wilderness. Potential dispersed, low intensity, wildfire patches around structures/sites would have long-term, beneficial, site-specific, impacts to the natural quality of wilderness character by helping to restore and/or maintain natural habitat around the structures/sites.

4.10.2 Impacts from Alternative B: Mechanical Fuels Reduction

4.10.2.1 Direct and Indirect Effects of Alternative B on Wilderness

The effects of Alternative B on qualities of wilderness character, (including undeveloped, untrammeled, naturalness, and opportunity for solitude or unconfined recreation) from the presence and accumulation of hazardous vegetative fuels around structures/sites would be similar to those under Alternative A. Under this alternative, the hazardous vegetative fuels management would be limited to mechanical treatments. This management tool would reduce the severity of fires at and adjacent to the structures/sites in the designated wilderness areas.

Untrammeled: Clearing vegetation around the 76 high priority structures/sites would manipulate the wilderness, degrading the untrammeled quality of wilderness character.

Natural: There would be a minor effect on natural processes or ecosystems because the areas affected are small. Firewise treatments would affect a minimum distance of 100 feet from each structure/site where vegetation would be altered. All vegetation would be removed within 15 feet of the 76 structures/sites. Vegetation would be removed or thinned beyond the 15-foot radius from the 76 structures/sites. Impacts would be site-specific and would not constitute a large area of the wilderness or affect ecological processes on a large scale.

Opportunities for solitude and unconfined resources: An increased human presence, use of airplanes and helicopters to access the areas, and use of motorized mechanical tools and equipment would occur to remove hazardous vegetative fuels at and around 76 structures/sites. Each of the 76 structures/sites would be visited for site reconnaissance, on-site evaluation and an on-site meeting with the contractor. Noise associated with site visits would temporarily degrade opportunities for solitude in the wilderness at and adjacent to the 76 structures/sites. Noise from the motorized tools used at the initial clearing of the structures/sites would also degrade the opportunity for solitude.

Undeveloped: An increased human presence, use of aircrafts and motorboats to access the areas, and use of motorized mechanical tools and equipment to remove hazardous vegetative fuel at and around 76 structures/sites would degrade the undeveloped quality of wilderness character. Noise from the motorized tools used at the initial clearing of the structures/sites would also degrade the undeveloped quality.

4.10.2.2 Cumulative Effects

See Cumulative Effects under Alternative A for a description of past impacts to wilderness resources. The impact of mechanical fuels reduction treatments within and near designated wilderness areas consists of 76 structures/sites that would have up to a 100-foot radius of vegetation cleared around structures, each resulting in less than an acre of vegetation clearing or no more than about 75 acres of clearing throughout the affected NPS units. Under Alternative B, impacts to wilderness characteristics would be minor from vegetation clearing, temporary disturbance of natural soundscapes from mechanical equipment and human presence when compared to over 29 million acres of Wilderness in the Alaska NPS units and the scale of the past impacts. The incremental increase from this alternative to manage hazardous vegetative fuels would be minor.

4.10.2.3 Conclusion

Clearing vegetation around 76 structures/sites would degrade the untrammeled and natural qualities of wilderness character. The impacts from vegetation clearing to untrammeled and natural qualities would be adverse, minor, site-specific, and long-term because the amount to be cleared would be small areas—less than one acre and no more than 75 acres per structure/site—in the affected NPS units. The increased human presence, use of airplanes and helicopters to access the areas, and use of motorized mechanical tools and equipment at and around high priority structures/sites would cause degradation of opportunities for solitude and undeveloped qualities of wilderness

character. Degradation would be short-term, adverse, minor, and site-specific for motorized access to sites and short-term, adverse, up to minor, and local for noise from the use of motorized tools. Alternative B would also provide beneficial, long-term, minor, localized effects to wilderness character through the reduced potential for future severe wildfires and associated fire-suppression activities at and adjacent to structures and sites.

4.10.3 Impacts from Alternative C: Mechanical Fuels Reduction & Prescribed Fire

4.10.3.1 Direct and Indirect Effects of Alternative C on Wilderness

This alternative would include the use of prescribed burning as an additional tool to clear vegetation accumulated around structures/sites. This alternative could involve treatments beyond the initially identified Firewise buffer, including fuel breaks. This would reduce the potential for wildfires that would be more difficult to control at and adjacent to the structures/sites.

Untrammeled: Clearing vegetation around the 76 structures/sites would manipulate the wilderness, degrading the untrammeled quality of wilderness character. Using prescribed burning would manipulate the wilderness over a larger area around the 76 structures/sites, thus further degrading the untrammeled quality.

Natural: There would be a minor effect on natural processes or ecosystems because the areas affected are small. Firewise treatments would affect a minimum distance of 100 feet from each structure/site where vegetation would be altered. All vegetation would be removed within 15 feet of the 76 structures/sites. Vegetation would be removed or thinned beyond the 15-foot radius from the 76 structures/sites. Prescribed burning would impact the natural air quality, would alter the vegetation and soils, and could displace wildlife at and adjacent to the 76 structures/sites. However, impacts would be site-specific and would not constitute a large area of the wilderness or affect ecological processes on a large scale.

Opportunities for solitude and unconfined resources: An increased human presence, use of airplanes and helicopters to access the areas, and use of motorized mechanical tools and equipment would occur to remove hazardous vegetative fuels at and around 76 structures/sites. Each of the 76 structures/sites would be visited for site reconnaissance, on-site evaluation and an on-site meeting with the contractor. Noise associated with site visits would temporarily degrade opportunities for solitude in the wilderness at and adjacent to the 76 structures/sites. Noise from the motorized tools used at the initial clearing of the structures/sites would also degrade the opportunity for solitude. Prescribed burning would contribute to additional degrading of the opportunity for solitude by the presence of fire crews in and around the 76 structures/sites.

Undeveloped: An increased human presence, use of aircrafts and motorboats to access the areas, and use of motorized mechanical tools and equipment to remove hazardous vegetative fuel at and around 76 structures/sites would degrade the undeveloped quality of wilderness character. Noise from the motorized tools used to conduct prescribed burning and to clear vegetation at and around the structures/sites would also degrade the

undeveloped quality. Prescribed burning would contribute to additional degrading of the undeveloped quality.

4.10.3.2 Cumulative Effects

See Cumulative Effects under Alternative A for a description of past impacts to wilderness resources. The impact of mechanical fuels reduction treatments within and near Wilderness areas is the same as Alternative B. Impacts from broadcast burns within and near Wilderness areas would consist of 25,500 acres over 15 years—WRST, LACL, YUCH, and WEAR Alaska NPS units. Prescribed broadcast burning would occur at 76 structures/sites within the designated wilderness areas treating up to about 5,700 acres in the affected NPS units. Under Alternative C, impacts to wilderness characteristics would be minor from vegetation clearing, temporary disturbance of natural soundscapes from mechanical equipment and fire crews when compared to acres of Wilderness in the Alaska NPS units (over 29 million) and the scale of the past impacts. The incremental increase from this alternative to manage hazardous vegetative fuels would be minor.

4.10.3.3 Conclusion

Alternative C would have the same impacts for the use of mechanical tools in designated wilderness areas, as Alternative B. Prescribed burning would contribute to additional degrading of all qualities of wilderness character. The impacts from prescribed burning to untrammeled and natural qualities would be adverse, minor, site-specific, and long-term because the amount to be cleared would be small areas in the affected NPS units. The increased human presence, use of airplanes and helicopters to access the areas, and use of motorized mechanical tools and equipment at and around the structures/sites would cause additional degradation of opportunities for solitude and undeveloped qualities of wilderness character. Degradation would be short-term, adverse, minor, and site-specific for motorized access to sites and short-term, adverse, up to minor, and local for noise from the use of motorized tools. Alternative C would also provide beneficial, long-term, minor, localized effects to wilderness character through the reduced potential for future severe wildfires and associated fire-suppression activities at and adjacent to the structures/sites.

4.11 Effects to Wildlife and Habitat

4.11.1 Impacts from Alternative A (No Action)

4.11.1.1 Direct and Indirect Effects of Alternative A on Wildlife and Habitat

Hazardous vegetative fuels would not be cleared or thinned around structures or roads in the project area under this alternative. Consequently, the risk of severe wildfires would increase around identified protection points. Generally, the effects of fire on habitat are more substantial than the effects on existing animals. Habitat changes determine the suitability of the environment for future generations of animals. Severe fires are not as

beneficial to wildlife as are more moderate fires. Fires of low severity and intensity should benefit browsing animals and their predators by opening the canopy, recycling nutrients, and stimulating sprouting of shrubs (Kennedy and Fontaine 2009, Haggerstrom and Kelleyhouse 1996, Viereck and Schandelmeier 1980). Mature trees that are killed but not consumed by the fire provide sites and perches for cavity nesting by many raptors and passerine birds. Larger animals and adult birds can typically disperse from a burning forest; fires may kill small mammals or nesting birds. Fires may have a short-term negative impact on existing animals by displacing or sometimes killing them or by disrupting critical reproductive stages (Kennedy and Fontaine 2009, Smith 2000). However, populations may recover quickly if suitable habitat is provided. Herbivores are directly affected by changes in vegetative cover and forage associated with fire. Predators respond indirectly to changes in cover and abundance of their primary prey. Fire severity and frequency influence the length of time that grass and herbaceous plant stage will persist. Severe burning delays the re-establishment of shrubs. Fire dependent vegetation may decrease in prevalence and vigor, with negative effects on wildlife species adapted to those vegetation types.

Without sufficient ecological restoration in these areas, invasive species could continue to increase in density and abundance, potentially out-competing native vegetation and leading to a more homogenous habitat state, thus reducing wildlife habitat quality and increasing the potential for an uncharacteristic wildfire. In addition, without successful ecological restoration (i.e., prescribed fire mimicking natural fire cycles), fire dependent vegetation may decrease in prevalence and vigor, with negative effects on wildlife species adapted to those vegetation types. This could also lead to a buildup of hazardous fuel loads, which could lead to more intense wildfires that are difficult to suppress/manage. Impacts on wildlife habitat and individuals due to increased potential for locally severe fire effects would be indirect, adverse, up to moderate, localized, and long-term.

Furthermore, with increasing density of vegetation around structures and important human-use protection sites, the potential for hazardous human-wildlife close encounters increases.

4.11.1.2 Cumulative Effects

Development, maintenance activities, and management practices (e.g., suppression activities), within and outside of the project area could contribute to cumulative impacts. Roads, the majority of which are in WRST, and trails have fragmented wildlife habitat, and have led to disturbance of wildlife and occasional wildlife-human interactions. Numerous airstrips and landing pads also exist in the parks. Park buildings, campgrounds and other facilities have disturbed wildlife habitat in most park units. The cumulative effects of these past, present, and expected future human activities on the wildlife and habitat of the parks is judged moderate in a setting with the millions of acres of undisturbed wildlife habitat and health wildlife populations. The incremental increase in impacts from the No Action Alternative to manage hazardous vegetative fuels would

result in a minor additional impact on wildlife in terms of increased risk of severe wildfires near identified protection points.

4.11.3 Conclusion

This alternative would result in adverse, up to moderate, long-term impacts to wildlife and habitat by increasing the potential for future severe wildfires as hazardous vegetative fuels increase around structures and adjacent to roads. Furthermore, as the density of vegetation increases around structures and identified protection sites, the potential for hazardous human-wildlife close encounters increases.

4.11.2 Impacts from Alternative B: Mechanical Fuels Reduction

4.11.2.1 Direct and Indirect Effects of Alternative B on Wildlife and Habitat

Impacts under this alternative would be similar to those under Alternative A. Under Alternative B, mechanical treatments would remove vegetation that provides wildlife habitat for relatively small areas in the Park units (Table 2.2). This would result in minor short-term loss of wildlife habitat, which is widespread in the respective NPS units. Individual animals could be inadvertently killed during mechanical treatments, but this is highly unlikely. Wildlife is likely to disperse in presence of the noise and human activity. Implementing the mechanical treatments would reduce the risk of severe wildfires that could burn vegetative fuels around human structures and identified protection points, thereby protecting a few thousand acres of habitat across the affected parks.

Impacts on wildlife species that are less mobile from mechanical and manual treatments used for hazardous fuel reduction would be short-term, adverse, and localized due to stress and disturbance. Potential mitigations include avoiding seasons when birds are actively nesting. Short-term impacts on more mobile wildlife species would be temporary displacement from the treatment areas. Thinning of vegetation around structures and other human use sites identified as protection points would reduce the potential for close encounters between humans and wildlife because sighting distances would increase.

4.11.2.2 Cumulative Effects

The primary past impact to wildlife habitat is clearing of native terrestrial vegetation for construction of structures, transportation corridors, and maintenance of trees and shrubs that would inhibit an area's administrative use. Past habitat impacts include approximately 970 acres of vegetation cleared for construction of roads, OHV trails, airfield strips, and commercial lodges. There are approximately 900 acres of land that have been impacted by past mining operations in YUCH and 400 abandoned mine sites in KATM. Impacts to wildlife populations include sport and subsistence hunting.

The impacts of mechanical fuels reduction treatments under Alternative B to wildlife and/or their habitat would be minor (1,485 acres of mechanical treatments over 15 years) when compared to over 40 million acres covered by the Alaska NPS units and the scale

of the past impacts. The incremental increase in impacts from Alternative B to manage hazardous vegetative fuels would result in a minor additional impact on wildlife.

4.11.2.3 Conclusion

This alternative would result in minor adverse effects to wildlife from losses of habitat, but beneficial long-term impacts from decreasing the potential for future severe wildfires as hazardous vegetative fuels are reduced around structures and adjacent to roads and from decreasing the potential for human-wildlife close encounters near protection points.

4.11.3 Impacts from Alternative C: Mechanical Fuels Reduction & Prescribed Fire

4.11.3.1 Direct and Indirect Effects of Alternative C on Wildlife and Habitat

The effects of this alternative are similar to those under Alternative B. Use of prescribed fire would temporarily disturb wildlife species within the burn units. During prescribed fire activities, wildlife in the area would experience an increase in noise disturbance from equipment, human presence, smoke, fire, and soil disturbance. In addition, reproduction and survival for individuals may be affected due to increased stress and loss of foraging opportunities (Kennedy and Fontaine 2009, Smith 2000). Temporary displacement and habitat loss may occur for some individuals within the burn units. Mortality to wildlife species that are smaller and less mobile, such as small mammals, may also occur from prescribed burns. However, these species are relatively common and/or widespread, and occasional impacts to individual animals generally do not affect wildlife populations, wildlife communities, or ecological processes.

Prescribed fire would benefit individual wildlife species and their habitat by emulating the natural fire regime and creating a more natural vegetation pattern across the Alaska NPS units, enhancing the variety and diversity of vegetation communities and wildlife habitat present. Prescribed fire would also provide more nutrients to the soils in the short-term, which would increase plant growth and improve the amount available and nutritional quality of forage for wildlife species (Viereck and Schandelmeier 1980). The burned areas generally green up earlier than non-burned areas, thus providing earlier grazing.

Prescribed fires could directly impact nesting migratory birds if conducted during breeding season through mortality of fledglings that are unable to flee or avoid the burn units; however, avoiding breeding seasons is noted in the mitigation measures section 2.6.

The habitat requirements of passerine birds vary greatly with their nesting and foraging requirements. Ground, shrub and timber nesting birds are vulnerable to fire in nesting and brooding periods in wet and dry tundra and gramminoid dominated habitats and regions.

Hawks, owls, eagles and falcons may benefit from fire. Small raptors that feed on mice and voles benefit most rapidly by rejuvenation of herbaceous vegetation that is preferred by some rodents and birds.

Black bears are omnivorous and fires often increase the availability of both plant and animal foods in some habitats and decrease preferred foods in others. Moose calves are important in the diets of both black and grizzly bears in the springtime. Early stages of plant succession tend to increase moose production. Therefore, more calves are available as prey.

Caribou have definitive summer and winter ranges. Lichens are the major forage for caribou in winter and typically take 80 years after fire disturbance to achieve suitable biomass for caribous (Auclair 1983). Light fires may rejuvenate stands of lichens with declining production.

Fire generally benefits moose populations by increasing the quantity of forage for two to three decades and improving forage quality for two or three years (Viereck and Schandelmeier 1980).

Impacts on wildlife species that are less mobile from mechanical and manual treatments used for hazardous fuel reduction would be short-term, adverse, and localized due to stress and disturbance. Potential mitigations include avoiding seasons when ground nesting birds are actively nesting. Short-term impacts on more mobile wildlife species would be temporary displacement from the treatment areas.

There is anecdotal and oral-history evidence of indigenous burning in Alaska to maintain open areas and early-successional habitat for game prior to the influx of Europeans.

4.11.3.2 Cumulative Effects

See Cumulative Effects of Alternative B for a description of past impacts to wildlife. The impacts of mechanical fuels reduction treatments (1,485 acres over 15 years) and broadcast prescribed burns (25,500 acres over 15 years) under Alternative C to wildlife habitat would be minor when compared to over 40 million acres covered by the Alaska NPS units and the scale of the past impacts. The incremental increase in impacts from Alternative C to manage hazardous vegetative fuels would result in minor additional impact on wildlife.

4.11.3.3 Conclusion

This alternative would result in minor adverse effects to wildlife from losses of habitat, but beneficial long-term impacts from decreasing the potential for future severe wildfires as hazardous vegetative fuels are reduced around structures and adjacent to roads.

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5.0 CONSULTATION AND COORDINATION

5.1 Public Involvement

The Alaska NPS Wildland Fire Management Program considers outreach and education on the hazardous vegetative fuels program a top priority. For a summary of the fuels program, visit http://www.nps.gov/akso/nature/fire/firefuels.cfm. Over the last 10 years the program has conducted community-based Firewise workshops, developed table top and standing graphic panels, and written and disseminated brochures and rack cards about removing fuels to reduce wildfire risk around structures, and natural and cultural resources. Two high profile vegetative fuels reduction projects were implemented at headquarter sites for Denali NP and Wrangell-St. Elias NP. Part of the success of those projects was comprehensive communication plans that targeted NPS employees and the local community and included consistent key messages about the importance of managing fuels around park structures and individual homes. Fire management staff reached out to villages in the Ahtna region while planning for the WRST fuels project. Village residents received firewood. For the benefit of employees and the public, when a fuels project is conducted in a park, park managers work with the park public information officer to disseminate a press release. At the conclusion of the project, fire stories are written to highlight significant achievements, partnerships, lessons learned etc. To peruse those stories, visit http://www.nps.gov/akso/nature/fire/stories.cfm.

5.2 Intra-agency and Inter-agency Involvement

The NPS held a multi-park teleconference on the draft EA on 11/27/2012, two working days after the draft EA was received, and decided to take more time to involve park representatives in the review over the holiday season. Parks wanted to consider the application of special use permits to authorize private property owners within parks (inholdings) to conduct Firewise treatment on park property where hazardous vegetative fire fuels have accumulated and threaten to burn their structures within 100 feet of a boundary with NPS.

The NPS held a teleconference with Ted Swem and Ellen Lance of the U.S. Fish and Wildlife Service on May 23, 2013 to discuss the potential for adverse effects on listed threated and endangered species and their habitats. The NPS followed up with a letter requesting USFWS to list the potential affected species and their habitats for consideration in the EA. We all decided the proposed NPS action would not likely adversely affect listed wildlife species that spend their entire lives in the sea because all of the proposed NPS actions would take place on land. Some seabirds that nest on inland sites could be adversely affected if proposed actions were to take place in or near nesting habitat.

5.3 List of Preparers and Consultants

Table 5.1 lists personnel who prepared parts and consulted on development of this environmental assessment, respectively.

Table 5.1. List of EA Preparers (Interdisciplinary Team)

Name	Organization	Position
Bud Rice	NPS Alaska Region, Environmental Planning and Compliance	NEPA Project Coordinator, Purpose and Need, Alternatives Chapter
Dan Warthin	NPS Alaska Region, Fire Management Officer	Regional Fire Management Officer, Alternatives Chapter
Clarence Summers	NPS, Alaska Region, Subsistence Specialist	ANILCA 810 Evaluation
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Mike Tremble	Ecosystem Management, Inc.	Project Manager
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Stephanie Lee	Ecosystem Management, Inc.	NEPA Specialist, Biologist
Garth Hayden	Ecosystem Management, Inc.	Editor, Cultural Resources Specialist
Ted Swem	USFWS, Fairbanks Field Office	Endangered Species Branch Chief
Ellen Lance	USFWS, Anchorage Field Office	Endangered Species Branch Chief

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Appendix A: ANILCA Subsistence Evaluation and Findings

ANILCA SECTION 810(a)
SUBSISTENCE EVALUATION AND FINDING

I. Introduction

Title VIII, Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA) requires Federal agencies having jurisdiction over lands in Alaska to evaluate the potential impacts of proposed actions on subsistence uses and needs. This analysis evaluates the potential restrictions to ANILCA Title VIII subsistence uses and needs that could result from the implementation of the National Park Service (NPS) Alaska Fire Hazardous Vegetative Fuels Management Plan within the boundaries of Alagnak Wild River, Katmai National Park and Preserve, Bering Land Bridge National Preserve, Cape Krusenstern National Monument, Gates of the Arctic National Park and Preserve, Kobuk Valley National Park, Lake Clark National Park and Preserve, Noatak National Preserve, Wrangell-St.Elias National Park and Preserve, and Yukon-Charley Rivers National Preserve. The NPS is granted broad statutory authority under various acts of Congress to manage and regulate activities in areas of the National Park System, (16 U.S.C. 1a-2(h), 3, and 3120).

II. The Evaluation Process

Section 810(a) of ANILCA states:

In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands . . . the head of the Federal agency . . . over such lands . . . shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for the purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit, or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be effected until the head of such Federal agency

(1) gives notice to the appropriate State agency and the appropriate local committees and regional councils established pursuant to Section 805;

(2) gives notice of, and holds, a hearing in the vicinity of the area involved; and

(3) determines that (A) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands, (B) the proposed activity would involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition, and (C)

reasonable steps would be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions.

ANILCA and National Park Service regulations authorize subsistence use of resources in all Alaska national parks, monuments, preserves and components of the Wild and Scenic River System with the exception of Glacier Bay National Park, Katmai National Park, Kenai Fjords National Park, Klondike Gold Rush National Historical Park, "old" Mount McKinley National Park, and Sitka National Historical Park (Codified in 36 CFR Part 13, Subparts A, B, and C).

Section 201 of ANILCA created new units of the national park system in Alaska for the following purposes:

Aniakchak National Monument and Preserve, containing approximately one hundred and thirty-eight thousand acres of public lands, was created by ANILCA, section 201(1) for the following purposes:

"To maintain the caldera and its associated volcanic features and landscape, including the Aniakchak River and other lakes and streams, in their natural state; to study, interpret, and assure continuation of the natural process of biological succession; to protect habitat for, and populations of, fish and wildlife, including, but not limited to, brown/ grizzly bears, moose, caribou, sea lions, seals, and other; marine mammals, geese, swans, and other waterfowl and in a manner consistent with the foregoing, to interpret geological and biological processes for visitors."

Bering Land Bridge National Preserve, containing approximately two million four hundred and fifty-seven thousand acres of public land, was created by ANILCA, section 201(2) for the following purposes:

"To protect and interpret examples of arctic plant communities, volcanic lava flows, ash explosions, coastal formations and other geologic processes; to protect habitat for internationally significant populations of migratory birds; to provide for archeological and paleontological study, in cooperation with Native Alaskans, of the process of plant and animal migration, including man, between North America and the Asian Continent, to protect habitat for, and populations of, fish and wildlife including, but not limited to, marine mammals, brown/grizzly bears, moose and wolves; ….to continue reindeer grazing use…. in accordance with sound range management practices; to protect the viability of subsistence resources; and in a manner consistent with the foregoing, to provide for outdoor recreation and environmental education activities including public access for recreational purposes to the Serpentine Hot Springs area."

Cape Krusenstern National Monument, containing approximately five hundred and sixty thousand acres of public lands, was created by ANILCA, section 201(3) for the following purposes:

"To protect and interpret a series of archeological sites depicting every known cultural period in arctic Alaska; to provide for scientific study of the process of human population of the area from the Asian Continent, in cooperation with Native Alaskans, to preserve and interpret evidence of prehistoric and historic Native cultures, to protect habitat for seals and other marine mammals; to protect habitat for and populations of, birds, and other wildlife, and fish resources; and to protect the viability of subsistence resources…."

Gates of the Arctic National Park, containing approximately seven million fifty-two thousand acres of public lands, Gates of the Arctic National Preserve, containing approximately nine hundred thousand acres of Federal lands, was created by ANILCA, section 201(4)(a) for the following purposes:

"To maintain the wild and undeveloped character of the area, including opportunities for visitors to experience solitude, and the natural environmental integrity and scenic beauty of the mountains, forelands, rivers, lakes, and other natural features; to provide continued opportunities, including reasonable access, for mountain climbing, mountaineering, and other wilderness recreational activities, and to protect habitat for and the populations of, fish and wildlife, including, but not limited to, caribou, grizzly bears, Dall sheep moose, wolves, and raptorial birds."

Kobuk Valley National Park, containing approximately one million seven hundred and ten thousand acres of public land, was created by ANILCA, section 201(6) for the following purposes:

"To maintain the environmental integrity of the natural features of the Kobuk River Valley, including the Kobuk, Salmon, and other rivers, the boreal forest, and the Great Kobuk Sand Dunes, in an undeveloped state, to protect and interpret, in cooperation with Native Alaskans, archeological sites associated with Native cultures; to protect migration routes for the Arctic caribou herd; to protect habitat for, and populations of, fish and wildlife including but not limited to caribou, moose, black and grizzly bears, wolves, and waterfowl and to protect the viability of subsistence resources."

Lake Clark National Park, containing approximately two million four hundred thirty-nine thousand acres of public lands and Lake Clark National Preserve, containing approximately one million two hundred and fourteen thousand acres of public lands, was created by ANILCA, section 201(7) (a) for the following purposes:

"To protect the watershed necessary for perpetuation of the red salmon fishery in Bristol Bay; to maintain unimpaired the scenic beauty and quality of portions of the Alaska Range and the Aleutian Range, including active volcanoes, glaciers, wild rivers, lakes, waterfalls, and alpine meadows in their natural state; and to protect habitat for and populations of fish and wildlife including but not limited to caribou, Dall sheep, brown/grizzly bears, bald eagles, and peregrine falcons." …

Noatak National Preserve, containing approximately six million four hundred and sixty thousand acres of public lands, was created by ANILCA, section 201(8) (a), for the following purposes:

"To maintain the environmental integrity of the Noatak River and adjacent uplands within the preserve in such a manner as to assure the continuation of geological and biological processes unimpaired by adverse human activity; to protect habitat for, and populations of, fish and wildlife, including but not limited to caribou, grizzly bears Dall sheep, moose, wolves, and for waterfowl, raptors, and other species of birds; to protect archeological resources; and in a manner consistent with the foregoing, to provide opportunities for scientific research."

Wrangell-St. Elias National Park, containing approximately eight million one hundred and forty-seven thousand acres of public lands, and Wrangell-St. Elias National Preserve containing approximately four million one hundred and seventeen thousand acres of public lands, was created by ANILCA, section 201(9), for the following purposes:

"To maintain unimpaired the scenic beauty and quality of high mountain peaks, foothills, glacial systems, lakes and streams, valleys, and coastal landscapes in their natural state; [and] to protect habitat for, and populations of, fish and wildlife including but not limited to caribou, brown/grizzly bears, Dall sheep, moose, wolves, trumpeter swans and other waterfowl, and marine mammals; and to provide continued opportunities including reasonable access for mountain climbing, mountaineering, and other wilderness recreational activities."

Yukon-Charley Rivers National Preserve, containing approximately one million seven hundred and thirteen thousand acres of public lands, was created by ANILCA, section 201(9), for the following purposes:

"To maintain the environmental integrity of the entire Charley River basin, including streams, lakes and other natural features, in its undeveloped natural condition for public benefit and scientific study; to protect habitat for, and populations of, fish and wildlife, including but not limited to the peregrine falcons and other raptorial birds, caribou, moose, Dall sheep, grizzly bears, and wolves; and in a manner consistent with the foregoing, to protect and interpret historical sites and events associated with the gold rush on the Yukon River and the geological and paleontological history and cultural prehistory of the area. Except at such times when and locations where to do so would be inconsistent with the purposes of the preserve, the Secretary shall permit aircraft to continue to land at sites in the Upper Charley River watershed."

The act also states, "Subsistence uses by local residents shall be permitted in the park where such uses are traditional, in accordance with the provisions of title VIII."

ADDITIONS TO EXISTING AREAS

Section 202 of ANILCA created new units and additions to Alaska NPS areas. The following ANILCA additions are affected by the proposed action:

Katmai National Monument was expanded by the addition of an area containing approximately one million and thirty-seven thousand acres of public land. Approximately three hundred and eight thousand acres of additional public land was established as Katmai National Preserve. The monument was re-designated as "Katmai National Park". The park and preserve were created by ANILCA, section 202(2), for the following purposes:

"To protect habitats for, and populations of, fish and wildlife including, but not limited to, high concentrations of brown/grizzly bears and their denning areas; to maintain unimpaired the water habitat for significant salmon populations; and to protect scenic, geological, cultural and recreational features."

GENERAL ADMINISTRATION

Among other general administrative provisions, section 203 of ANILCA states, "Subsistence uses by local residents shall be allowed in national preserves and, where specifically permitted by this Act, in national monuments and parks."

TITLE VI, PART C – ADDITION TO NATIONAL WILD AND SCENIC RIVERS SYSTEM LOCATED OUTSIDE NATIONAL PARK SYSTEM UNITS
Section 603(a) of ANILCA designated the following wild and scenic river outside the national park system in Alaska:

ALAGNAK, ALASKA. – Those segments or portions of the main stem and Nonvianuk tributary lying outside and westward of the Katmai National Park /Preserve and running to the west boundary of township 13 south, range 43 west; to be administered by the Secretary of the Interior.

Alagnak Wild River: The upper 108 km (67 mi) of the Alagnak, including the two upper branches, were designated a Wild River in 1980 by Title VI, Section 601 (25 and 44) of the Alaska National Interest Lands Conservation Act (ANILCA) and is managed by the National Park Service (NPS) according to the provisions of the National Wild and Scenic Rivers Act of 1968. All but the lower 29 km (18 mi) of the river have been designated Wild River status. Subsistence uses by local residents are allowed in accordance with the provisions of ANILCA and Federal regulations.

ANILCA and NPS regulations do not authorize subsistence use on federal lands within Kenai Fjords National Park, Klondike Gold Rush National Historical Park, Sitka National Historical Park, and areas previously managed as Mt. McKinley National Park, Katmai National Monument, and Glacier Bay National Monument.

The potential for significant restriction must be evaluated for the proposed action's effect upon ". . . subsistence uses and needs, the availability of other lands for the purposes sought to be achieved and other alternatives which would reduce or eliminate the use." (Section 810(a))

III. Proposed Action on Federal Lands

The NPS is considering adopting new protocols in a comprehensive fire hazardous vegetative fuels management plan to protect lives, property, and natural resources threatened by wildfire. Proposed actions modify the amount, structure, and continuity of flammable vegetation to reduce fire occurrence and intensity and risks posed by wildfire within the boundaries of Alagnak Wild River, Katmai National Park and Preserve, Bering Land Bridge National Preserve, Cape Krusenstern National Monument, Gates of the Arctic National Park and Preserve, Kobuk Valley National Park, Lake Clark National Park and Preserve, Noatak National Preserve, Wrangell-St. Elias National Park and Preserve, and Yukon-Charley Rivers National Preserve. The NPS requires every administrative unit with burnable vegetation to develop a fire management plan.

The following is a brief summary of the proposed alternatives considered in the environmental assessment (EA):

Alternative A: No-Action
Under this alternative no coordinated program for clearing or thinning vegetation around structures would occur. Vegetation would continue to grow and accumulate around structures. The park's wild land fire management staff and structural fire brigade would respond to fires in accordance with the Alaska Interagency Wild land Fire Management Plan 2010 (Alaska Wildland Fire Coordinating Group). Trees which present a physical hazard to personnel, structures, or equipment would be removed on a case by case basis.

Alternative B Mechanical Fuels Reduction
General Concept
The National Park Service will remove hazardous vegetative fuels that surround structures in the developed areas and at remote backcountry structures utilizing general Alaska Firewise concepts. Fuel reduction techniques would utilize mechanical treatments to reduce or remove vegetation to create and maintain a defensible space around park structures or private inholdings. Mechanical fuels reduction is defined as the use of power saws, cross-cut saws, mowers, hand tools, or similar devices to mitigate hazard fuel buildup or recreate historical landscape conditions in areas where fire would pose an unreasonable threat to property or resources. Creation of this space would reduce the risk of property damage in the event of a wildland fire, improve security for visitors and residents, and reduce the risks for firefighters.

The proposed areas of hazardous vegetative fuel treatments are focused on Park Development Zones. The proposal also includes isolated historic and cultural sites located throughout the affected NPS areas. To continue the benefits of hazardous vegetative fuel reduction, a maintenance program involving periodic repeated removal of vegetation in

these same areas is addressed in this proposal. Similar treatments would also be applied to new structures

Alternative C: Mechanical Fuels Reduction & Prescribed Fire (Environmentally Preferred Alternative)
This alternative would include all the aspects of Alternative 2 and would use broadcast burning as an additional clearing tool to create a protected buffer for the given asset. Park management would use prescribed fire for the purposes for reducing hazard fuel loads in the vicinity of resources requiring protection or for restoring historical conditions at selected sites.

Prescribed fire operations constitute the intentional setting of vegetation on fire as an alternative/supplemental means to removing fuels between a protection asset and the environment from which a wildfire would approach. These operations would reduce fuel availability to a wildfire as it advances across the landscape thus greatly reducing the intensity of a fire.

This alternative may involve treatments of varying size beyond the initially identified Firewise buffer, including fuel breaks. Fuel breaks often serve as the first line of defense. Fuel breaks are typically near a community or high concentration of structures. Fuel breaks may be used in lieu of prescribed fire or in combination with prescribed fire where appropriate. Typically, fuel breaks are created using the shaded fuel break concept, much like the mechanical fuels reduction treatment prescription for Zone 2 and Zone 3. Prescribed burns would only occur under favorable conditions generating low intensity burns that could be easily controlled and producing minimal smoke effects to surrounding inhabited areas. The prescribed burns would utilize strategic weather, vegetative and topographic conditions identified in a specific burn plan to attain desired effects. The burn treatments would be located to capitalize on fuel breaks of natural features (e.g. rock outcroppings, streams, and lakes) and manmade facilities (e.g. roads, trails, and utility corridors). They would also be located close enough to structures that a wildfire would not become unmanageably intense before it reached Zone 2 of the Fire Wise landscaping.

IV. Affected Environment

Subsistence uses, as defined by ANILCA, Section 803, means “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." Subsistence activities include hunting, fishing, trapping, and collecting berries, edible plants, and wood or other materials.

Alagnak Wild River is located in Game Management Unit (GMU) 9C. The headwaters of the Alagnak Wild River lie within the rugged Aleutian Range of neighboring Katmai National Park & Preserve. Meandering west towards Bristol Bay and the Bering Sea, the Alagnak traverses the beautiful Alaska Peninsula, providing an unparalleled opportunity

to experience the unique wilderness, wildlife, and cultural heritage of southwest Alaska. Local residents from King Salmon, Levelock, Igiugig, Naknek, and other villages make use of the Alagnak area for subsistence fishing, hunting, berry picking, and firewood gathering. In late May or early June, local residents hunted marine mammals and gather gull eggs, sourdock, wild celery, and fiddlehead ferns for personal consumption. In summer, salmon are caught for smoking, drying and freezing for the winter. Moose, caribou, and bear are hunted during the fall. As colder weather approached, local residents collected salmon berries, black berries and blueberries for winter use. In winter, smelt, trout, and grayling are harvested by ice fishing. Subsistence trapping was also an important activity. Mink, otter, martin, beaver, fox, wolf, lynx, wolverine, rabbit, weasel, and squirrel are trapped for their furs. Furs may have been sold or used for clothing.

Katmai National Park and Preserve located on the Northern Alaska in GMU 9C, contain superlative geologic features, scenery, wildlife and human history. Subsistence uses by local residents are allowed in Katmai National Preserve. ANILCA and NPS regulations do not authorize subsistence use on federal lands within Katmai National Park. Residents of communities around the park and preserve have hunted, fished and gathered berries and other materials from the land for many generations. Before the 1912 Mt. Katmai/Novarupta eruption, there were four year-round villages and many other seasonally used camps in what is now Katmai National Park and Preserve. Due to the heavy ash fall of the 1912 eruption, the inhabitants of Savonoski, Kaguyak (Douglas), Kukak, and Katmai villages left and resettled elsewhere along the Alaska Peninsula.

People with historic ties to Katmai now live around southwest Alaska and beyond, especially in the villages of South Naknek, Naknek, King Salmon, Kokhanok, Igiugig, Levelock, Egegik, Chignik and Perryville. Many Katmai descendants are actively involved in subsistence activities, and participate in the park management process through Alaska Native corporate and non-profit organizations.

The region's subsistence resource harvest activities include hunting, trapping, fishing, gathering firewood, berries, wild plants and bird eggs. Historical resource utilization patterns such as fish camps or communal hunts, are linked to traditional social and subsistence use patterns. Sharing of resource occurs between communities, as well as within communities throughout the region. Local residents use subsistence resources such as caribou, brown bear, moose, beaver, snowshoe hare, fox, lynx, mink, wolf, wolverine, ptarmigan, waterfowl, otter, marine mammals, salmon, trout, halibut, berries, wild edible plants, and other wood resources.

The Northern Alaska Peninsula and Mulchatna caribou herds are an important subsistence resource for communities within GMU 9B and 9C. Since the late 1940's the Northern Alaska Peninsula Caribou Herd (NAPCH) has grown steadily from 2,000 to about 20,000 in 1984. Until recently the NAPCH population has been high throughout the 1980's and early 1990's when the population began to decline to about 10,000 animals in 1997. Aerial surveys conducted in June/July of 1998 revealed the population to decline by 800 animals bringing the current population estimate to 9,200 animals (Aug. 28, 1998, FWS Staff Analysis Report). As a result, the State Board of Game

(BOG) instituted a Tier II subsistence hunt for the 1999/2000 regulatory year and the Federal Subsistence Board (FSB) followed suit by issuing Federal permits for public lands in GMUs 9C and 9E. State regulations also closed the non-resident caribou season in GMU 9E.

Recent moose surveys conducted on established trend areas by the Alaska Department of Fish and Game and US Fish and Wildlife Service (FWS) show that the current moose population is stable. The moose population is above the management objective for a bull:cow ratio of 40-50 bulls per 100 cows set the ADFG. In 1984 non-resident hunting pressure forced the BOG to reduce the winter season from 31 days to 15 days. Current Federal subsistence regulations allow qualified residents of GMUs 9A, 9B, 9C, and 9E to harvest one bull with no antler restrictions during Sept. 1- 15 or Dec. 1 – Dec 31. Current State regulations allow resident hunters one bull harvest limit during the Sept. 1 – Sept 15 and Dec. 15 – Jan 15 hunting season. Nonresident hunters are limited to harvest one bull with antler restrictions during Sept. 5 – Sept. 15 season.

Federal subsistence regulations allow for qualified local rural residents the opportunity to take black and brown bears, beaver, coyote, red fox, lynx, mink, muskrat, land otter, wolverine and wolf. During the 1992-96 reporting harvest period an average of 169 beaver was harvested by an average of 22.2 trappers in GMU 9. Lynx total harvest average was 41.2 by 19.4 trappers, 83.2 otters harvested by 22 trappers and 46.4 wolverines harvested by 24.2 trappers. The 1993-94 Harvest Summary, ADFG, Division of Wildlife Conservation, March 1995 reported 40 wolves were harvested in GMU 9E by 10 trappers.

Bering Land Bridge National Preserve is located in northwestern Alaska about 500 miles northwest of Anchorage in GMUs 22 and 23 on the Seward Peninsula. Local residents use camps within the preserve to support their subsistence hunting, trapping, fishing and wild plant food gathering activities. Seasonal use of the preserve is largely a function of viable transportation. During winter and spring snow machines and dog teams used to access the preserve. Summer and fall access is largely by boat and so access is limited to coastal and riparian areas near navigable rivers and streams.

The preserve has a gradient of landforms from coastal plain along the northern coast rising to a central plateau, and bordered in the south by a mountain range. The climate shows both maritime and continental influences and is strongly affected by conditions of the surrounding maritime waters, whether they are frozen or ice-free (generally mid-June to early November).

Three hundred twenty-six species and subspecies of vascular plants and 60 lichens have been identified from the preserve. Brackish/salt marsh grasslands occur in estuaries and around lagoons with drier grasslands on sandy seashore dunes. Wet tundra is common throughout the coastal lowlands with moist tundra on drier hills and slopes. Moist tundra predominates throughout the uplands of the plateau and foothills generally as tussock grass but with shrubs in patches and thickets along river courses. Alpine tundra predominates in the mountainous areas. Willow, alder and birch make up some of the

more noticeable shrub thickets. Willow, sourdock, wild rhubarb, dwarf fireweed, wild celery, and a variety of berries such as blackberries, blueberries, salmon berries, and cranberries are valued subsistence resources.

The preserve's varied habitats support a rich avifauna and some 108 species have been recorded in or around the preserve. The marine/estuarine habitats along with extensive freshwater lakes and ponds support large populations of migratory geese, ducks, and shorebirds. Varied tundra habitats especially in the uplands support the majority of the preserve's passerine birds. Birds valued for their subsistence use include several geese (Lessor Canadian Goose, Emperor Goose, White-fronted Goose, and Brant), surface feeding ducks (Mallard, Pintail, Green-winged Teal, and American Wigeon), and diving ducks (Greater Scaup, Oldsquaw, and several species of eiders).

Large mammals include moose, caribou, muskoxen, and brown bear. Moose and caribou dominate in subsistence importance with muskoxen slowly increasing. The Western Arctic Caribou Herd is a major subsistence resource throughout its range. Currently estimated at about 325,000 animals, and apparently continuing to decline from a peak in about 490,000 animals in 2003, it remains a major resource, Substantial numbers of the herd (generally numbering several thousand though varying yearly) occupy winter range in the eastern half of the Seward Peninsula where they reasonably accessible to several communities. Brown bears are much less importance, but this importance varies by community.
Furbearers include wolf, wolverine, red and arctic foxes, beaver, muskrats, and arctic ground squirrels, which provide raw materials for clothing and handicraft items. Depending on the species trapped and market conditions, these resources provide a source of potential cash.

While the preserve does not actually contain offshore marine waters, those marine waters adjacent to the preserve contain a diverse group of marine mammals, many of which are important for subsistence. These include polar bear, bowhead whale, beluga whale, walrus, bearded seal, and several smaller seals such as spotted and ringed seals. Some of the seals use islands (part of the preserve) and beaches in the Cape Espenberg area as haul out areas.

Subsistence fishing occurs in both the fresh water areas of the preserve and marine waters adjacent to the preserve. While four species of salmon occur, chum salmon and pink salmon are the most important. Other important fish species include whitefish (both broad whitefish and humpback whitefish), herring, members of the cod family (burbot, arctic cod, saffron cod), sculpin, smelt, flounder, grayling, and arctic char.

There are three primary communities located adjacent to the preserve and within traditional tribal territories that use the lands and waters within the preserve as a source of subsistence resources. These are Deering, Shishmaref, and Wales. In addition, there are two more communities (Brevig Mission and Nome), some of whose residents utilize portions of the preserve as a source of some subsistence resources, though to a lesser degree than the three primary communities. There are also a few families from Kotzebue

who seasonally use the Cape Espenberg area of preserve. Additionally, subsistence resources harvested by the communities identified above may be distributed over a much wider social network especially among relatives and friends in the form of gifting, exchanges, and following social customs.

Cape Krusenstern National Monument is located about 550 miles northwest of Anchorage near Kotzebue and the villages of Kivalina and Noatak. North of the Arctic Circle, the monument occupies 70 miles of shoreline on the Chukchi Sea in GMU 23. The monument's coastline is composed of five large lagoons. Further inland, rolling hills topped by dry tundra are connected by large areas of tussock grass. The majority of the monument is characterized by tundra vegetation on the southern boundary adjacent to Kotzebue Sound and alpine tundra in the upland areas. Within the monument subsistence users have traditionally gathered berries, roots, and leaves of edible plants such as blue berries, salmonberries, cranberries, sourdock, wild chives, beach greens, willow leaves, masu and cottongrass. White spruce an important subsistence wood source for local residents is found in the southeast portion of the monument. White spruce is used as fuel to heat homes, construct cabins, boat frames, sled runners, spear handles, oars, drying racks, and tent stakes. In the spring and summer, local residents moved to fishing spots where temporary dwellings were often made with willow and covered with caribou hides. Sheefish, whitefish, salmon, northern pike, caribou, moose, muskox, hares, migratory birds, and marine mammals are major subsistence resources. The monument's offshore and inland marine environment provides important habitat for marine mammals including seals and beluga whales. During the winter, local residents travel to the monument by snow machine on a system of winter trails to hunt for animals and fish through the ice.

Kobuk Valley National Park is located in northwest Alaska within GMU 23. The middle two-thirds of the Kobuk River, from just above Kiana to just below Ambler is included in the park, as are several major tributaries (Salmon and Hunt rivers). Three general landscape types exist within Kobuk Valley National Park: the Baird Mountains, the Waring Mountains, and the Kobuk Valley (floodplains and terraces). The Baird Mountains, north and east of the river, are the western extension of the Brooks Range and separate the Kobuk and Noatak rivers. They range in height from 2500 to 4760 feet. On the south side of the Kobuk River lie the Waring Mountains, which are generally less than 2,000 feet high.

The Kobuk River runs through the lowland between these two sets of mountains. Trees approach their northern limit in the Kobuk Valley, where boreal forest and arctic tundra meet. Large expanses of tundra cover the valley in some locations, while forests cover the better-drained portions. In some places, sparse stands of spruce, birch, and poplar grow above a thick ground cover of lichens (reindeer moss). Sand created by the grinding action of glaciers has been carried to the valley by wind and water. Large sand dunes lie on the south side of the Kobuk River. These are the Great Kobuk Sand Dunes, the Little Kobuk Sand Dunes, and the Hunt River Sand Dunes. Older, vegetated dunes cover much of the southern portion of the valley.

The Kobuk Valley is partially forested and is typical of the broad transition zone between forest and tundra. The vegetation of this park is of particular scientific interest because of tree line phenomena, the relationship of vegetation to the sand dunes, the proximity to the eastern end of the Bering land Bridge, and the relationship of vegetation to human use of the Kobuk Valley for thousands of years. Forests occur on the better-drained areas along stream courses and on higher ground. There is an alternating tundra and forest pattern that forms a mosaic across the valley. Spruce and balsam poplar grow in the lower and middle reaches of the river valleys that extend into the Baird and Waring mountains. Willow and alder thickets and isolated cottonwood grow up to the headwaters of the rivers and streams. Alpine tundra covers the higher slopes and ridges. Tussock tundra and low, heath-type vegetation covers most of the flat floor of the valley.

Humans have made their homes in Kobuk Valley National Park for at least 9,000 years. Inupiaq Eskimo peoples call this area home. In the past, Athapaskan Indians also traveled and traded in the upper Kobuk region. Subsistence harvest of fish and wildlife is allowed in the park by qualified subsistence users subject to Federal subsistence management regulations and park-specific regulations and policies. Caribou, moose, furbearers, waterfowl, salmon (chum, king, pink), sheefish, grayling are important subsistence wildlife resources found within the park. Onion Portage, located on the Kobuk River within the park is a major crossing point of the Western Arctic Caribou herd. The herd migrates through the park twice a year - southward in August from their summer range north of the Brooks Range and the DeLong Mountains and northward from their winter range in the Selawik Hills-Buckland River area in March.

Noatak National Preserve is located in northwestern Alaska within GMU 23. It is bordered on the west by Gates of the Arctic National Park and Preserve, to the south by Kobuk Valley National Park and to the west by Cape Krusenstern National Monument. Bering Land Bridge National Park and Preserve lies to the southwest, just across Kotzebue Sound. The Noatak River originates in Gates of the Arctic National Park and Preserve to the east, and flows westward through the Noatak River basin that makes up the central portion of the preserve and empties into Kotzebue Sound, just north of the city of Kotzebue

Vegetation within the preserve is predominately low mat tundra. The lower Noatak drainage contains a boreal forest cover. At higher elevations, an alpine tundra community can be found, with willow, heather and combinations of grasses, sedges, wildflowers and mosses. Drier areas support lichens and saxifrages. Moist tundra community occurs along the foothills of the Noatak Valley. This is the predominant vegetation of the preserve and consists of cottongrass, willow, dwarf birch, labrador tea, Lapland rosebay, mountain alder and avens. Bog rosemary and cranberry are found in wetter areas as are salmonberry and a variety of mosses. A spruce forest community, consisting of white spruce, paper birch, aspen, poplar and black spruce, occur sporadically throughout the preserve and are generally located along the south-facing foothills and valley bottoms

NPS qualified subsistence users annually harvest caribou, moose, Dall sheep, furbearers and waterfowl in the preserve. The Noatak River is considered key in the subsistence

fisheries harvest for Northwest Alaska. The most common fish, Arctic grayling and Arctic char, are found in the Noatak River and its tributaries. Salmon occur throughout the Noatak drainage system, with Chum being the most abundant, and sockeye, pinks and king found in the lower reaches of the river. Sheefish inhabit the Kobuk and Selawik Rivers in the preserve and are considered a preferred subsistence item. Trout are found in the deeper lakes within the preserve, as are burbot and freshwater cod.

Gates of the Arctic National Park and Preserve located in the Brooks Range in northern Alaska, covers nearly 8.5 million acres in GMUs 23, 24 and 26. The park and preserve lie in the central Brooks Range and occupy lands on either side of the continental divide from the eastern boundary at the Trans-Alaska Pipeline Utility Corridor and the Dalton Highway to Noatak National Preserve boundary on the west. The northern boundary runs along the range front; the North Slope stretches beyond to the Arctic Ocean. The southern boundary runs through the taiga forest including some of the southern foothills within the park.

The Nunamiut community of Anaktuvuk Pass is located within the park. Nomadic peoples have used and occupied the area for thousands of years, following caribou herds and traveling to regional trading areas to meet with other Native groups. These peoples were from at least three distinct Alaska Native cultures: Koyukon Athapaskan Indians, Kobuk Eskimo, and Nunamiut Eskimo. Archeological sites found today trace their history and use, and may give clues to the earliest human inhabitants of northern Alaska. The temporal range of known sites in the park/preserve covers at least the last ten millennia. The variety of known archeological sites includes seasonal villages, long- and short-term camps, hunting and butchering locales, caribou fences, lookout sites, fish camps, trapping camps, and resource harvesting locations such as birch bark gathering. Local rural residents still depend upon traditional areas and a wide array of resources in the park to sustain a subsistence way of life.

Subsistence harvest of fish and wildlife is allowed in the park and preserve by qualified subsistence users subject to Federal subsistence management regulations and park-specific regulations and policies. NPS qualified subsistence users from designated "resident zone communities" (Nuiqsut, Wiseman, Anaktuvuk Pass, Bettles, Evansville, Allakaket, Alatna, Hughes, Kobuk, Shungnak, and Ambler) and NPS subsistence permit holders are allowed to engage in subsistence uses within the park. Hunting, fishing, trapping and gathering remain a vital part of a subsistence way of life for local residents that continue to evolve in this region.

Major subsistence resources include lake trout, Arctic grayling, Arctic char, ptarmigan, furbearers, waterfowl, squirrels, brown bears, moose, wolves, Dall sheep, caribou and several species of berries. Occasionally subsistence users will make special trips into specific areas such as Chandler Lake or other large lakes to fish for arctic char and lake trout. Arctic grayling are caught in large numbers on lower Ekokpuk Creek near the confluence with Kollutarak Creek.

Summer and fall hunting for caribou, Dall sheep, moose, grizzly bear, arctic ground squirrel and birds occurs opportunistically whenever people leave the village. Winter trapping efforts concentrate on the harvest of lynx, wolverine, wolves, marten and red fox. These and other subsistence activities occur throughout the year and are concentrated in a large region surrounding the community in the central, northern and eastern portions of the park and preserve.

Lake Clark National and Preserve is a composite of ecosystems representative of many regions of Alaska. This richly diverse and magnificent land has also been the homeland for Native Alaskan peoples for centuries. The vast undeveloped areas of the park and preserve include the rugged Chigmit Mountains bordered by the Aleutian Range to the south and the Alaska Range to the north, rolling foothills, active volcanoes, alpine lakes, dramatic glaciers, scenic lakes, boreal forests, open expanses of tundra, jagged coastlines, and three national wild rivers. Lake Clark, 50 miles long, and many other lakes and rivers within the park are critical salmon habitat to the Bristol Bay subsistence salmon fishery

Residents of communities around the park and preserve have hunted, fished and gathered berries and other materials from the land for many generations. Six Resident Zone Communities are identified for Lake Clark National Park and Preserve: Lime Village, Port Alsworth, Nondalton, Iliamna, Newhalen, and Pedro Bay. Dena'ina Athabascans are the most prevalent Alaska Natives in the areas of Lime Village, Nondalton and Pedro Bay. The southern portions of the Lake Iliamna area and Newhalen are occupied by people of primarily Yup'ik descent. Important subsistence wildlife resources harvested annually in GMUs 9A, 9B, 16B, 17B and 19B by NPS qualified subsistence users include caribou, black bear, moose, beaver, Dall sheep, snowshoe hare, fox, lynx, mink, wolf, wolverine, ptarmigan, waterfowl, otter, marine mammals, salmon, trout, halibut, crab, clams, berries, wild edible plants, and wood.

Wrangell-St. Elias National Park and Preserve is located in eastern interior, south-central, and southeast Alaska within GMUs 5, 6, 11, 12 and 13. The Alaska Highway and the Richardson Highway provide road access to the north and west boundaries of the park while the Glenn Highway provides access from Anchorage. The western boundary roughly follows the Copper River and the eastern boundary is the international border. The far southeastern boundary stretches to the Malaspina Forelands and Yakutat Bay of the Gulf of Alaska. The principal landscape features include spectacular mountain ranges, glaciers, active volcanoes, and wildlife. Major ranges include the Wrangell, St. Elias, Chugach, Mentasta, and Nuzotin mountains. Vegetation communities contains nearly all of the major vegetation types found in south central, southeastern and interior Alaska

Based on 2010 U.S. Census data compiled by the Alaska Department of Community and Economic Development, the National Park Service estimates that approximately 5,200 local rural residents are eligible to engage in Federal subsistence activities in Wrangell-St. Elias National Park and Preserve. These activities include hunting, trapping, fishing, berry picking, gathering mushrooms and other plant materials, collecting firewood, and harvesting timber for subsistence construction purposes. Important subsistence resources annually harvested by local residents include salmon, moose, caribou, Dall sheep,

mountain goat, ptarmigan, grouse, snowshoe hare, furbearing animals, berries, mushrooms, and dead and green logs for construction and firewood. Most subsistence hunting within Wrangell-St. Elias National Park and Preserve occurs off the Nabesna, McCarthy, and Kotsina roads. The Copper, Nabesna, Chisana and Chitina rivers serve as popular river access routes for subsistence users.

Yukon-Charley Rivers National Preserve is a located in GMUs 20E, 25B and 25C on the Yukon River lying between the communities of Eagle and Circle in the traditional homeland of the Han Athapaskan native group. Most of the nonfederal land within the boundary of the preserve is held by Doyon Ltd., the native regional corporation. Land is also held by the Eagle Village Corporation and in native allotments.

The Charley River is one of three major tributaries to the Yukon River within the Preserve. The Charley flows from its source at an elevation of approximately 4,000 ft. and flows in a northerly direction roughly 106 miles to its confluence with the Yukon River. Average gradient is 31 feet per mile and flows are estimated to range between 6 and 8 mph.

In the preserve, low slopes are vegetated with dwarf birch/shrub tundra and uplands become more thinly forested with increasing elevation or ice-rich soils. Vegetation in most areas above 2,000 feet consists of treeless shrub tundra. These benches support moderately open black spruce stands. On south slopes, aspen-birch groves alternate with spruce and spruce tends to dominate the north-facing slopes. Coal Creek and its tributaries drain approximately 84 square miles. he upper Coal Creek drainage is forested on the south slopes and the riparian habitat is largely dense willow stands. Elsewhere in the watershed, low slopes are vegetated with dwarf birch/shrub tundra. An estimated 340 acres in the lower and middle portions of the Coal Creek streambed has been disturbed by mining. Colorado Creek, the major tributary to Coal Creek, is lined with white spruce-poplar forest and some mining claims are located here. The benches support moderately open black spruce stands. On the south slope, aspen-birch groves alternate with spruce and spruce dominates the north-facing slopes.

Subsistence wildlife resources in the preserve include caribou, black bear, moose, beaver, Dall sheep, snowshoe hare, fox, lynx, mink, wolf, wolverine, ptarmigan, waterfowl, otter, marine mammals, salmon, trout, berries, wild edible plants, and wood. Moose are present in low to moderate numbers and in summer months are commonly seen in subalpine habitats and in stream-margin shrublands. Caribou from the Forty-mile herd utilize the preserve and on occasion, caribou from the Porcupine herd do as well. In some years, caribou calving occurs in or near the upper portions of the Charley River drainage. Black and grizzly bear range throughout the Preserve and can be found in virtually any habitat. Wolves are widely distributed throughout the area and are most commonly found along watercourses where wildlife tends to concentrate. The area supports a variety of small mammals including wolverine, beaver, mink, marten, and fox. The Yukon River and its tributaries in the Yukon-Charley Rivers National Preserve provide important fishery habitat for salmon and trout.

Comprehensive descriptions of the affected subsistence environment within each Alaska national park system unit can be found in:

- "General Management and Land Protection Plans" for each NPS unit. (See online at http:// ww.nps.gov)
- Alaska Department of Fish and Game General and Subsistence Harvest Information and Publications (See online at http://www.state.ak.us/adfg)
- Federal Subsistence Management Regulations, Office of Subsistence Management, FWS, (See on line at http://alaska.fws.gov/asm/home.html)
- National Park Service Management Policies, NPS, 2006. Information and Publications (See online at http:// ww.nps.gov/policy)
- Alaska Subsistence, NPS Management History, NPS 2002
- Code of Federal Regulations, Part 13 National Park System Units in Alaska

The NPS recognizes that patterns of subsistence use vary from time to time and from place to place depending on the availability of wildlife and other renewable natural resources. A subsistence harvest in a given year may vary considerably from previous years because of weather, migration patterns, and natural population cycles.

V. Subsistence Uses and Needs Evaluation

Potential Impacts to Subsistence Users

To determine the potential impacts on existing subsistence activities for the proposed action, three evaluation criteria were analyzed relative to existing subsistence resources.

the potential to reduce important subsistence fish and wildlife populations by (a) reductions in number, (b) redistribution of subsistence resources, or (c) habitat losses;

what affect the action might have on subsistence fisherman or hunter access;

the potential for the action to increase fisherman or hunter competition for subsistence resources.

1. The potential to reduce populations:

(a) Reduction in Numbers:

The occasional displacement of plant and wildlife populations due to wildland fire is a natural and inevitable occurrence within fire dependent ecosystems. The proposed actions to implement various alternatives are not expected to cause a significant decline of wildlife species in the affected areas.

(b) Redistribution of Resources:

Redistribution of subsistence resources would be short-term. The proposed actions are not expected to cause a significant redistribution of subsistence resources in the affected areas.

(c) Habitat Loss:

The proposed actions are expected to be beneficial for maintaining preferred habitat for key subsistence resources within the affected areas. Proposed actions are expected to provide a positive effect on distribution, densities and availability of subsistence resources.

Impacts to subsistence resources and habitat from the proposed actions are not expected to have adverse effects on subsistence uses. The NPS would work closely with subsistence users to minimize impacts to subsistence resources in the affected area.

Restriction of Access:

The proposed actions are not expected to significantly restrict current subsistence use patterns.
Access for Title VIII subsistence uses within NPS areas is permitted according to Federal and State law and regulations.

Increase in Competition:

The proposed actions are not expected to significantly restrict or increase competition for ANILCA Title VIII subsistence resources on Federal public lands within the affected area.

Availability of Other Lands:

The proposed actions are consistent with NPS mandates in NPS areas in Alaska.

Alternatives Considered:

No other alternatives were identified that would reduce or eliminate the use of NPS public lands needed for subsistence purposes.

VII. Findings
This analysis concludes that the proposed actions will not result in a significant restriction of subsistence uses.

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APPENDIX B: Wilderness Minimum Requirements/Minimum Tool (MR/MT) Analysis

ARTHUR CARHART NATIONAL WILDERNESS TRAINING CENTER

MINIMUM REQUIREMENTS DECISION GUIDE

WORKSHEETS

". . . except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act..."

– the Wilderness Act, 1964

Please refer to the accompanying MRDG *Instructions* for filling out this guide.

The spaces in the worksheets will expand as necessary as you enter your response.

The MRDG Instructions may be found at: http://www.wilderness.net/mrdg/

Project Title: **NPS Alaska Fire Hazardous Vegetative Fuels Management Plan**

Step 1: Determine if any administrative action is necessary.

Description: ***Describe the situation that may prompt action.***

Hazardous vegetative fuels have built up around the following types of structures and installations: administrative structures, repeaters, fire RAWS, Inventory and Monitoring RAWS, historic cabins, other significant cultural resources, shelter cabins, residences, temporary structures, and other non-historic structural resources.

These structures are located within park units that have an approved fire management plan and associated vegetative fuels management plan designed to protect the built environment and the lives of visitors, employees, and firefighters in the event of

wildfires. These plans are very broad and general in their address of mitigating hazardous vegetative fuels build-up with a proactive fuels reduction program. Most of the standing fire management plan/environmental assessments (FMP/EAs) for the affected NPS areas were written 8-12 years ago. These plans emphasize responses to wildfire and were developed during a time when the magnitude of the vegetative fuels management program was not fully understood due to an incomplete asset inventory and the lack of community protection plans. The fire management program has evolved over time to accommodate an increased need to protect NPS and community assets. Though the current FMP/EAs include fuel reduction techniques (mechanical and prescribed fire) to reduce or remove vegetation to create and maintain defensible spaces around park structures and private inholdings, these plans were programmatic in nature and did not address the potential environmental impacts of specific fuel reduction prescriptions, since developed for these areas. That level of detail was beyond the scope of the original FMP/EAs.

NPS needs to evaluate the scope and effects of detailed protocols for the removal of vegetation that could carry a wildfire toward infrastructure and humans, and also to address a maintenance plan for retaining competent fire breaks around facilities and sites.

A new Fire Hazardous Fuels Management Plan (FHFMP) and programmatic environmental assessment (EA) is being developed for managing hazardous vegetative fuels within:

- Western Arctic National Parklands (WEAR)
- Yukon-Charley Rivers National Preserve (YUCH)
- Lake Clark National Park and Preserve
- Gates of the Arctic National Park and Preserve (GAAR)
- Wrangell –Saint Elias National Park and Preserve (WRST)
- Katmai National Park and Preserve (KATM)

Each of the park units participating in the plan has structures within designated or eligible wilderness that would fall under protection guidelines under the FHFMP.

To determine if administrative action is necessary, answer the questions listed in A–F on the following pages by answering Yes or No, and providing an explanation.

A. Options Outside of Wilderness

Is action necessary within wilderness? YES

Explain: Approximately 95% of parkland in the AK Region is designated or eligible wilderness. Consequently, the majority of structures identified in the Fire Hazardous Fuels Management Plan lie within designated or eligible wilderness boundaries. There are 187 sites that have been identified in eligible wilderness and 75 sites that have been identified in designated wilderness.

B. Valid Existing Rights or Special Provisions of Wilderness Legislation

Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that allows or requires consideration of the Section 4(c) prohibited uses? Cite law and section. NO

Explain: Specifically, hazardous vegetative fuels treatment is not required by wilderness legislation; however, ANILCA Section 13.10(a) provides for maintenance of navigational aids and other facilities that existed prior to 1980, and ANILCA Section 13.15(d) provides for maintenance of new public use cabins and shelters that are necessary for the protection of the public health and safety. It is reasonable that maintenance activities could include hazardous fuels treatment.

C. Requirements of Other Legislation

Is action necessary to meet the requirements of other laws? Cite law and section. NO

Explain: Hazardous fuel reduction in wilderness is not necessary to meet requirements of other laws.

D. Other Guidance

Is action necessary to conform to direction contained in agency policy, unit and wilderness management plans, species recovery plans, or agreements with tribal, state and local governments or other federal

Explain: NPS Management Policies 2006 address fire management in general in section 4.5 – Fire Management with additional guidance in section 5.3.12 for Fire Detection, Suppression, and Post-fire Rehabilitation and Protection of cultural resources, section 6.3.9 for Fire management in Wilderness, section 8.2.5.1 for Visitor Safety, and section 9.1.8 – Structural Fire Protection and Suppression.

Section 4.5 outlines the basic objectives for fire management programs that:

- Responds to the park's natural and cultural resource objectives;
- Provides for safety consideration for park visitors, employees, and developed facilities;
- Addresses potential impacts on public and private neighbors and their property adjacent to the park; and
- Protect public health and safety.

Section 5.3.1.2 emphasizes that the NPS will take action to prevent or minimize the impact of wildland, prescribed, or structural fires on cultural resources. Park and local fire personnel will be advised of the locations and characteristics of cultural resources

threatened by fire and of any priorities in protecting them during any planned or unplanned fire incident.
Section 6.3.9 states that all fire management activities conducted in wilderness areas will conform to the basic purposes of wilderness. Actions to suppress wildfires must use the minimum requirements concept unless the on-site decision-maker determines in his or her best professional judgment that conditions dictate otherwise. Additional guidance is provided in DO #18–Wildland Fire Management and Director's Order #41–Wilderness Stewardship.

Section 8.2.5.1 places a preference on the saving of human life over all other management actions by the Service. The NPS recognizes it cannot eliminate all natural hazards; however, the NPS will strive to protect human life and provide for injury-free visits.

Section 9.1.8 states that superintendents will manage structural fire activities as part of a comprehensive interdisciplinary effort to protect resources and promote the safe and appropriate public enjoyment of those resources. Developing defensible spaces around such structures is an element of fire management around and in structures.

DO #18 – Wildland Fire Management is expressed more completely in Reference Manual 18 (RM 18). Chapters 1 through 21 represents the most detailed and comprehensive guidance on implementing Service-wide wildland fire management policy for the National Park Service. RM 18 provides NPS field employees legal references, operating policies, standards, procedures, general information, recommendations, and examples to assist them in carrying out Management Policies and DO. The document is intended to be read in its entirety. While certain chapters or sections provide important guidance by themselves, there is an interrelationship among the chapters that provides clarity and continuity for the management of wildland fire on lands administered by the NPS.

In consideration of the interrelationship with other aspects of wildland fire management, Chapter 7 of RM 18 provides the purpose and guidance for implementing a hazardous fuels program:

The fuels management program of the National Park Service has become increasingly important for reducing the risk of severe wildland fire to human communities and for maintaining or improving the integrity of park ecosystems. The NPS, along with other federal, state, tribal, and local land managers, must continue to work collaboratively to ensure that safe and effective fuels treatment efforts are planned and implemented. Because firefighter and public safety is the first priority in every fire management activity, fuels management programs will include a risk assessment process that adequately identifies and controls hazards in order to protect life, property, and resources.

E. Wilderness Character

Is action necessary to preserve one or more of the qualities of wilderness character including: Untrammeled, Undeveloped, Natural, Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation, or Unique Attributes or Other Features that reflect the character of this wilderness area?

Untrammeled: **Yes:** ☐ **No:** ☒

Explain: Fire hazardous fuel reduction is a manipulation of the wilderness environment. On the other hand, without a FHFMP, natural ignition source fires burning in the vicinity of priority structures within wilderness could be fully suppressed, which is also a manipulation. Fuel manipulation to protect these structures may allow for fires to follow a more natural course, averting the potentially larger scale manipulation of full fire suppression efforts to protect structures and human life.

Undeveloped: **Yes:** ☐ **No:** ☒

Explain: This project does not contribute to the preservation of the undeveloped quality.

Natural: **Yes:** ☐ **No:** ☒

Explain: This project does not contribute to the preservation of the natural quality.

Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation:

Yes: ☐ **No:** ☒

Explain: The proposed action does not preserve or contribute to the preservation of opportunities for solitude or primitive and unconfined recreation.

Unique Attributes or Other Features that reflect the character of this wilderness:

Yes: ☒ **No:** ☐

Explain: Some of the structures that are significant cultural resources may be part of the fabric of wilderness character in the area. Protecting these structures may protect the historic or cultural value of the wilderness.

F. Public Purposes

Is action necessary to protect one or more of the public purposes for wilderness (as stated in Section 4(b) of the Wilderness Act) of recreational, scenic, scientific, educational, conservation, and historical use?

Recreational: **Yes:** ☒ **No:** ☐

Explain: Hazard Fuel Reduction is not necessary to protect the recreational value of wilderness.

Scenic: **Yes:** ☐ **No:** ☒

Explain: Hazard Fuel Reduction is not necessary to protect the scenic value of wilderness.

Scientific: **Yes:** ☐ **No:** ☒

Explain: Hazard Fuel Reduction would support the scientific value of wilderness when it is used to protect scientific instruments (FireRAWS and navigational facilities that pre-existed ANILCA).

Educational: **Yes:** ☐ **No:** ☒

Explain: Hazard Fuel Reduction would support the educational value of wilderness when it is used to protect cultural resources.

Conservation: **Yes:** ☒ **No:** ☐

Explain: Hazard Fuel Reduction is not necessary to protect the conservation value of wilderness.

Historical: **Yes:** ☒ **No:** ☐

Explain: Many of the structures to be protected through hazard fuel reduction are historic structures.

Step 1 Decision: **Is any administrative action necessary in wilderness?**

Yes: ☒ **No:** ☐

The protection of critical infrastructure within designated and eligible wilderness is necessary for the following types of structures to ensure that these structures can withstand wildland fire with minimal need for emergency suppression efforts: administrative structures, repeaters, FireRAWS, shelter cabins, navigational or other facilities that pre-exist ANILCA, residences, historic cabins, and other significant cultural resources/sites. It is not necessary for the following types of structures: temporary structures, trespass structures, scientific installations that are not directly related to the

protection of public health and safety, and other structural resources that do not fit in one of the above categories.

By definition, administrative sites located in wilderness are necessary to administer the area as wilderness. It is thus necessary to proactively treat hazardous vegetation around administrative structures in wilderness.

NPS Policies contains guidance on protecting human lives from fire. To ensure the public health and safety, it is necessary to proactively treat hazardous vegetation around repeaters, FireRAWS, residences, and shelter cabins.

- Repeaters serve a critical administrative need by allowing for communication in day to day administration of wilderness and in emergency situations that may involve protection of human lives.
- FireRAWS serve a critical administrative need by allowing fire managers to gather fire weather observations. The weather data generated by the stations is used in fire business applications such as the National Fire Danger Rating System (NFDRS)/Canadian Forest Fire Danger Rating System (CFFDRS) and fire behavior, in order to support critical fire decision-making requirements (RM-18 Fire Equipment: Remote Automated Weather Stations Maintenance Program). These stations assist with making informed decisions about fire safety and protection of resources within the wilderness area. If allowed to go too long without vegetative maintenance, measurements of wind speed and relative humidity will not reflect true fire weather observations and will not be translated into accurate fire danger indices. People may be living or seeking emergency shelter in residences and shelter cabins, so it's important to public safety to treat these types of structures.

NPS Policies contains guidance on protecting cultural resources from fire. To protect cultural resources it is necessary to proactively treat hazardous vegetation around historic cabins and other significant cultural resources.

Neither law nor policy requires hazard fuel treatment around the remaining types of structures in wilderness. Treatment of the remaining type of structures is not necessary for the preservation of wilderness character. If they were lost to a fire, wilderness character would not be degraded.

If action is necessary, proceed to Step 2 to determine the minimum activity.

It is expected that Step Two of the MRA will be written for specific projects to determine access methods.

Step Two for this Programmatic MRA looks at use of motorized tools at all locations and use of broadcast burning as a tool for hazard fuels reduction.

Step 2: Determine the minimum activity.

Please refer to the accompanying MRDG *Instructions* for information on identifying alternatives and an explanation of the effects criteria displayed below.

Description of Alternatives

For each alternative***, describe what the action is, when the activity will take place, where the activity will take place, and what methods and techniques will be used. Detail the impacts to the qualities of wilderness character and other comparison criteria, including safety. Where mitigation is possible, include mitigation measures. In addition to describing the effects of the alternative, it may be useful to break down each alternative into its component parts and list in tabular form the impacts to each comparison criterion.***

1.0 Alternative # A. Use non-motorized tools

The National Park Service would remove hazardous vegetative fuels that surround structures in the developed areas and at remote backcountry structures utilizing general Alaska Firewise concepts. Fuel reduction techniques would utilize only non-motorized tools such as cross-cut saws, hand tools, or similar devices to mitigate hazard fuel buildup or recreate historical landscape conditions in areas where fire would pose an unreasonable threat to property or resources.

Subsequent maintenance work would be accomplished with non-motorized tools.

Impacts to Wilderness Character:

Untrammeled: Removing vegetation around structures receiving hazardous vegetative fuel treatment is an action that would manipulate natural resources and consequently degrade the untrammeled quality of wilderness character.

Natural: There would be a minor effect on natural processes or ecosystems because the areas affected are small localized areas. The project would affect a 100+' radius around each of the structures where the vegetation will be altered. All vegetation would be removed within 15' of the structure. Outside of 15' vegetation would be removed or thinned.

Undeveloped: The undeveloped quality of wilderness character would not be affected by this alternative.

Opportunities for solitude or primitive and unconfined recreation: The presence of fire crews at the sites would degrade this quality of wilderness character. While overall noise would be lowest in this alternative, the work would take longer so crews would be on site for longer periods of time, which would impact opportunities for solitude for a longer amount of time.

Impacts to other criteria:

Maintaining Traditional Skills: Traditional skills would be maintained by using non-motorized tools.

special Provisions: n/a

Economics and Timing Constraints: It would take crews longer to accomplish the work with non-motorized tools.

2.0 Alternative # B. Use motorized tools and no broadcast burning

The National Park Service would remove hazardous vegetative fuels that surround structures in the developed areas and at remote backcountry structures utilizing general Alaska Firewise concepts. Fuel reduction techniques would utilize motorized tools such as power saws, mowers, or similar devices to mitigate hazard fuel buildup or recreate historical landscape conditions in areas where fire would pose an unreasonable threat to property or resources.

Subsequent maintenance work would be accomplished with non-motorized tools.

Impacts to Wilderness Character:

Untrammeled: Removing vegetation around structures receiving hazardous vegetative fuel treatment is an action that would manipulate natural resources and consequently degrade the untrammeled quality of wilderness character.

Natural: There would be a minor effect on natural processes or ecosystems because the areas affected are small localized areas. The project would affect a 100+’ radius around each of the structures where the vegetation will be altered. All vegetation would be removed within 15’ of the structure. Outside of 15’ vegetation would be removed or thinned.

Undeveloped: Use of motorized tools degrades the undeveloped quality of wilderness character by introducing modern human equipment into the wilderness.

Opportunities for solitude or primitive and unconfined recreation: The presence of fire crews at the sites would degrade this quality of wilderness character. There would be a temporary effect of motorized noise, exhaust, and presence of personnel.

Impacts to other criteria:

Maintaining Traditional Skills: Traditional skills would not be maintained.

Special Provisions: n/a

Economics and Timing Constraints: It would take crews a shorter amount of time to do the work with motorized tools instead of non-motorized tools.

3.0 Alternative # C. Use motorized tools and broadcast burning

The National Park Service would remove hazardous vegetative fuels that surround structures in the developed areas and at remote backcountry structures utilizing general Alaska Firewise concepts. Fuel reduction techniques would utilize motorized tools such as power saws, mowers, or similar devices to mitigate hazard fuel buildup or recreate historical landscape conditions in areas where fire would pose an unreasonable threat to property or resources.

Subsequent maintenance work would be accomplished with non-motorized tools.

This alternative would include the use of broadcast burning as an additional clearing tool to create a protected buffer for the given asset. Prescribed fire operations constitute the intentional setting of vegetation on fire as an alternative/supplemental means to removing fuels between a protection asset and the environment from which a wildfire would approach. This alternative may involve treatments of varying size beyond the initially identified Firewise buffer, including fuel breaks.

Impacts to Wilderness Character:

Untrammeled: Removing vegetation around structures receiving hazardous vegetative fuel treatment is an action that would manipulate natural resources and consequently degrade the untrammeled quality of wilderness character. The untrammeled quality would be further degraded by broadcast burning, a manipulation over a larger area.

Natural: There would be a minor effect on natural processes or ecosystems because the areas affected are small localized areas. The project would affect a 100+’ radius around each of the structures where the vegetation will be altered. All vegetation would be removed within 15’ of the structure. Outside of 15’ vegetation would be removed or thinned. Additionally broadcast burning would negatively affect the natural quality by altering vegetation, soils, and wildlife.

Undeveloped: Use of motorized tools degrades the undeveloped quality of wilderness character by introducing modern human equipment into the wilderness. Motorized equipment and access associated with broadcast burning would further degrade the undeveloped quality.
Opportunities for solitude or primitive and unconfined recreation: The presence of fire crews at the sites would degrade this quality of wilderness character. There would be a temporary effect of motorized noise, exhaust, and presence of personnel. Broadcast burning would contribute additional negative impacts to opportunities for solitude by the presence of crews in these areas.

Impacts to other criteria:

Maintaining Traditional Skills: Traditional skills would not be maintained.

Special Provisions: n/a

Economics and Timing Constraints: It would take crews a shorter amount of time to do the work with motorized tools instead of non-motorized tools.

Comparison of Alternatives

It may be useful to compare each alternative's positive and negative impacts to each of the criteria in tabular form, keeping in mind the law's mandate to "preserve wilderness character."

	Alternative A	Alternative B	Alternative C
Untrammeled	-	-	--
Undeveloped	0	-	--
Natural	-	-	--
Solitude or Primitive and Unconfined Recreation	--	-	--
WILDERNESS CHARACTER	-4	-4	-8

	Alternative A	Alternative B	Alternative C
Maintaining Traditional Skills	+	1	1
Economics & Timing	0	+	+
OTHER CRITERIA SUMMARY	+	0	0

	Alternative A	Alternative B	Alternative C
SAFETY (visitors & workers)	-	0	+

Safety Criterion

Occasionally, safety concerns can legitimately dictate choosing one alternative which degrades wilderness character (or other criteria) more than an otherwise preferable alternative. In that case, describe the positive and negative impacts in terms of risks to the public and workers for each alternative here but avoid pre-selecting an alternative based on the safety criteria in this section.

Documentation:

To support the evaluation of alternatives, provide an analysis, reference, or documentation and avoid assumptions about risks and the potential for accidents. This documentation can take the form of agency accident-rate data tracking occurrences and severity; a project-specific job hazard analysis; research literature; or other specific agency guidelines.

Step 2 Decision: What is the Minimum Activity?

Please refer to the accompanying MRDG *Instructions* before describing the selected alternative and describing the rationale for selection.

Selected alternative: B

Rationale for selecting this alternative (including safety criterion, if appropriate):

Alternative B was selected because it causes the least impact to wilderness character while providing the most efficient and cost-effective means to accomplish the work. Alternative B creates a greater impact to the undeveloped quality of wilderness character by introducing motorized equipment into the wilderness. However, it creates less of an impact to opportunities for solitude than Alternative A because there would be a smaller crew on site for a shorter period of time.

Generally on first entry treatments, there is a considerable vegetative fuel load that needs removal. For a given normal site, it is estimated that it would take three people eight days to complete a fuels project using non-motorized equipment, whereas it would take the same three people three days to complete the project using motorized equipment.

Alternative C was not selected because broadcast burning degrades all of the qualities of wilderness character. At this time, broadcast burning is generally not the minimum tool for removing hazardous vegetative fuels. However, if a compelling case arises in the future (for instance, a public safety need to provide a larger buffer around a community), broadcast burning in wilderness may be re-visited on a case by case basis.

Monitoring and reporting requirements:

Check any Wilderness Act Section 4(c) uses approved in this alternative:

- ☐ mechanical transport
- ☒ motorized equipment
- ☐ motor vehicles
- ☐ motorboats
- ☐ landing of aircraft
- ☐ temporary road
- ☐ structure
- ☐ installation

Record and report any authorizations of Wilderness Act Section 4(c) uses according to agency policies or guidelines.

Follow agency policies for the following review and decision authorities:

Approvals	Signature	Name	Position	Date
Prepared by:		Adrienne Lindholm	AKR Wilderness Coordinator	
Recommended:				
Recommended:				
Approved:				

APPENDIX C: U.S. Fish and Wildlife Service Threatened and Endangered Species Informal Consultation

United States Department of the Interior

NATIONAL PARK SERVICE
240 W. 5th Avenue, Rm 114
Anchorage, AK 99501

In Reply Refer to:

L7617 (AKRO-EPC)

Ted Swem
Endangered Species Branch Chief
Fairbanks Fish and Wildlife Service Field Office
101 12th Avenue, Box 19, Room 110
Fairbanks, AK 99701

Ellen W. Lance
Endangered Species Branch Chief
Anchorage Fish and Wildlife Service Field Office
605 West 4th Avenue, Room G61
Anchorage, AK 99501

Dear Mr. Swem and Ms. Lance:
Thank you for your time and advice at a teleconference with Bud Rice of my staff and other National Park Service (NPS) employees on Thursday, May 23, 2013 to discuss the potential for the NPS Programmatic Fire Hazardous Fuels Management Plan to affect threatened or endangered species in Alaska. This plan addresses, in more detail than approved Fire Management Plans for NPS units, the estimated maximum acres and locations of areas to be proactively treated to prevent wildfire from consuming valued assets and sites within park areas. This is primarily a matter of safety to develop defensible spaces around places used and enjoyed by the public, for employees working in these areas, and for response personnel.

We understand you have digital copies of the draft public review plan, which briefly addresses threatened and endangered species on page 1-14 of the document. Parks to be addressed by this plan are listed on page 1-1 of the EA and shown in a map on page 1-2. Sites potentially to be protected (fire protection points) are shown on map figures on pages 3-10 to 3-15. Fire histories in these park areas are shown in map figures on pages 3-60 to 3-66. So far we have dismissed the impact topic on threatened and endangered species from detailed analysis because we think that the proposed fire prevention activities "are not likely to adversely affect listed species." We would like to address this

determination in more detail in appendix C of the EA and obtain concurrence from the Fish and Wildlife Service.

After the teleconference and review of the list of endangered, threatened, proposed, and delisted species in Alaska (updated May 16, 2013) as posted on a U.S. Fish and Wildlife Service web page at: http://alaska.fws.gov/fisheries/fieldoffice/anchorage/endangered/consultation.htm , we understand most of the following species are marine-oriented and may occur in or near the parks addressed in this plan:

Listed Endangered Species

Steller sea lion (western DPS)
(We are not listing the Short-tailed albatross, cetaceans, or other pinnipeds managed by NMFS because they do not haul out on lands where proposed NPS activities would take place.)
Listed Threatened Species
Polar bear
Northern sea otter
Steller's eider
Spectacled eider
Steller sea lion (eastern DPS)
Candidates for Listing
Yellow-billed loon
Kittlitz's murrelet
Pacific Walrus

The NPS would appreciate a thorough listing of potentially affected species, including proposed and designated critical habitat. We are not prepared at this time to determine the proposed action would have "no effect" on any listed species, but we do think agency actions "are not likely to adversely affect listed species", especially if mitigating measures are prescribed by FWS and followed by NPS.

Sincerely,

Joan B. Darnell
Environmental Planning and Compliance Team Manager

cc:
Dan Warthin, Regional Fire Management Officer, Alaska Region

In reply refer to:
AFWFO

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Anchorage Fish & Wildlife Field Office 605 West 4th Avenue, Room G-61
Anchorage, Alaska 99501-2249

June 12, 2013

EMAILED TO:
Mr. Bud Rice
Environmental Protection Specialist NPS Alaska Regional Office
240 West 5th Avenue
Anchorage, AK 99501

Re: Programmatic Fire Plan, National Park Service, Alaska (*Consultation number 2013-0095*)

Dear Mr. Rice,
Thank you for your May 29, 2013, letter requesting section 7 consultation pursuant to the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq., as amended, ESA) for activities associated with the management of hazardous fuels across National Park Service (NPS) lands in Alaska. The NPS proposes to approve the *Programmatic Fire Hazardous Fuels Management Plan*, which estimates a maximum number of acres by location to be proactively treated for the prevention of wildfire and the protection of valued assets within National Park lands in Alaska.

The NPS has provided the U.S. Fish and Wildlife Service (USFWS) with a list of potentially affected listed and candidate species in the action area, and has made a preliminary determination that the approval and implementation of this Plan is not likely to adversely affect listed species or their critical habitat. The purpose of this communication is to provide information and suggest avoidance and minimization measures that may assist the NPS when making a final determination.

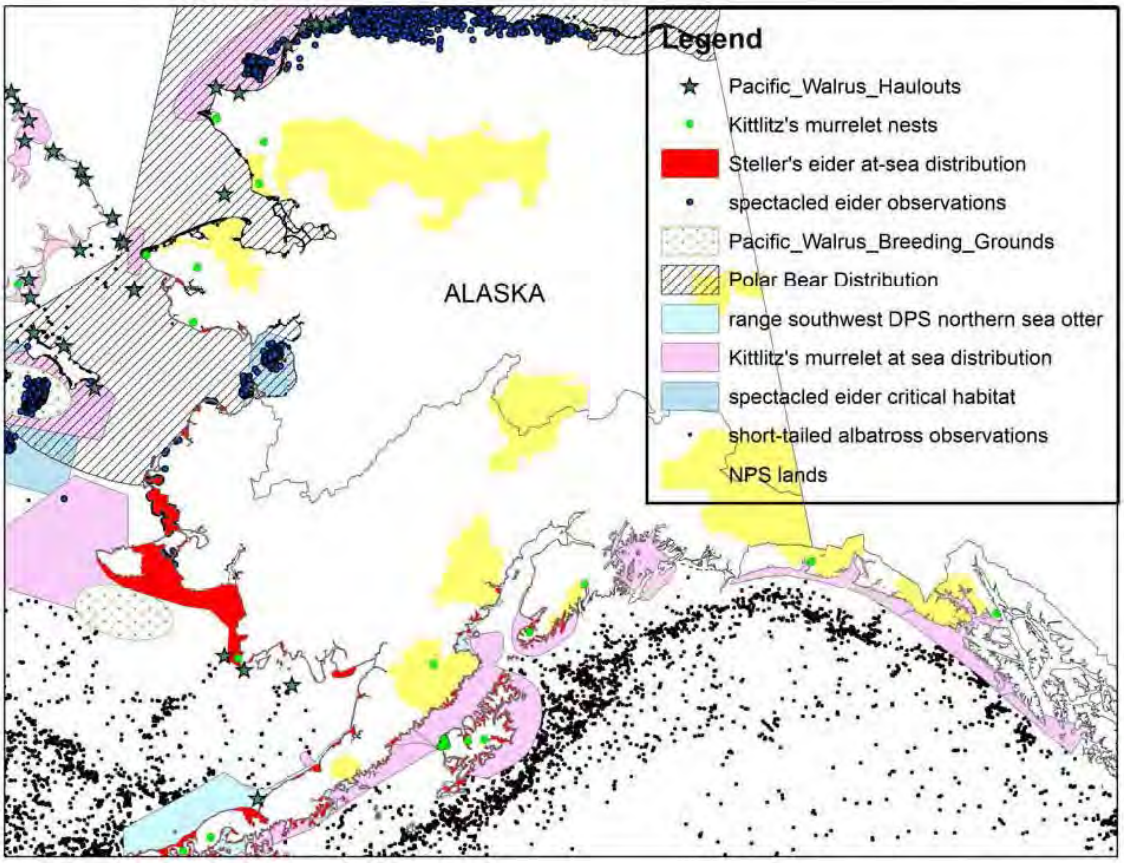
7.0 ESA-Listed and Candidate Species

Management authority for species protected by the ESA is split between the USFWS and the National Marine Fisheries Service (NMFS). Determining the agency that has management authority over various marine mammal species can be tricky. In Alaska, the USFWS oversees the management of polar bear (*Ursus maritimus*), listed as threatened in 2008, the southwest Distinct Population Segment (DPS) of northern sea otter (*Enhydra lutris kenyoni*), listed as threatened in 2005, and Pacific walrus (*Odobenus rosmarus divergens*), listed as a candidate species in 2011. All three species may occur in the vicinity of several NPS parks in Alaska (Figure 1). Please note that the NMFS manages Steller sea lions (*Eumetopias jubatus*); both the western DPS, listed as endangered, and eastern DPS listed as threatened; the NMFS should be contacted directly for Bud Rice.

Section 7 consultation on Steller sea lions.

As correctly noted in your letter, both yellow-billed loons (*Gavia adamsii*), listed as a candidate in 2009, and Kittlitz's murrelets (*Brachyramphus brevirostris*), listed as a candidate in 2004, may occur in the action area, while short-tailed albatross (*Phoebastria albatrus*), listed as endangered in 2000, are not likely to be found in or near the Parks (Figure 1). Likewise, spectacled eiders (*Somateria fischeri*), listed as threatened in 1993, are unlikely to be in the vicinity of NPS lands and activities. North American breeding Steller's eiders (*Polysticta stelleri*), listed as threatened in 1997, may occur in the nearshore waters adjacent to Katmai National Park. A few Kittlitz's murrelet nests have been found in several NPS parks, however due to their rarity, their nesting habitat, and their biology, the likelihood of disturbance is low. Absent from the map is a depiction of the distribution of yellow-billed loons that nest along the shores of large, fresh-water lakes in northern Alaska.

Figure 1. Distribution of listed and candidate species and critical habitat under the management authority of the USFWS in proximity to NPS lands in Alaska.



Section 7 of the ESA requires that a federal agency use their existing authorities to conserve threatened and endangered species and ensure that their actions do not jeopardize the continued existence of those species or adversely modify federally designated critical habitat. There are not similar requirements for candidate species; action agencies may voluntarily consider ways to avoid or minimize adverse effects to those species.

8.0 Potential Effects of the Proposed Action and Recommended Avoidance Measures

Of the ESA-listed and candidate species managed by the USFWS in Alaska, we believe only
Pacific walrus and yellow-billed loons (both candidate species) have the potential to be directly affected by activities through disturbance from aircraft. Steller's eiders and sea otters may be indirectly adversely affected if water quality in the nearshore habitat adjacent to Parks on the Alaska Peninsula was contaminated by residues related to fire suppression.

Recommended Avoidance Measures- Disturbance:
Pacific Walrus – In late summer, large herds of walruses may be found hauled out on isolated beaches and barrier islands along the Chukchi Sea coast. Large-scale mortality events have occasionally resulted from herd stampedes, with calves being particularly vulnerable to trampling injuries. Avoid flying near coastal haul outs. Fixed-winged aircraft traveling along the coast should maintain a minimum altitude of 1,500 feet, and maintain a lateral distance of ½ mile. Activities such as buzzing, circling, landing, taking off, and taxiing near walrus groups are likely to cause disturbances. When weather conditions allow, pilots should fly well inland from walrus groups to avoid flushing animals into the water.
• Yellow-billed loons- We recommend contacting Melanie Flamme (NPS, Fairbanks) to identify lakes used by yellow-billed loons for nesting and brood-rearing in northern Parks. In the unlikely event that treatment activities are desired near any of these lakes, we can work with you to recommend timing or other measures to minimize potential for disturbance or other impacts.
Recommended Minimization Measures-Contamination of Nearshore Marine Waters:
• To minimize the potential for pollutants (such as fire retardants) to enter the nearshore marine waters where Steller's eiders and sea otters forage, ensure no chemicals enter fresh water tributaries.

This letter relates only to federally listed or proposed species and/or designated or proposed critical habitat under jurisdiction of the Service. It does not address species under the jurisdiction of National Marine Fisheries Service, or other legislation or responsibilities under the Fish and Wildlife Coordination Act, Marine Mammal Protection Act, Clean Water Act, National Environmental Policy Act, Bald and Golden Eagle Protection Act, or Migratory Bird Treaty Act. However, we would like to make sure you are aware of the land clearing timing windows that have been established to protect another of our trust resources-migratory birds. To minimize potential violation of the Migratory Bird Treaty Act, please see the attached Land Clearing Timing Guidelines for Alaska.

Thank you for your cooperation in meeting our joint responsibilities under section 7 of the ESA. This information is provided to aid your future efforts to complete section 7 consultation on this proposed action. Should you require further assistance in making your determination, please don't hesitate to contact Ted Swem at (907) 456-0441 or myself at (907) 271-1467.

Sincerely,

Cc: Ted Swem, FFWFO Attachment (1)
T:\s7\2013 sec 7\Ellen\NPS\2013-0095 NPS fireplan.doc
Ellen W. Lance
Endangered Species Branch Chief

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APPENDIX D: Example of Special Use Permit

Form 10-114
Rev. DEC. 00
Page 1 of 4
UNITED STATES DEPARTMENT OF THE INTERIOR
National Park Service

Special Use Permit

Name of Use: Fuel Reduction, FIREWISE

Date Permit Reviewed

20
Reviewed 20
Reviewed 20

Expires 20
Long Term X **Permit # _ARO_WRST**
600 -H0
Region Park Type No. #
Short Term
Wrangell-St. Elias National Park and Preserve

_____ of _____,

Name or Permittee **Address**
Phone

is hereby authorized during the period from (Time 0001 day 01 Month 04 , 2004), through (Time 0001 day 01 Month 04, 2009), to use the following described land or facilities in the above named area: the park land adjacent to private residence located (SAMPLE) *Mile 7.5 Nabesna Rd. approximate property center line, S 55 degrees 37 west, N 55 degrees 37 E, Latitude; 2 degrees 39 .2' N, Longitude 143.49'W. The private land totaling 5 acres.*

For the purpose(s) of: Removal of flammable vegetation to reduce risk to life and private property and park lands from spread of wildland fire. The permit only authorizes work on public land within 100 ft. of private land owner structures that would become endanger in the event of a wildland fire.

Authorizing legislation or other authority (RE - DO-53): Title 36 CFR Section 13.17 (4)

NEPA Compliance: CATEGORICALLY EXCLUDED__X__EA/FONSI____EIS____OTHER APPROVED PLANS

PERFORMANCE BOND: Required _____ Not Required X Amount $ 0.00

LIABILITY INSURANCE: Required _____ Not Required X Amount $ 0.00

ISSUANCE of this permit is subject to the conditions on the reverse hereof and appended pages and when appropriate to the payment to the U.S. Dept. of the Interior, National Park Service of the sum of $ 0.00

The undersigned hereby accepts this permit subject to the terms, covenants, obligations, and reservations, expressed or implied herein.

PERMITTEE _____, _____ ,
_____ **Signature**
Name **Date**

Authorizing Official_____,_____ _____ _____,
_____ **Signature**
Title **Date**

Additional Authorizing Official_____,_____,
_____ **(if Required)** **Signature**
Title **Date**

SPECIAL USE PERMIT: ARO WRST 6000/04 H00##

CONDITIONS OF THIS PERMIT

1. The permittee shall exercise this privilege subject to the supervision of the Superintendent, and shall comply with all applicable laws and regulations of the area.

2. Damages - The permittee shall pay the United States for any damage resulting from this use which would not reasonably be inherent in the use which the permittee is authorized to make of the land described in this permit.

3. Benefit - No Member of Congress shall be admitted to any share or part of this permit or to any benefit that may arise there from: but this provision shall not be construed to extend to this grant if made with a corporation for its general benefit.

4. Assignment - This permit may not be transferred or assigned without the consent of the Superintendent, in writing.

5. Revocation - This permit may be terminated upon breach of any of the conditions herein or at the discretion of the Superintendent.

6. The permittee is prohibited from giving false information; to do so will be considered a breach of conditions and be grounds for revocation [Re: 36 CFR 2.32(a)(4)].

7. Permittee will comply with applicable public health and sanitation standards and codes.

SPECIAL USE PERMIT: ARO WRST 6000/04 H00##

CONDITIONS OF THE PERMIT (CONTINUED)

SPECIAL USE PERMIT STIPULATIONS

8. The permittee hereby agrees to indemnify and to save and hold harmless the United States of America, its agents and employees, from any and all claims, damages, suits of law or equity of whatever kind or nature for damages to or loss of property or injury or death to persons resulting directly or indirectly from or attributable to the permittee or its employees in connection with the activities authorized by this permit.

9. The premittee is allowed to remove all flammable vegetation from within 30 feet of structures, down to a height of 5 inches. Stumps of trees maybe taken down to ground level with the use of chain or hand saw without the disturbance of the soil (specifically black and white spruce). Removal of vegetation down to bare mineral soil is prohibited on park land. The use of motorized equipment; brush hog and lawn mower, will require pre approval by the superintendent and his/her designee.

10. The premittee may not locate private property; burn barrels, firewood, scrap wood, propone tanks, and other flammables on WRST Park and Preserve land.

11. The premittee may reduce flammability of the area 30 – 100 feet from structures and 10 feet along either side of ingress/egress roads by the following:

a. Reduce low-lying limbs on black and white spruce so that the lowest hanging branches are 5-10 feet above the ground.
b. Provide a minimum of a 2 foot break between the lowest hanging branches of spruce trees and the tallest ground vegetation under or adjacent to spruce trees, by either limbing standing trees or reducing ground vegetation
c. The remove black and white spruce trees to allow a minimum of 5 feet between crowns (crown spacing is measured from the furthest branch of one tree to the nearest branch on the next tree) This spacing should be increased if structures are located on a slope above flammable vegetation
d. Remove concentrations of dead and down vegetation.

12. All large accumulation of slash must be removed off park and preserve land. The dumping of vegetation material on to Park land is prohibited. This includes but is not limited to all slash and vegetation debris generated from fuel reduction efforts on private land.

13. The removal of heavy fuel loads located 100 ft. down slope from a structure is only allowed after a site visit and approval by the superintendent and or his or her designee.

14. The location of any historical or archeological remains encountered shall be reported to the Superintendent as soon as possible and work will stop until given further direction. To retain site integrity, no disturbance to sites or materials is permitted. Disturbance or collection of any or all archeological or land vertebrate pale ontological materials is prohibited.

15. Motorized equipment may not be used without the specific approval of the Superintendent or his or her designee.

SPECIAL USE PERMIT: ARO WRST 600/04 H00##

16. Removal of vegetation will be completed in a manner that does not damage or disturb vegetation to remain, other natural resources, and historic and cultural resources.

17. All trash, equipment and other materials shall be removed from the public lands. Burial of trash is not permitted.

18. Hazardous fuels reduction activities using prescribed fire is prohibited.

19. This permit does not authorize hazardous fuels reduction activities on federal lands within the Wrangell-St. Elias that have been designated Wilderness or Wilderness suitable areas.

20. The use of pesticides or herbicides is prohibited.

21. Under this permit burn piles are not authorized on federal lands within Wrangell-St. Elias National Park and Preserve. Premittee so refer to the local State of Alaska, Department of Natural Resource for information related to burn permits.

22. During the period of this permit periodic maintenance of defensible area is permitted.

I have read and agree to comply with the terms and conditions of this permit.

_____ _____

Permittee Date

APPENDIX E: U.S. Fish and Wildlife Service Land Clearing Timing Guidance for Alaska

U.S. Fish & Wildlife Service

Land Clearing Timing Guidance for Alaska

Plan Ahead to Protect Nesting Birds

General Information:

Under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703) (see http://ipl.unm.edu/cwl/fedbook/mbta.html), it is illegal for anyone to "take" migratory birds, their eggs, feathers or nests. "Take" includes by any means or in any manner, any attempt at hunting, pursuing, wounding, killing, possessing or transporting any migratory bird, nest, egg, or part thereof. Take and possession under MBTA can be authorized through regulations, such as hunting regulations, or permits, e.g., salvage, research, depredation, or falconry. The MBTA does not distinguish between intentional and unintentional take. In Alaska, all native birds except grouse and ptarmigan (protected by the State of Alaska) are protected under the MBTA.

Destruction of active bird nests, eggs, or nestlings that can result from spring and summer vegetation clearing, grubbing, and other site preparation and construction activities would violate the MBTA. The following timing guidelines are not regulations, but are intended as recommendations to help you comply with the MBTA. Some species and their nests have additional protections under other federal laws, including those listed under the Threatened and Endangered Species Act (ESA), and bald and golden eagles (protected under the Bald and Golden Eagle Protection Act or BGEPA). Please contact the U.S. Fish and Wildlife Service to ensure compliance with ESA and BGEPA if these species may be present in your project area.

Directions:

1. Apply timing window guidelines to your project planning, unless project-specific review results in unique guidelines from the USFWS for your project.

2. If you encounter an active nest *at any time*, including before or after the local timing window, leave it in place and protected until young hatch and depart. "Active" is indicated by intact eggs, live chicks, or presence of adult on nest. Timing guidelines should considerably reduce the risk of inadvertent nest destruction, but final compliance with the law is your responsibility: do not destroy eggs, chicks, or adults of wild bird species.

3. If you have any questions regarding the MBTA and the timing guidelines, including projects that may occur in "boundary areas" between regions described on the matrix, contact your local Fish and Wildlife Field Office for assistance:

Anchorage (907) 271-2888	Kenai (907) 262-9863
Fairbanks (907) 456-0203	Juneau (907) 780-1160

U.S. Fish & Wildlife Service

Recommended Time Periods to Avoid Vegetation Clearing

HABITAT TYPE → / REGION ↓	Forest or woodland[1] *(i.e., trees present)*	Shrub or Open *(i.e., shrub cover or marsh, pond, tundra, gravel, or other treeless/ shrubless ground habitat)*	Seabird colonies *(including cliff and burrow colonies)*	Raptor and raven cliffs
Southeast	April 15 – July 15	May 1 – July 15 [2]	May 1 – September 15 [3]	April 10 – August 10
Kodiak Archipelago			April 15 – September 7 [3]	
Southcentral *(Lake Illiamna to Copper River Delta; north to Talkeetna)*	May 1 – July 15 [2]			
Bristol Bay/AK Peninsula *(north to Lake Illiamna)*	April 10 – July 15	May 1 – July 15 [2, 4]	May 10 – September 15	
Interior *(north of Talkeetna to south slope Brooks Range; west to treeline)*	May 1 – July 15 [2]		May 1 – July 20 [5]	April 15 – August 1
Aleutian Islands		April 25 – July 15	May 1 – September 15 [3]	April 1 – August 1
Yukon-Kuskokwim Delta *(east to treeline)*		May 5 – July 25 [2, 4]	May 20 – September 15	April 15 – August 15
Seward Peninsula		May 20 – July 20 [4]		
Northern *(includes northern foothills of Brooks Range)*		June 1 – July 31 [4]		
Pribilof and Bering Sea Islands		June 1 – July 15	May 25 – September 1	

USFWS July 2009

[1] Owl species may begin to nest two or more months earlier than other forest birds, and are fairly common breeders in forested areas of Alaska. You may wish to survey for nesting owls (or other early spring tree-cavity nesters) prior to tree-cutting. It is your responsibility to protect active nests from destruction.
[2] Canada geese and swan habitat: begin April 20
[3] Storm petrel burrow habitat: April 1 – October 15
[4] Black scoter habitat: through August 10
[5] Seabird colonies in Interior refer to terns and gulls