National Park Service
U.S. Department of the Interior

Katmai National Park and Preserve
Alagnak Wild River
Alaska

Wildland Fire Management Plan

Environmental Assessment
November 2012

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Note to Reviewers

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ACRONYMS AND ABBREVIATIONS

ALAG	Alagnak Wild River
AMR	Appropriate Management Response
ANILCA	Alaska National Interest Lands Interest Lands Conservation Act
BIA	Bureau of Indian Affairs
BMP	Best Management Practice
CFR	Code of Federal Regulations
DCP	Development Concept Plan
DO	Director's Order
EA	Environmental Assessment
EIS	Environmental Impact Statement
FMO	Fire Management Officer
FMP	Fire Management Plan
FMU	Fire Management Unit
GMP	General Management Plan
KATM	Katmai National Park and Preserve
MIST	Minimum Impact Suppression Tactics
NEPA	National Environmental Policy Act
NHL	National Historic Landmarks
NHPA	National Historic Preservation Act
NPS	National Park Service
NWCG	National Wildfire Coordinating Group
PL	Public Law
RMP	Resource Management Plan
USC	United States Code
USFWS	United States Fish and Wildlife Service
UWF	Use of Wildland Fire
VRAA	Valley Road Administrative Area
VTTS	Valley of Ten Thousand Smokes

1.0 PURPOSE AND NEED FOR ACTION

1.1 PURPOSE OF AND NEED FOR ACTION

The National Park Service (NPS) is considering implementing Director's Order 18 (DO-18) (2008a) by establishing a Fire Management Plan (FMP) in Katmai National Park and Preserve (KATM or park), Alaska (Figure 1-1) starting in 2012. As specified in DO-18, "Each park with vegetation capable of burning will prepare a fire management plan to guide a fire management program that is responsive to the park's natural and cultural resource objectives and to safety considerations for park visitors, employees, and developed facilities." The FMP serves as a detailed and comprehensive program of action to implement fire management policy principles and goals, consistent with the park's resource management objectives. The complete proposed action and alternatives are described in Chapter 2.

The FMP is a comprehensive document that outlines the KATM fire management goals and describes the policies and actions by which these goals would be realized. The purpose of the plan is to provide consistent operational guidance to management as to questions arising in the inevitable event of a wildfire within its jurisdictional boundary. It also formalizes park-specific responsibilities for implementing the Alaska Interagency Wildland Fire Management Plan, and formalizes park-specific fire management decision making process and procedures, redefines fire management strategies, articulates the park's fire management organization and responsibilities, and establishes the direct linkage between resource management goals and fire management strategies.

Alagnak Wild River (ALAG) would be managed under the same policies as Katmai National Park and Preserve as stated in the General Management Plan (GMP). They share a common border and are both administered by the NPS staff at King Salmon. For the purpose of this FMP, they will be collectively referred to as Katmai National Park and Preserve or KATM and all reference to fire management within KATM shall include the Alagnak Wild River.

The FMP provides a concise communication tool for understanding actions, roles and responsibilities of involved fire personnel. It is designed to support management goals and objectives defined in the Katmai GMP and Resource Management Plan (RMP) but will additionally give clearly defined direction in regards to fire and its management within the park. It is vital that park managers are aware how fire is managed in Alaska and, how they will be able to assist in ensuring fire management objectives are met when fire revisits the Katmai landscape.

The FMP is necessary to comply with DO-18 and codifies the way fire would be managed within KATM. Although fire protection needs may arise and remain the first priority, fire has long been an integral component of the area's ecosystems and is critical for the maintenance of virtually all indigenous conditions, from plant and animal populations to soil and permafrost layers. Accordingly, the scope of the preferred alternative and other considered alternatives entail the planning and implementation of policies and practices flexible enough to allow the simultaneous pursuit of protection and resource management goals.

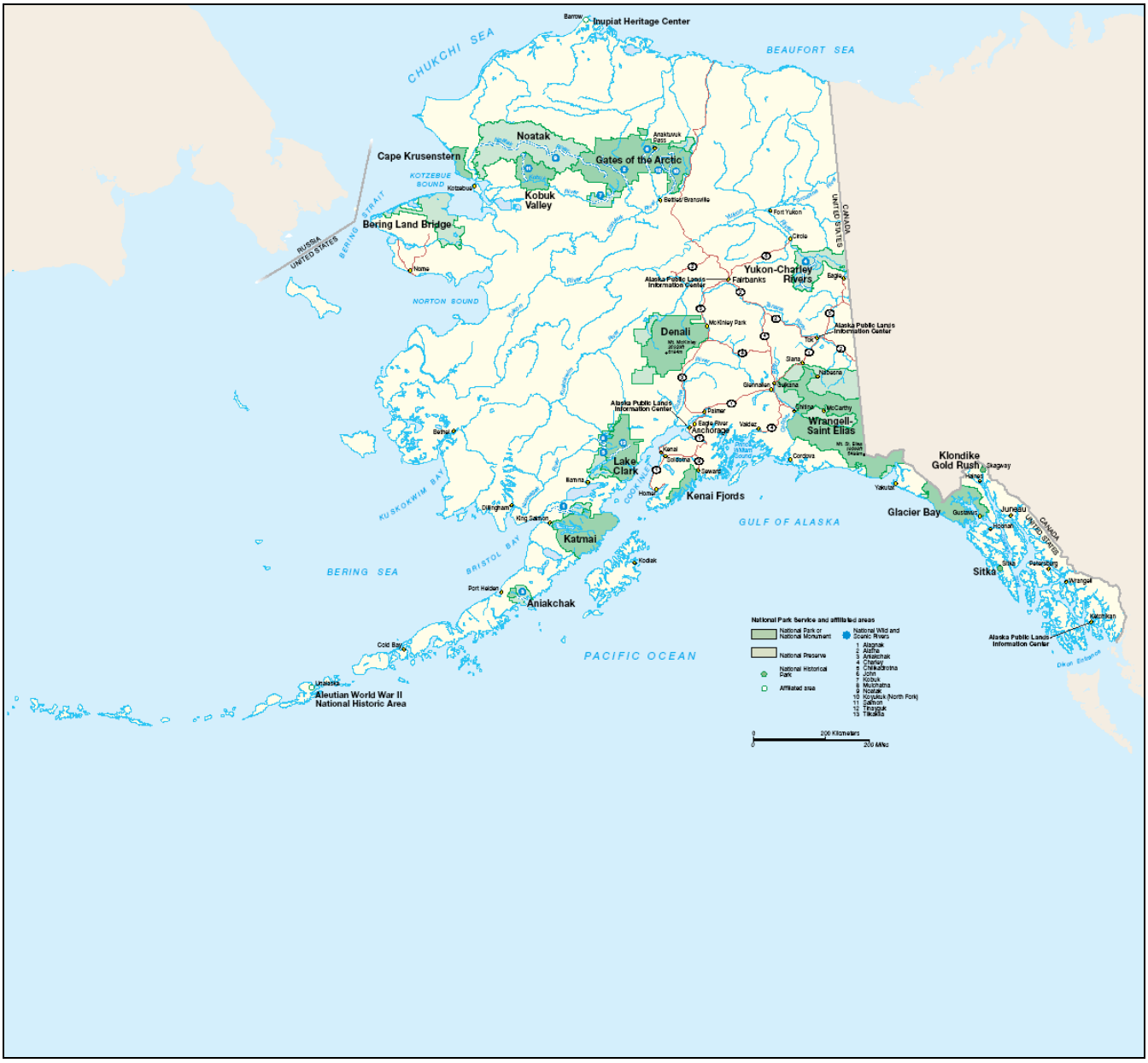

Figure 1-1. Vicinity map of Katmai National Park and Preserve.

This environmental assessment (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 CFR 1508.9).

1.2 BACKGROUND

1.2.1 Park Purpose and Significance

KATM was initially established in 1918 by Presidential Proclamation under the authority of the Antiquities Act. Its purpose was to preserve the living laboratory of its cataclysmic 1912 volcanic eruption, in particular, the Valley of Ten Thousand Smokes. In subsequent years portions of coastline, the lake systems and critical wildlife habitat were recognized as significant resources to the monument and were added to the initial acreage. In 1980 the passage of the Alaska National Interest Lands Conservation Act (ANILCA), added additional acreage and enabled Congress to re-designated Katmai as a National Park and Preserve and designate some 3.4 million acres as Wilderness.

Park Purpose

The purpose of Katmai National Park and Preserve is to protect, study, and interpret active volcanism surrounding the Valley of Ten Thousand Smokes, extensive coastal resources, habitats supporting a high concentration of salmon and brown bears, and an ongoing story of humans integrated with a dynamic subarctic ecosystem.

Park Significance

1. Katmai National Park and Preserve protects the Valley of Ten Thousand Smokes, the site of the 1912 eruption of Novarupta Volcano, the world's largest eruption during the 20th century.

2. Katmai National Park and Preserve is home to one of the world's largest protected population of brown bears, offering visitors an unprecedented opportunity to study and view bears in their native habitat.

3. Katmai National Park and Preserve protects the Naknek Lake drainage, an important spawning and rearing ground for Bristol Bay sockeye salmon, sustaining one of the largest salmon runs in the world.

4. Katmai National Park and Preserve contains vast multi–lake watersheds with hundreds of miles of rivers that link the freshwater and marine aquatic systems and provide essential habitat for fish and wildlife.

5. Katmai National Park and Preserve provides an outdoor laboratory for studying the effects of volcanism, climate change, and other large scale landscape processes on cultural and biological systems.

6. Katmai National Park and Preserve contains a 9,000 year record of human adaptation to environmental and ecological change that continues today.

7. Katmai National Park and Preserve offers 3.7 million acres of remote, yet accessible, wilderness–based recreational opportunities.

8. The Alagnak River, a designated Wild River, is internationally renowned for its scenic beauty and wide range of outstanding recreational opportunities.

In December of 1980 ANILCA designated the Alagnak River as a Wild River under the provisions of the Wild and Scenic Rivers Act. The Alagnak was chosen because it possessed "outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values, and shall be preserved in free-flowing condition." It further specified that the River, its' designated tributaries "and their immediate environments shall be protected for the benefit and enjoyment of present and future generations." (Wild and Scenic Rivers Act, Section 10(a)).

1.2.2 Laws, Regulations, and Policies

The FMP is consistent with the following laws, policies, guidelines and plans discussed below.

NPS Organic Act
Congress directed the U.S. Department of the Interior and NPS to manage units "to conserve the scenery and the natural and historic objects and the wild life therein and to 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" (16 U.S.C. § 1). Congress reiterated this mandate in the Redwood National Park Expansion Act of 1978 by stating that the NPS must conduct its actions in a manner that will ensure no "derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress" (16 U.S.C. § 1 a-1).

The NPS Organic Act and the General Authorities Act prohibit impairment of park resources and values. The 2006 NPS Management Policies uses the terms "resources and values" to mean the full spectrum of tangible and intangible attributes for which the park is established and managed, including the Organic Act's fundamental purpose and any additional purposes as stated in the park's establishing legislation. The impairment of park resources and values may not be allowed unless directly and specifically provided by statute. The primary responsibility of the NPS is to ensure that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities for enjoyment of them.

The evaluation of whether impacts of a proposed action would lead to an impairment of park resources and values is included in this environmental assessment. Impairment is more likely when there are potential impacts to a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- identified as a goal in the park's general management plan or other relevant NPS planning documents.

NPS Omnibus Management Act

The National Park Service Omnibus Management Act of 1998 (P.L. 105-391, 112 Statute 3497) addresses resources inventory and management in Title II. Section 201 defines the purposes of this title to enhance and encourage scientific study in National Park System (NPS) units. Section 202 authorizes and directs the Secretary of the Interior to assure management is enhanced of NPS units by a broad program of high quality science and information. Section 205 states the Secretary may solicit, receive, and consider requests from Federal and non-Federal public or private entities for the use of NPS units for scientific study. Such proposals must be: 1) consistent with applicable laws and the NPS Management Policies, and 2) the study would be conducted in a manner as to pose no threat to park resources or public enjoyment of those resources.

Wilderness Act of 1964

The Wilderness Act of 1964 (Public Law 88-577, 16 U.S.C. §§ 1131-1136, 78 Stat. 890) established the National Wilderness Preservation System and identified the National Park Service as one of the four federal agencies responsible for protecting and preserving the nation's wilderness resource. The Wilderness Act defines wilderness as follows:

> A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this chapter an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

Section 4(c) of the Wilderness Act defines prohibited uses as:

> Except as specifically provided for in this Act, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any wilderness area designated by this Act and, except as necessary to meet minimum requirements for the

> administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.

The minimum requirement concept is used when making all decisions concerning management of wilderness, including administrative practices, proposed special uses, scientific activities, and equipment use (including weather stations) in wilderness. When the minimum requirement is determined, the potential disruption of wilderness character and the physical resource is considered and given more weight than economic efficiency and convenience. If a compromise of wilderness resource or character is unavoidable, only those actions that preserve wilderness character and/or have localized, short-term adverse impacts will be acceptable. The minimum requirement/minimum tool analysis for this project is included in Appendix A.

Therefore, a two-step process is used:

1) Determine whether the proposed management action is needed, necessary for the purpose of wilderness, and does not pose a threat to wilderness resources and character.
2) Determine the techniques and type of equipment needed to ensure that impact to wilderness resources and values is minimized.

National Historic Preservation Act

The National Historic Preservation Act (NHPA) sets forth Government policy and procedures regarding historic properties including districts, sites, buildings, structures and objects included in or eligible for the National Register of Historic Places. Section 106 of NHPA requires that Federal agencies consider the effects of their actions on such properties, following regulations issued by the Advisory Council on Historic Preservation (36 CFR 800).

Alaska National Interests Lands Conservation Act

The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) provided for the designation and conservation of certain public lands, including the designation of units of the National Park and National Wilderness Preservation Systems:

Section 101. (a) In order to preserve for the benefit, use, education, and inspiration of present and future generations certain lands and waters that contain nationally significant natural, scenic, historic, archeological, geological, scientific, wilderness, cultural, recreational, and wildlife values, the units described in the following titles are hereby established.

(b) To preserve unrivaled scenic and geological values associated with natural landscapes; to provide for the maintenance of sound populations of, and habitat for, wildlife species of inestimable value, including those species dependent on vast relatively undeveloped areas; to preserve in their natural state extensive unaltered arctic tundra, and boreal forest; to protect and preserve rivers and lands, and to preserve wilderness resource values and related recreational opportunities; and to maintain opportunities for scientific research and undisturbed ecosystems.

Section 202. (2) Katmai National Monument 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 is hereby established as Katmai National Preserve, both as generally depicted on map numbered 90,007, and dated July 1980; furthermore, the monument is hereby redesignated as "Katmai National Park". The monument addition and preserve shall be managed for the following purposes, among others: 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.

Director's Order-12 (DO-12)

DO-12 (2001a) is the NPS guidance for Conservation Planning, Environmental Impact Analysis, and Decision Making. DO-12 states the guidelines for implementing NEPA according to NPS regulations. DO-12 meets all Council on Environmental Quality (CEQ) regulations for implementing NEPA. In some cases, NPS has added requirements under DO-12 that exceed the CEQ regulations.

Director's Order-18 (DO-18)

DO-18 (2008a), the NPS guidance for Wildland Fire Management, states that "every NPS unit with burnable vegetation must have an approved Fire Management Plan." DO-18 defines what an approved FMP must include, stressing that "firefighter and public safety is the first priority" and promoting "an interagency approach to managing fires on an ecosystem basis across agency boundaries." Director's Order 18 also directs parks to identify, manage, and reduce, where appropriate, accumulations of hazardous fuels. Procedures for completion, review, approval, and required contents for FMPs are provided in Reference Manual-18 (RM-18). A unit without an approved FMP must take aggressive suppression action on all wildland fires.

NPS Management Policies

NPS Management Policies, 2006 (2006) establishes service-wide policies for the preservation, management and use of park resources and facilities. These policies provide guidelines and direction for management of natural resources within the park (including natural processes that shape them, such as fire). Chapter 4 states that "naturally ignited fire, including the smoke that it produces, is part of many of the natural systems that are being sustained in parks" and requires that the NPS "adopt park resource preservation, development, and use management strategies that are intended to maintain the natural population fluctuation and processes that influence the dynamics of individual plant and animal populations, groups of animal and plant populations, and migratory animal populations in parks".

With regard to the disruption of natural processes such as ecosystems where the natural fire regime has been altered by suppression efforts, *NPS Management Policies, 2006* state that the NPS will "seek to return human-disturbed areas to the natural conditions and processes characteristic of the ecological zone in which the damaged resources are situated." Additionally, those policies state that "biological or physical processes altered in the past by human activities may need to be actively managed to restore them to a natural condition or to maintain the closest

approximation of the natural condition in situations in which a truly natural system is no longer attainable."

1.2.3 Relationship of Proposal to Other Planning Projects

The General Management Plan for KATM (1986) recognizes the role of fire as an important process in the perpetuation of natural ecosystems within the park. It also specifies that the park's Fire Management Plan "will outline objectives, procedures and responsibilities for the management of fire within Katmai and, that the overall objective is to "Let fires burn except where property or people would be threatened." Further the GMP acknowledges the NPS commitment to cooperate in the development of fire management plans which include "establishment of priorities for the control of wildfires and use of prescribed fires."

The GMP reiterates that one of the many purposes of Katmai was "to preserve in their natural state extensive unaltered arctic tundra, boreal forest, and coastal rainforest ecosystems, to protect the resources related to subsistence needs…to maintain opportunities for scientific research and undisturbed ecosystem."

The GMP continues that "Although the frequency of wildfire in Katmai has historically been low, it is an important process in the perpetuation of natural ecosystems. The park's fire management plan outlines objectives, procedures, and responsibilities for managing fires in Katmai. The overall objective of the plan is to let fires burn except where property or people would be threatened."

The current Resource Management Plan for Katmai (1994) states several objectives in support of allowing fire to play a natural role, wherever possible.

1. Manage human influences to maintain the natural and cultural environment as unimpaired as possible. The focus of this management is to protect resources by preserving ecological processes rather than protecting specific natural features of the park and preserve.
2. Identify, protect, and perpetuate Katmai's outstanding wildlife, vegetation, water and volcanic features in their wilderness environment.
3. Identify, preserve and protect the park/preserve's cultural resources…

The foundation statement for KATM also recognizes "Katmai National Park and preserve provides an outdoor laboratory for studying the effects of volcanism, climate change, and other large scale landscape processes on cultural and biological systems." (NPS, 2009a)

The FMP is designed to support management goals and objectives defined in the Katmai GMP and RMP and each alternative in the EA was developed with consideration of these goals.

1.3 FIRE MANAGEMENT OBJECTIVES

National Park Service Wildland Fire Management Guidelines (DO-18) require that all parks with vegetation capable of sustaining fire develop a wildland fire management plan. The plan should

meet the specific resource management objectives for that park and ensure that firefighter and public safety are not compromised. This guideline identifies fire as an important resource management tool that can be used by the National Park Service. The guideline further states that all non-structural fires occurring in the wildland are classified as either wildland fires or prescribed fires. Prescribed fires and wildland fire use may be authorized by an approved wildland fire management plan and contribute to a park's resource management objectives.

DO-18 identifies three paramount considerations for each Park's fire management program. They are:

- Protect human life and property both within and adjacent to Park areas;
- Perpetuate, restore, replace, or replicate natural processes to the greatest extent practicable; and
- Protect natural and cultural resources and intrinsic values from unacceptable impacts attributable to fire and fire management activities.

The purpose of the FMP is to provide a detailed plan for the management of wildland fire in such a manner as to safely accomplish resource management objectives. Under DO-18, fire activity is divided into two broad categories: wildland fire (including any unplanned ignition, whether natural or human caused) and prescribed fire (fire ignited by management for the purpose of achieving specific, predetermined objectives). Accordingly, this FMP articulates a comprehensive plan for the restoration of a healthy and safe fire environment at KATM through the effective and appropriate management of both wildland and prescribed fire.

The park's fire management goals, which follow, incorporate the park's overall management objectives as well as previously-discussed federal fire management policy principles and goals, including firefighter and public safety, collaboration, and accountability.

This FMP serves as a detailed and comprehensive program of action to implement federal fire management policy principles and goals. As identified in its mission, the NPS Fire Management Program "is dedicated to protecting lives, property and resources while restoring and maintaining healthy ecosystems". The use of fire is an important tool for meeting this goal. The park's fire management objectives tie directly to both this national fire program goal and to the park's resource management goals. Fire management goals at KATM are:

1. Let fires burn except where property or people would be threatened. (GMP 1986)
2. Maintain unimpaired the water habitat for all fish native to the Park/Preserve. (KATM Foundation Statement)
3. Identify, protect, and perpetuate Katmai's outstanding wildlife, vegetation, water and volcanic features in their wilderness environments. (RMP 1994)
4. Identify and afford protection to the Park and Preserve's fire-sensitive cultural resources. (RMP 1994)
5. Ensure that fire management activities conducted in designated or suitable Wilderness within Katmai conform to the basic purposes of wilderness. (DO-41)

1.4 ISSUES

To focus the environmental assessment, the NPS selected specific issues for further analysis and eliminated others from evaluation.

An interdisciplinary team of NPS staff have conducted internal project scoping to clearly define the project design, the project scope, the issues, and the impact topics to be analyzed in this environmental assessment.

1.4.1 Issues and Impact Topics

Issues are the potential environmental effects if the action is taken. Issue statements show the relationship between an action and a resource; they do not predict the degree or intensity of the action. The resource impact topics selected are as follows:

Air Quality
The 1970 Federal Clean Air Act stipulates that Federal agencies have an affirmative responsibility to protect a park's air quality from adverse air pollution impacts. All types of fires generate smoke and particulate matter, which can impact air quality within the park and surrounding region.

Water Quality
NPS policies require protection of water resources consistent with the Federal Clean Water Act and Executive Order 12088. Water is an important resource in the planning area and throughout the region. Activities addressed under the proposed alternatives have the potential to impact water resources in the planning area.

Vegetation (including wetlands)
Management actions, whether active or passive, can have tremendous effects on plant communities and the health and integrity of ecological systems. Executive Order 11990 also requires federal agencies to minimize the loss or degradation of wetlands. This policy requires that impacts to wetlands be avoided if possible and if wetlands are impacted then mitigation may be required. Activities addressed under the proposed alternatives have the potential to impact vegetation and wetlands in the planning area.

Fish and Aquatic Habitat
There are resident populations of various species of fish, as well as aquatic habitat, which can be impacted by fire management activities.

Wildlife and Habitat
There are resident populations of various species of reptiles, amphibians, birds, mammals, and invertebrates that can be adversely and/or beneficially impacted by fire management activities.

Visual Quality
NPS Management Policies, 2006 state that scenic views and visual resources are considered highly valued characteristics. Wildfires, associated smoke, and fire management activities may

influence visual resources in the park. Activities addressed under the proposed alternatives have the potential to impact visual quality in the planning area.

Visitor Experience
The 1916 Organic Act directs the NPS to provide for public enjoyment of the scenery, wildlife and natural and historic resources of national parks, "in such a manner and by such means as would leave them unimpaired for the enjoyment of future generations." Wildfire, smoke and fire management activities influence visitor use and experience in the park and have the potential to impact visitor experience.

Cultural Resources
Section 106 of the National Historic Preservation Act of 1966, as amended, provides the framework for Federal review and protection of cultural resources, and ensures that they are considered during Federal project planning and execution. The park has archeological sites and historic structures. These cultural resources can be affected by fire itself and by fire suppression activities.

Wilderness
NPS Management Policies, 2006 state "Fire management activities conducted in wilderness areas will conform to the basic purposes of wilderness." Activities addressed under the proposed alternatives have the potential to impact wilderness and wilderness values in the planning area. A Wilderness Minimum Requirement Minimum Tool Analysis is included in Appendix A.

Local Economy
Fires may limit economic opportunities and fire management may provide increased opportunities around bases of operation and for material suppliers.

Subsistence
Title VIII, Section 810 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." Noise and activity from fire management actions could impact subsistence users and wildlife. Subsistence uses and resources addressed in detail in the ANILCA Section 810 Evaluation (Appendix B).

Private Inholdings
Of the more than 4 million acres within the park boundaries, the NPS owns all lands, with the exception of some 150,000 acres that constitute native allotments, private inholdings, and state lands. Under ANILCA, allotments get full protection, thus if there is a large scale fire, small inholdings would be protected. Activities addressed under the proposed alternatives have the potential to affect private inholdings in the planning area.

1.4.2 Issues Considered but Dismissed

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

Climate Change
A growing body of scientific research, published in peer reviewed journals and synthesized by groups such as the Intergovernmental Panel on Climate Change and the U.S. Climate Change Science Program, depicts a global climate that is changing. Research also shows that human activities, especially emissions of greenhouse gases into the atmosphere, contribute to this changing climate. Emissions of greenhouse gases would be temporary and minor during fire management activities, but the park's long-term carbon footprint would not change; thus this project's contribution to climate change would not be measurable.

Natural Soundscape
In accordance with *NPS Management Policies, 2006* and *NPS Director's Order 47: Sound Preservation and Noise Management* (2001b), an important part of the NPS mission is preservation of natural soundscapes associated with Parks. Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. The proposed alternatives would not create additional noise other than short-term use of some equipment.

Threatened and Endangered Species and Critical Habitat
The Endangered Species Act of 1973 requires disclosure of impacts of federal actions on all federally protected threatened or endangered species. *NPS Management Policies, 2006* requires assessment of impacts to certain rare, candidate, declining and sensitive species. In compliance with the Endangered Species Act, the NPS reviewed the Anchorage Fish & Wildlife Service Field Office's ESA Section 7 Consultation Guide and found that no listed species or critical habitat are present in the project area. The Kittlitz's murrelet, a candidate species known to occur within the area, nests in scree and under rocks and would not be affected by vegetative fire control measures.

Environmental Justice
Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low-income Populations" requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. The EA alternatives would have no health or environmental effects on minorities or low-income populations or communities.

1.5 PERMITS AND APPROVALS NEEDED TO IMPLEMENT PROJECT

Wilderness: a minimum requirement/minimum tool analysis has been conducted for fire management activities occurring in designated or eligible wilderness at KATM. Results for this analysis are included in this EA (Appendix A).

2.0 ALTERNATIVES

2.1 INTRODUCTION

This chapter describes a range of reasonable alternatives, including the proposed action alternative and a no action alternative. This chapter also describes those alternatives and actions that will not be considered further (those not analyzed in Chapter 4). The table at the end of this chapter compares the alternatives in terms of their environmental impacts.

Each alternative consists of a different combination of the fire management strategies as mandated by DO-18, with each alternative representing a different application of fire as a management tool. The alternatives differ in their respective approaches to the management of wildland ignitions and in their allowance or preclusion of prescribed fire.

Actions Common to all Alternatives

All fire management actions at KATM would be conducted in full compliance with local, state, and interstate air pollution control regulations as required by the Clean Air Act, 42 U.S.C. 7418. Currently, no local or interstate air pollution control regulations exist in Alaska.

Wildland is an area in which development is essentially nonexistent. Structures, if any, are widely scattered.

Wildland fires are any non-structure fires, other than prescribed fires, that occur in the wildland. This term encompasses fires previously called both wildfires and prescribed natural fires.

Prescribed Fires are any fires ignited by management actions in defined areas under predetermined weather and fuel conditions to meet specific objectives.

Use of Wildland Fire is the management of naturally ignited (*e.g.* lightning) or human-ignited wildland fires to accomplish specific pre-stated resource management objectives in predefined geographic areas outlined in Fire Management Plans.

KATM would employ three primary strategies in order to protect archeological, cultural, and historic sites from damage by fire or fire suppression activities. First, culturally significant structures would be assigned Critical or Full Protection status, as dictated by the recommended criteria for fire protection of structural resources within KATM. Second, personnel conducting detection and/or reconnaissance flights within KATM would be directed to remain alert for the presence of any undiscovered cultural resource sites or structures and to report their presence to the Regional Fire Management Officer (FMO). Third, designated Incident Commanders would consult with appropriate resource advisors regarding the identification and sensitivity of previously unknown sites, and would cooperate with the Agency Advisor to mitigate any damage to such sites.

Certain fire suppression activities could pose a threat to fragile soil layers and to other ecosystem components. This type of risk would be mitigated through the use of Minimum Impact Suppression Tactics (MIST) as specified by NPS policy.

Four designations have been established to identify the appropriate actions to be taken within Fire Management Units (FMU) (Figure 2-1). See FMP Section 3.2 for more details.

Critical
Intent: To give the highest priority to suppression action on wildland fires that threaten human life, inhabited property, designated physical developments, and structural resources designated as National Historic Landmarks.
"Critical" areas within the boundaries of KATM and ALAG include the Amalik Bay Patrol Cabin, Nonvianuk Patrol Cabin, Swikshak Patrol Cabin, Baked Mountain Hut, Robert F. Griggs Visitor Center, Fure's Public Use Cabin, Lake Camp facilities, Brooks Lodge and Camp facilities, and Grosvenor Lodge. Additional structures and lodges on private lands, including Alagnak Wilderness Camps, Alaska's Enchanted Lake Lodge, Alaska Trophy Adventures Lodge, Battle Lake Cabins, Big Ku Lodge, Branch River Lodge, Hallo Bay Bear Camp, Katmai Wilderness Lodge, Kulik Lodge, Naknek River Camp, Nonvianuk Camp Lodge, and Royal Wolf Lodge (see Figure 4.1), would be in the "critical" category. 1,761 acres have been designated in the Critical FMU.

Full
Intent: To protect cultural and historical sites, uninhabited private property, natural resource high-value areas, and other high-value areas that do not involve the protection of human life and inhabited property. These vulnerable natural and cultural resources and uninhabited private properties would be protected. 130,214 acres have been designated in the Full FMU.

Limited
Intent: To recognize areas where the exclusion of fire may be detrimental to the fire dependent ecosystem, the environmental impacts of fire suppression activities may have more negative impacts on the resources than the effects of the fire, or the cost of suppression may exceed the value of the resources to be protected. The vast majority of the Katmai National Park and Preserve lands are in the "limited" designation. This designation recognizes the importance of allowing natural forces of disturbance in a dynamic ecosystem. 3,970,418 acres have been designated in the Limited FMU.

Modified
Intent: To provide designated areas that would be managed adaptively. The Modified designated areas are located between Full and Limited areas and are intended to buffer the Full designated areas. The Modified designated areas would be evaluated on July 10, August 10, August 30, and September 30 (conversion dates selected by the NPS); existing environmental conditions (weather, fuel loads, for example) would be evaluated to determine how wildland fire would be managed. For example, on September 30, long term weather predictions identify early fire-season ending events (rain/snow/temperature drop), and KATM has experienced a wet summer. The Modified designated areas may be "converted" to Limited designation. 9,855 acres have been designated in the Modified FMU.

The sum of the number of acres identified in each of the four designations is 4,112,248 acres. The Administrative boundary of park includes 4,130,558 acres. The 18,310 acre discrepancy can be attributed to variable identification of coastline bounding the park.

Under each alternative, mechanical fuel reduction may be used to mitigate hazard fuel buildup or recreate historical landscapes/conditions in areas where prescribed fire or wildland fire would pose an unreasonable threat to the property or resources.

2.2 ALTERNATIVE 1: FULL WILDLAND FIRE SUPPRESSION (NO ACTION)

This alternative represents a continuation of the existing situation and provides a baseline for evaluating the changes and impacts of the proposed action alternatives.

All ignitions, including those of natural origin, would be suppressed and no prescribed fire would be implemented. Reduction of flammable vegetation would be accomplished strictly by mechanical means (e.g., through the use of chain saws, cross cut saws or other tools). Mechanical reduction would be limited primarily to the protection of historic and/or archeological sites and Park/Preserve boundary areas. In some cases, however, mechanical reduction could be used to restore selected landscapes to historic conditions.

All wildland fires would receive initial attack action and be totally suppressed as the preferred response to wildland fire. Response to wildland fire is defined as the mobilization of the necessary services and responders to a fire based on ecological, social, and legal consequences, the circumstances under which a fire occurs, and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected. The specific response would be formally assessed for each event, taking into account firefighter and public safety and estimated cost of suppression. The Incident Commander would develop the response to wildland fire as part of the size-up process by analyzing the current situation and expected fire weather. MIST would also be utilized in all wildland fire events.

Manual or mechanical thinning (*e.g.* chainsaws, brush hogs) would be used to reduce fuel loads around park structures and cultural sites, depending on findings in a wilderness minimum requirements/minimum tool (MR/MT) analysis for locations in wilderness. These treatments would include reducing hazard fuels accumulations and promoting ecosystem sustainability; maintaining existing defensible space around structures; maintaining existing firebreaks; and creating and/or maintaining hazard fuels breaks along private inholdings to help prevent the spread of fire to adjacent non-agency land.

Figure 2-1. Fire Management Units, Katmai National Park and Preserve.

2.3 ALTERNATIVE 2: USE OF WILDLAND FIRE (LAND/RESOURCE MANAGEMENT OBJECTIVES INCLUDING SUPPRESSION STRATEGY)

Natural ignitions occurring in certain areas and under predetermined conditions would be managed for the accomplishment of resource management goals, including the preservation of fire in its natural role and the reduction of hazardous accumulations of burnable vegetation. Any fire posing a threat to life or property would be immediately suppressed. The suppression response is described in the Alaska Interagency Wildland Fire Management Plan. Prescribed fires would not be implemented. All human-caused wildland fire would be suppressed.

Regarding unplanned ignitions, Use of Wildland Fire (UWF) would be both emphasized and utilized heavily in the 3,970,418 acres of Limited Fire Management Option lands within KATM as directed in the park objectives, RMP, GMP and DO-41 Wilderness Stewardship. UWF would also be considered in the other management options on a case by case basis at the discretion of the Regional FMO and Agency Administrator and when agreed to by the protection agency.

As in Alternative 1, reduction of flammable vegetation would be accomplished strictly by mechanical means (e.g., through the use of chain saws, cross cut saws or other tools). Mechanical reduction would be limited primarily to the protection of historic and/or archeological sites and park boundary areas. In some cases, however, mechanical reduction could be used to restore selected landscapes to historic conditions.

A chief objective in the park would be the restoration and maintenance of natural conditions by considering alternative management strategies in the case of naturally caused wildland fires. Such fire activity may be permitted, provided that predetermined parameters for environmental conditions and resource availability are not exceeded. Adherence to these parameters would be determined through daily monitoring by trained personnel of fire size, location, rate of spread, intensity, and potential threat.

2.4 ALTERNATIVE 3: COMBINATION OF PRESCRIBED FIRE AND USE OF WILDLAND FIRE (NPS PREFERRED ALTERNATIVE)

Both major management actions (Use of Wildland Fire and Prescribed Fire) described under DO-18 would be allowed, as determined by a combination of pre-established and incident-specific decision making criteria. This alternative represents no change in the on-the-ground implementation of fire management activities; however, it does define the strategy for UWF. Wildland fires that do not pose a threat to life, property, or significant resources would be managed for the accomplishment of land/resource management goals, including the preservation of fire in its natural role and the reduction of hazardous accumulations of burnable vegetation.

Prescribed fire would be implemented, in certain cases, under the direction of NPS personnel for the purpose of reducing hazardous fuel loads in Critical and Full FMUs. In some area, hazardous fuels loads may be reduced instead by mechanical means, as described in Alternative 1.

Suppression would continue in or near developed areas and near KATM boundaries when neighboring administrative units with different fire management objectives adjoin NPS land. In areas known to contain fire sensitive cultural and/or archeological resources that warrant protection, or whenever insufficient resources are available to ensure the effective, long-term management of wildland fire to meet resource management objectives, suppression action would continue.

As in Alternative 2, UWF would be both emphasized and utilized heavily in the 3,970,418 acres of Limited Fire Management Option lands within Katmai. Planned fuel treatment projects would take a less significant role by utilizing both mechanical and prescribed fire, often in tandem to protect valuable park resources. These tools can be implemented to provide increased protection to park resources regardless of the fire management option selection surrounding the resource. Suppression actions would be used as a tool predominantly where Critical and Full management options prevail.

Prescribed fire would be used where appropriate to protect life, property, and park resources from the effects of unwanted fire and to manage ecosystems and associated fuels to meet management objectives. Prescribed burning activities would include all associated chemicals, drip torch fuel, and gas gel. Helicopters and all-terrain vehicles may also be used for ignition purposes. Prescribed fires would be conducted in designated burn units and within specified weather and fuel moisture parameters. Prescriptions may be adjusted, as warranted by information gained from monitoring. Priorities for prescribed fires would be determined by the length of time since the previous burn, current fuel loading and vegetative conditions, topographic advantage, and by personnel and logistical factors.

2.5 ENVIRONMENTALLY PREFERABLE ALTERNATIVE

Alternative 3 is the environmentally preferable alternative because it provides the full spectrum of fire management strategies and practices to accomplish KATM fire and resource management objectives while protecting human life and identified resources/values. The potential use of prescribed fire would permit managers to reduce the risk of catastrophic fires around important cultural resource sites as well as limiting the severity of fire in natural resource areas.

2.6 ALTERNATIVES AND ACTIONS CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

The following project alternatives were considered but were eliminated for consideration and will not be analyzed further in this environmental assessment. The rationale for eliminating alternatives from further analysis is based primarily on factors relating to whether the alternative is reasonable or feasible.

2.6.1 Full Wildland Fire Suppression and Prescribed Fire

All ignitions, including those of natural origin, would be suppressed. The effects of natural wildland fire would be simulated through the use of planned ignitions conducted by park personnel in defined zones. Such fires would be ignited under predetermined fuel and weather conditions; control problems would thereby be minor.

This alternative is dismissed from further consideration for the following reasons: 1) the inability to maintain a natural burn cycle through only prescribed burns; 2) the increased risk of catastrophic wildland fire which would result from the exclusion of the area's natural burn cycle; 3) the prohibitively high cost of large-scale mechanical fuel reduction and prescribed burns; 4) non-conformance with the existing interagency management scheme and a potential to cause an impairment of park resources and values.

2.7 MITIGATION MEASURES

For all action alternatives, best management practices (BMPs) and mitigation measures would be used to prevent or minimize potential adverse effects associated with fire management. These practices and measures would be incorporated to reduce the magnitude of impacts and ensure that major adverse impacts would not occur. Mitigation measures undertaken during project implementation would include, but would not be limited to, those listed below.

Fire Management Activities

NPS policy requires fire managers and firefighters to select management tactics commensurate with a fire's existing or potential behavior, but which cause as little impact to natural and cultural resources as possible. All suppression activities at KATM would therefore incorporate the minimum impact suppression tactics policy, to the greatest extent feasible and appropriate for the given situation. Examples of minimum impact suppression tactics that would be implemented include:

- Not using heavy equipment (e.g. bulldozers, plows) for constructing fireline.
- Not using fireline explosives.
- Using existing natural fuel breaks and human-made barriers, wet line, or cold trailing the fire edge in lieu of fireline construction whenever possible.
- Keeping fireline width as narrow and shallow as possible when it must be constructed.
- Avoiding ground disturbance within known natural and archeological/cultural/historic resource locations. When fireline construction is necessary in proximity to these resource locations it would involve as little ground disturbance as possible and be located as far outside of resource boundaries as possible.
- Using water in lieu of fire retardant.
- Using soaker hose, sprinklers or foggers in mop-up; avoiding boring and hydraulic action.
- Minimizing cutting of trees.
- Scattering or removing debris as prescribed by the incident commander.
- Protecting air and water quality by complying with the Clean Air Act, the Clean Water Act, and all other applicable federal, state, and local laws and requirements.
- Education efforts would help with negative perceptions in the aftermath of wildfire.

Human Health and Safety

Firefighter and public safety is the highest priority in every fire management activity. In light of this:

- Only fully qualified (i.e. meeting NWCG (National Wildfire Coordinating Group) qualifications and accepted interagency knowledge, skills and abilities for the assigned fire job) personnel would be assigned fire management duties (unless assigned as trainees, in which case they would be closely supervised by an individual fully qualified for the given position).
- No fire management operation would be initiated until all personnel involved have received a safety briefing describing known hazards and mitigating actions, current fire season conditions, and current and predicted fire weather and behavior.
- Wildland fire incident commanders would minimize firefighter exposure to heavy smoke.
- Park neighbors, visitors and local residents would be notified of all fire management events that have the potential to impact them.
- The superintendent or designee may, as a safety precaution, temporarily close parts of the parks to the visiting public.

Property

- To the greatest extent feasible and appropriate, park infrastructure, any other development, native allotments, private inholdings, and adjacent non-agency land would be protected during all fire management activities.

Air and Water Quality

- The park would comply with the Clean Air Act, the Clean Water Act, and all other applicable federal, state, and local laws and requirements. Additionally:
    - The suppression response selected to manage a wildland fire would consider air quality standards.
    - During fire suppression, water would be used in lieu of fire retardant whenever possible. If retardant must be used, a non-fugitive type would be chosen, and bodies of water avoided.
    - No retardant would be applied within 300 feet of any surface water, unless there is a threat to life and property and with Superintendent approval.
    - Large delivery water handling equipment would be sanitized so as not to introduce exotic water species that may be transported from "infected" areas to pristine waters.
    - Pump containment "skirts" would be used to prevent/contain accidental fuel spills.

Natural and Cultural Resources

- Natural and cultural resources would be protected from the adverse effects of unwanted fire as well as the adverse effects of fire management activities. During all fire management activities, the minimum impact tactics policy would be incorporated to the greatest extent feasible and appropriate, employing methods least damaging to park resources for the given situation.

- Historic structures would be protected from wildland fire via the maintenance of existing defensible space around each. There may also be a need to create defensible space around structures where such space is not being maintained as an incident evolves.
- Avoiding ground disturbance within known sensitive or unique natural and cultural resource locations. When fireline construction is necessary in proximity to these resource locations it will involve as little ground disturbance as possible and be located as far outside of resource boundaries as possible.

Wilderness Resources

Prescribed burns in wilderness areas would be subject to supplementary minimum requirements analysis to ensure the trammeling and other wilderness impacts are the minimal tool to manage the wilderness resources.

Monitoring and reporting requirements:

The plan and environmental assessment include guidelines to minimize impacts of fire management activities on wilderness, including the following mitigations:

- Wilderness Fire Resource Advisors will be assigned to all extended attack fires and Burned Area Emergency Stabilization and Response (BAER) activities, including those occurring in or near wilderness.
- Park wilderness coordinator will review fire management unit designations when they are revised.
- All fire suppressions in wilderness would follow Minimum Impact Suppression Tactics (MIST) as specified by NPS policy. Give preference to using methods and equipment that cause the least:
    - Alteration of the wilderness landscape.
    - Disturbance to the land surface or degradation of habitat or water quality
    - Disturbance to visitor solitude.
    - Reduction of visibility during periods of visitor use.
    - Adverse effect on other air quality related values.
    - Need for subsequent restoration or mitigation
- Fire camps and incident command centers will be located outside of wilderness, whenever feasible.
- Fire suppression activities in wilderness will minimize the unnatural effects
- The use of mechanized equipment will be scrutinized and must be defensible as necessary to suppress a wildfire with a clear threat to public health and safety, including firefighter safety. Within wilderness, chain saws, helicopters, heavy equipment, or pumps will only be used when essential to meet suppression objectives, but with due consideration to impacts on wilderness character and subject to minimum tool determination with the superintendent and incident commander making the ultimate decision.
- For fire management purposes, helicopters would use unimproved landing locations in wilderness.
- To the extent possible, non-emergency use of helicopter landings in wilderness will be avoided. If it cannot be avoided, the decision to use a landing spot in wilderness will be

detailed in a Wilderness Minimum requirements analysis as well as an environmental compliance document (i.e. the Environmental Assessment or Categorical Exclusion).

- All prescribed burns (non-emergency) will be pre-planned with an action specific Wilderness Minimum Requirements Analysis.

Table 2-2. Summary of Alternative Impacts

Impact Topic	Alternative 1: Full Wildland Fire Suppression (No Action)	Alterative 2: Use of Wildland Fire	Alternative 3: Prescribed Fire and Use of Wildland Fire (Preferred Alternative)
Air Quality	Adverse, short-term, localized to regional, negligible to minor impacts when wildfires are suppressed. In the case of a catastrophic wildfire, impacts would be adverse, short-term, localized to regional, and moderate.	Adverse, short-term, localized to regional, minor impacts from the use of wildland fire. Impacts would be greater than under Alternative 1 as unplanned ignitions would be allowed to burn longer than they would if they were suppressed, creating greater amounts of smoke.	Adverse, short-term, localized to regional, minor impacts from use of wildland fire and prescribed fire. Impacts would be greater than under Alternative 1 as unplanned ignitions would be allowed to burn longer than they would if they were suppressed, and greater than Alternative 2 as there would be the addition of prescribed fire, but not appreciably.
Water Quality	Adverse, short- to long-term, localized, minor to moderate effects from wildfire suppression, and depending on the nature and intensity of wildland fire. Catastrophic wildfire has the potential for substantial adverse effects on water quality from direct effects of burned materials entering streams and from erosion of bare soils and subsequent sedimentation of streams.	Adverse, short-term, localized, minor impacts from fire management activities, including use of wildland fire. The chances of catastrophic fires would be reduced under this alternative, thus decreasing impacts on water quality as compared to Alternative 1.	Adverse, short to long-term, negligible to moderate impacts caused by fire protection, management of wildfires, and fuels management activities. The potential for wildfires outside the range of normal variability would be minimized as this alternative would promote the natural role of fire across the landscape, benefitting water resources over the long-term.
Vegetation	Adverse, minor to moderate, short- to long-term impacts depending on the nature and	Adverse, minor to moderate, short- to long-term impacts depending on the nature and	Adverse and beneficial, negligible to moderate, short- to long-term impacts as this

	intensity of wildland fire and suppression activities. Catastrophic wildfire would have adverse effects on vegetation that would range from moderate to severe, depending on the extent of the fire.	intensity of wildland fire and fire management activities. There would also be long-term, minor to moderate, beneficial effects on native plant communities from use of wildland fire that enhances the survival of native species.	alternative would best promote the natural role of fire and minimize the potential for eventual changes in vegetation communities that are outside the range or natural variability. These effects on vegetation would be considered adverse over the short-term to the extent that vegetation is removed, but beneficial over the long-term from removal of undesirable hazard fuels. Although vegetation impacts would be somewhat greater due to the increased fire management activities, Alternative 3 would attain the widest range of beneficial uses.
Fish and Aquatic Habitat	Adverse, short- to long-term, localized, negligible to moderate effects from wildfire suppression and mechanical fuel reduction depending on the nature and intensity of wildland fire. Catastrophic fires have the potential for substantial adverse effects on fish and aquatic habitat due to erosion of burned areas.	Adverse, negligible to minor, short- to long-term impacts depending on the nature and intensity of wildland fire and fire management activities. The chances of catastrophic fires would be reduced under this alternative, decreasing impacts on fish and aquatic habitat as compared to Alternative 1.	Adverse, negligible to minor, short- to long-term impacts depending on the nature and intensity of wildland fire and fire management activities, similar to Alternative 2.
Wildlife and Habitat	Negligible to moderate, short- to long-term, adverse effects associated with fire suppression and mechanical fuel treatments depending on	Negligible to moderate, short- to long-term, adverse effects associated with fire management activities depending on the nature	Negligible to moderate, short- to long-term, adverse effects associated with fire management activities. Alternative 3 would best

	the nature and intensity of wildland fire. Catastrophic wildfire would have adverse effects on wildlife and habitat that would range from moderate to severe, depending on the extent of the fire.	and intensity of wildland fire. Long-term benefits to wildlife from prevention of catastrophic wildfires would be substantial, to the extent that fire management actions prevent catastrophic wildfires, and minor to moderate long-term benefits from restoration and maintenance of natural habitat.	promote the natural role of fire with the largest range of fire management actions, and minimize the eventual changes in wildlife habitat that are outside the normal range of variability. In the long-term, there would be minor to moderate beneficial impacts on wildlife and habitat.
Visual Quality	Direct adverse impacts would include short episodes of increased particulates and decreased visibility. These direct adverse impacts would be short-term, localized, and negligible to minor. Indirect and longer-term adverse would impacts include contributions to regional haze and the possibility of wind-blown dust near the burned areas. However, in the case of a catastrophic wildfire, impacts to visual quality would be adverse, short-term, localized to regional, and moderate.	Direct adverse impacts would include short episodes of increased particulates and decreased visibility. These direct adverse impacts would be short-term, localized, and minor. Indirect and longer-term adverse impacts would include contributions to regional haze and the possibility of wind-blown dust near the burned areas. Areas blackened by fires would have short-term, adverse, localized, minor to moderate impacts on visual quality, but long-term, beneficial, minor to moderate effects as vegetation recovers.	Direct adverse impacts would include short episodes of increased particulates and decreased visibility. These direct adverse impacts would be short-term, localized, and minor. Indirect and longer-term adverse impacts would include contributions to regional haze and the possibility of wind-blown dust near the burned areas. There would be additional impacts on visual quality due to the use of prescribed fire, but not appreciably. Areas blackened by fires would have short-term, adverse, localized, minor to moderate impacts on visual quality, but long-term, beneficial, minor to moderate effects as vegetation recovers.
Visitor Experience	Short-term, localized, adverse, negligible to minor effects on the visitor experience from	Short-term, localized, adverse, negligible to minor effects from smoke, closures, and	Short-term, localized, adverse, negligible to minor effects from smoke, closures, and

	smoke, closures, and burned vegetation in the park, depending on the location and size of wildfires.	burned vegetation in the park with wildland fire use, fire suppression, and mechanical clearing.	burned vegetation in the park with wildland fire use, prescribed fire, fire suppression, and mechanical clearing.
Cultural Resources	Adverse, negligible to moderate, short- to long-term impacts depending on the nature and intensity of wildfire and subsequent fire suppression response and rehabilitation activities. The effects on historic structures from mechanical fuel reduction would be localized, short-term to long-term, minor to moderate, and beneficial.	Adverse, negligible to moderate, short- to long-term impacts similar to Alternative 1.	Adverse, negligible to moderate, short- to long-term impacts depending on the nature and intensity of wildfire and subsequent fire management response and rehabilitation activities. The effects on historic structures from mechanical fuel reduction would be localized, short-term to long-term, minor to moderate, and beneficial. Adverse effects on cultural resources from planned fire management actions would be avoided.
Wilderness	Short- and long-term, localized, adverse, minor to moderate impacts as a result of fire suppression activities and not allowing fire to have its natural and historic role in the wilderness landscape.	Minor to moderate, short-term, localized, adverse impacts on wilderness during and immediately after fire management actions, and changes to wilderness character would be small. Allowing wildland fires to burn in wilderness would enhance and maintain many wilderness characteristics. In the long-term, fewer fires would need to be suppressed, resulting in fewer direct impacts associated with protection actions, and	Minor to moderate, short-term, localized, adverse impacts on wilderness during and immediately after fire management actions, and changes to wilderness character would be small. Using prescribed fire and allowing wildland fires to burn in wilderness would enhance and maintain many wilderness characteristics. In the long-term, fewer fires would need to be suppressed, resulting in fewer direct impacts associated with

		there would be minor to moderate beneficial effects on wilderness.	protection actions, and there would be minor to moderate beneficial effects on wilderness. Including prescribed fire would enhance these benefits incrementally as compared to Alternative 2.
Local Economy	Negligible to minor, beneficial, short-term impacts from reducing the potential loss of visitor spending associated with wildfire events. Some potential risk of moderate, long-term, adverse impacts may be associated with the risk of catastrophic wildfire as the result of disrupting the area's natural burn cycle.	Negligible to minor, beneficial, short-term impacts, with some potentially negligible adverse impacts associated with temporary disruptions of visitor activity and corresponding business activity inside the park. Some increase in local spending for labor, equipment, and supplies for fire management activities may offset any decreases in visitor spending experienced in the local economy.	Negligible to minor, adverse, short term impacts associated with the use of prescribed fires. Minor, beneficial, long-term impacts from the reduction of the frequency and severity of naturally occurring fires.
Subsistence	Negligible to minor, beneficial impacts in preventing further damage to valued resources from wildfires depending on the nature of the fire event and the importance of the specific resource to subsistence populations. Some negligible to minor, short-term adverse impacts may be associated with suppression actions. Over the long-term, the increased risk of catastrophic fire could contribute to a more moderate, adverse impact	Minor, beneficial impacts to subsistence users and resources through management and control of wildland fires to preserve the natural role of fire. UWF fire to control and reduce hazardous accumulations of burnable vegetation would reduce the risk of future catastrophic fire, thereby decreasing the long-term threat to valuable subsistence resources.	Minor, adverse, short-term impacts from prescribed fires that could result in an increase in the number of smaller fires and the potential for additional ground disturbing activity that may threaten subsistence resources. Minor, long-term, beneficial effect from reducing the risk of catastrophic fires which may have a more intense impact on subsistence resources

	to specific resources.		
Private Inholdings	Short-term, negligible to minor, beneficial, localized impacts from protection with full wildfire suppression. In the long-term, a catastrophic wildfire could have moderate, adverse impacts if full suppression is not possible or rapid. Temporary, adverse, minor effects would occur from smoke reaching inholdings from nearby fires.	Short-term, negligible to minor, beneficial, localized impacts from protection with full wildfire suppression. In the long-term, wildland fire use would reduce the risk of catastrophic wildfire and provide minor to moderate beneficial effects. Temporary, adverse, minor effects could occur from smoke reaching inholdings from nearby managed fires.	Short-term, negligible to minor, beneficial, localized impacts from protection with full wildfire suppression. In the long-term, wildland fire use and prescribed fire would reduce the risk of catastrophic wildfire and provide minor to moderate beneficial effects. Temporary, adverse, minor effects could occur from smoke reaching inholdings from nearby managed fires.

3.0 AFFECTED ENVIRONMENT

3.1 PROJECT AREA

Katmai National Park and Preserve encompasses approximately 4.1 million acres of federal land and is located near the north end of the Alaska Peninsula in southwestern Alaska, about 290 miles southwest of Anchorage (Figure 1-1). It is bounded to the east by Shelikof Strait on the Gulf of Alaska, across from the Kodiak Island archipelago. The north boundary loosely follows the divide between the Nonvianuk/Alagnak drainage and the Kvichak/Iliamna drainage. The west boundary is the moraine west of Naknek Lake; the Naknek drainage above this point is enclosed within the boundary. The southwest boundary encompasses the headwaters of the King Salmon River and Kejulik River drainages.

Four major landscape types can be distinguished in KATM: the rugged coastline; the Aleutian Range, whose volcanic peaks rise to elevations exceeding 7,000 feet; the lake country, where lakes, rivers, ponds, and marshes occupy long, northwest-trending glacially carved valleys; and the Bristol Bay lowlands, where permafrost and generally flat topography result in a landscape dotted with small ponds, marshes, and meandering streams.

3.2 AIR QUALITY

KATM has been designated a class II area under the provisions of the Clean Air Act, as amended. Class I and class II designations are given to areas where air quality is cleaner than the national ambient air quality standards. Class I areas have the most stringent regulations for the protection of air quality, permitting the lowest increments of air quality degradation, whereas class II status allows moderate deterioration that might accompany well-planned growth. Two class I airsheds exist in SW Alaska; the closest, Tuxedni Wilderness area, lies approximately 20 miles to the north across Kamishak Bay. The other, the Simeonof Wilderness area, lies approximately 260 miles southwest of KATM. Federal standards are consistently achieved at KATM, including those for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead.

The air over KATM appears essentially unaffected by human activity. Visibility and air quality can be called pristine, except for the small developed area of Brooks Camp where smoke from the lodge and cabins may temporarily accumulate. Air quality and visibility can be affected by inclement weather, dust blown from the Valley of Ten Thousand Smokes, and locally by sulfur dioxide from volcanoes.

3.3 WATER QUALITY

KATM is contained within the Naknek, Kvichak and Egegik river basins, including a coastal river basin that primarily drains the Aleutian mountains to the Shelikof Strait and Cook Inlet (Weeks, 1999). KATM contains the largest freshwater lake in the National Park system (Naknek

Lake) and some of the largest lakes in Alaska. These lakes make up approximately 8% of the park's surface area and most are found at low elevations (< 1,000 feet msl) along the northern slope of the Aleutian Range. Major lakes include Grosvenor, Colville, Brooks, Idavain, Kulik, Nonvianuk, Hammersly, Murray, Dakavak, Katmai, Kaguyak, as well as a small part of the drainage feeding Becharof Lake, which is not itself within the park. There are also several unnamed lakes.

The Alagnak River is a "Wild River" component of the National Wild and Scenic Rivers system and a unit area of the NPS administered by KATM. The Alagnak River is a tributary of the Kvichak River basin. American Creek, Big River, Brooks River, Funnel Creek, Hallo Creek, Headwaters Creek, Ikagluik Creek, Katmai River, Knife Creek (including Juhle Creek), and Kulik River have all been designated as potential rivers to be added to the National Wild and Scenic River System. Recent water quality studies conducted in the area indicate pristine water quality conditions.

Katmai National Park and Preserve 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.

Water quality in all of these lakes and rivers remains essentially unaltered by man. Some bodies of water are heavily silted with glacial outwash sediments or volcanic ash. Others contain clear and unsilted water. Water levels in the larger lakes may vary seasonally by as many as seven feet.

There have been several efforts since the 1970s to collect some baseline water chemistry for KATM's lakes and streams. Water samples have been collected in the Valley of Ten Thousand Smokes since 1979 to determine the extent to which the 1912 volcanic deposits are still being leached by surface waters. Knife Creek and River Lethe, the two major streams draining the 1912 ashflow sheet, are enriched in dissolved constituents (SiO_2, Ca, Na, K, Mg, Li, Cl, F, SO_4) compared to streams that have not had contact with the 1912 deposits (Weeks, 1999).

Lakes within the Alagnak system exhibit lower surface water alkalinity than those of the Naknek system. This may reflect the influence of granitic parent materials in the Alagnak drainage (Weeks, 1999). The larger lakes in KATM are low in nutrients. These lakes are able to circulate during the ice-free season due to frequent winds from coastal storms. The result is thermal instability that allows summer heat to mix deep into these lakes. The mixing conditions and heat allow these lakes to be important producers of fish, particularly juvenile sockeye salmon.

High-altitude lakes are acid sensitive. Of these, Battle Lake has the lowest alkalinity along with elevated concentrations of aluminum that possibly create toxic conditions. The U.S. Fish and Wildlife Service (King Salmon, AK) conducted surveys in this acidic tributary and found

virtually no traces of aquatic invertebrates or fish (Weeks, 1999). Water quality surveys indicated that the source of this acidity is drainage from Iron Springs Lake, a naturally acidic lake (pH = 3.6). Not surprisingly, algal and zooplankton concentrations were low in Battle Lake.

High aluminum concentrations were found in Iron Springs Creek in the Alagnak drainage and Up-a-Tree and Headwater creeks, which are located in the Naknek drainage. Aluminum concentrations that could be acutely toxic were measured in the Savonoski and Ukak rivers. The Iliuk Arm of Naknek Lake receives turbid, glacial waters from the Savonoski and Ukak Rivers in KATM. As a result of increased turbidity, Iliuk Arm has transparency readings of less than 1.6 to 3.3 feet. In contrast, transparency readings were recorded for Brooks Lake that ranged from 31.3 feet in July to 55.1 feet in August (Weeks, 1999). Because of reduced light penetration in Naknek Lake, there is less planktonic primary production per unit area than Brooks Lake.

3.4 VEGETATION (INCLUDING WETLANDS)

Tundra and dense shrubs are the most prominent plant communities in KATM. Spruce/birch forests and groves of balsam poplar occur on well-drained low elevation sites, especially near lakes. The forest is typically interspersed with grassy meadows, extensive marshland, and patches of low shrubs. Near timberline, which occurs at about 1,500 ft, the spruce become stunted, grading into dense thickets of alder, dwarf birch, and dwarf willow in association with lichens, grasses and other low shrubs. Much of the area is underlain by isolated masses of permafrost which influence drainage and, in turn, vegetation patterns.

KATM can be divided into four major landscape categories: the coast, the Aleutian Range, the lake country, and the Bristol Bay lowlands (NPS, 1994). Major vegetation cover types in these areas and the proportion of KATM over which they occur are:

<u>Alpine Tundra or Barren - 37%</u>
Alpine tundra occurs primarily in the Aleutian Range and the lake country. Characteristic species are lichens, crowberry, and blueberry. Exposed windswept areas are pioneered by lichens, lupine, aster, and cinquefoil. Alpine azalea, arctic willow, and mountain avens are found in more protected areas. Other plant species characteristic of alpine tundra include low-bush cranberry, dryas, anemone, gentian, lousewort, and saxifrage.

<u>Moist Tundra - 21 %</u>
Moist tundra occurs primarily in the Bristol Bay lowlands and the lake country. Moist tundra is characterized by a continuous mat of mosses and lichens in which a wide variety of low-growing shrubs, herbs, grasses, and sedges are rooted. Slight changes in exposure, drainage, or disturbance cause marked changes in the type of plants. Cottongrass, a sedge, is most obvious in poorly drained depressions. On slightly raised areas, low shrubs such as crowberry, Labrador tea, low-bush cranberry, dwarf birch, and arctic willow, predominate. During the summer, colorful flowers are scattered through the heath. These include lousewort, monkshood, bistort, and buttercup.

Tall Shrubs - 18%
Shrublands occur primarily along the coast and in the lake country. The tall shrub community is characterized by dense thickets of alder, willow, and birch with an understory of a wide variety of low shrubs, herbs, grasses, ferns, and mosses. Common plant species include geranium, lupine, winter green (*Pyrola*), bluejoint grass, horsetail, and ferns.

Upland Mixed Forest - 10%
Mixed conifer/deciduous forest occurs primarily in the lake country. White spruce with scattered birch is found on moderate south facing slopes. Black spruce, not documented in KATM, may occur on northern exposures or poorly drained flats. The understory consists of moss and low shrubs on cool moist slopes, grasses on dry slopes, and willow and alder with dwarf birch in the high open forests near timberline. Common plant species include high-bush cranberry, fireweed, milk vetch, pyrola, blue joint grass, horsetails, oakfern, and clubmoss.

Invasive, non-native plant species have established in several human-disturbed locations throughout the park. Common dandelion is widespread in Brooks Camp and Fure's Cabin. Along the Valley of Ten Thousand Smokes Road, the species of greatest concern is bird vetch. It also grows, along with narrow-leafed hawksbeard, at the gravel pit near Brooks Camp. Lake Camp's species of greatest concern are fall dandelion and sheep sorrel. Other species prevalent, but of lower management concern, include annual bluegrass, Kentucky bluegrass, shepherd's purse, mouse ear chickweed, pineapple weed, and common plantain (Frank and Woods, 2011). Several additional species are known to infest lands where fire mobilization would likely occur, such as King Salmon, Kodiak, or Homer.

KATM contains extensive wetlands that include marine, estuarine, riverine, palustrine, and lacustrine environments (estimates exceed 1 million acres) (Weeks, 1999). The park's wetlands represent transitional environments, located between uplands and deep water areas. Flora within these wetland systems exhibits extreme spatial variability, triggered by very slight changes in elevation. Temporal variability is also great because the surface water depth is highly influenced by changes in precipitation, evaporation and/or infiltration.

There are a number of tundra ponds, beaver ponds, and small tundra lakes along the park's western boundary. These bodies of water are shallow, frequently contain submerged and emergent aquatic vegetation, and occasionally have no surface connections with major stream systems. The Savonoski River/Bay of Islands area and the Margot Creek drainage, also located in the park's interior, contain extensive marshes and ponds. Along the park's coast, marine and estuarine wetlands (primarily under State jurisdiction) are common along with riverine, palustrine, and lacustrine wetland systems.

Obvious vegetative changes have been occurring in Katmai in the relatively recent past that 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. Current research on spruce bark beetle is being conducted by the NPS Southwest Alaska Network 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. 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.

3.5 FISH AND AQUATIC HABITAT

KATM has a diversity of aquatic habitats that support 25 species of fish (NPS, 1994). Principal fish include rainbow trout, salmon (chinook, coho, chum, pink, and sockeye), lake trout, char (Dolly Varden and arctic char), arctic grayling, whitefish (least cisco, humpback, pygmy, and round), northern pike, smelt, lamprey, sculpin, stickleback, longnose sucker, burbot, starry flounder, Pacific cod, and Alaska blackfish (NPS, 1986). Many of these species are important for commercial, sport fishing, and subsistence harvest.

The sockeye salmon is the most abundant and widely distributed species of salmon in the park. KATM contains spawning habitat for a substantial portion of the sockeye salmon population upon which the Bristol Bay commercial salmon fishery, and thus the regional economy, depends. Salmon migrating from the sea to spawn in freshwater streams represent a huge upstream flow of nutrients that is vital to the integrity of park ecosystems. This aquatic habitat not only is vital to aquatic organisms, but is fundamentally interrelated with terrestrial ecosystems as well.

The salmon run begins at KATM in late June. By the end of July, a million fish may have moved from Bristol Bay into the Naknek system of lakes and rivers. Salmon stop feeding upon entering freshwater, and physiological changes lead to the distinctive red color, humped back, and elongated jaw they develop during spawning. The salmon spawn during August, September, and October. Stream bottoms must have the correct texture of loose gravel for the eggs to develop. The stream must flow freely through winter to aerate the eggs. By spring the young fish that have just hatched emerge from the gravels and migrate into the larger lakes, living there two years. The salmon then migrate to sea, returning in two or three years to spawn and begin the cycle once again. Salmon provide food for bears, bald eagles, rainbow trout, and directly or indirectly for the other animals that forage along these streams.

Rainbow trout are found in many of the park's river drainage systems. High quality fisheries are located in several lakes and streams, notably Naknek Lake, Brooks River, Brooks Lake, Grosvenor and Colville lakes, American Creek, and the Nonvianuk, Alagnak, and Kulik rivers.

3.6 WILDLIFE AND HABITAT

KATM contains a diverse assemblage of wildlife. At least 29 species of land mammals, six species of marine mammals, and 150 species of birds have been reported in or near the park (NPS, 1986).

KATM provides protection to the largest population of brown bears in North America. The distribution of bears during summer largely reflects the distribution of salmon. The Brooks River is the first place where a significant number of salmon become available to bears. Over

the next three months, as many as 100,000 or more fish pass into the river. Bear numbers in the Brooks River area begin to increase steadily soon after the salmon arrive in late June, peaking in late July. The fish, which are not yet ready to spawn, are still healthy and are difficult for all but the most skilled bears to catch. In August, salmon begin to spawn and die in several tributary streams throughout the drainage, except the Brooks River, and most bears then disperse away from Brooks. Coho salmon spawn in the Brooks River and other streams during September and October, and a second peak in bear activity at Brooks coincides with this spawning.

Other mammal species include moose, caribou, wolf, furbearers (such as lynx, red fox, wolverine, beaver, and coyote), and mustelids (such as river otter, mink, and sea otter). Along the coast are sea lions, sea otters, seals, porpoise, and beluga, killer, and gray whales using Shelikof Strait.

Lake edges and marshes serve as nesting sites for tundra swans, ducks, loons, grebes, and the arctic tern. Sea birds abound along the coast, grouse and ptarmigan inhabit the uplands, and some 40 songbird species summer at KATM. Sea coast rock pinnacles and treetops along lakeshores provide nesting sites for bald eagles, hawks, falcons, and owls.

3.7 VISUAL QUALITY

KATM is a vast land of rivers, lakes, glaciers, alpine tundra, coastal fjords and bays, marshes, alder thickets, spruce forests, and 15 active volcanoes that line the Shelikof Strait. Unrivaled scenic values abound along the rugged coastline; in the Aleutian Range, whose volcanic peaks rise to elevations exceeding 7,000 feet; in the lake country, where lakes, rivers, ponds, and marshes occupy long, northwest-trending glacially carved valleys; and in the Bristol Bay lowlands, where permafrost and generally flat topography result in a landscape dotted with small ponds, marshes, and meandering streams.

In 1912, Novarupta Volcano erupted violently, forming the ash-filled Valley of Ten Thousand Smokes, which is a major scenic attraction for park visitors. The ashflow in the valley is richly colored in shades of yellow, red, and tan, and in places deep canyons have been cut by the River Lethe, allowing observers to see the ashflow strata.

The Alagnak Wild River's outstandingly remarkable scenic, fish and wildlife, and recreation attributes are primary reasons the river qualified for inclusion in the National Wild and Scenic Rivers System. The Alagnak traverses the Alaska Peninsula, providing an unparalleled opportunity to experience the unique wilderness, wildlife, and cultural heritage of Southwest Alaska.

3.8 VISITOR EXPERIENCE

KATM visitors participate in numerous activities, the majority of which occur in the lake region. A primary visitor interest is sport fishing because KATM is known as an area for trophy-sized rainbow trout. Fishing for sockey salmon is also popular during the early part of the annual

summer run. Viewing, studying, and photographing brown bears is a major visitor interest. Recreational visits in 2010 were 55,172 (NPS, no date).

The Brooks River Area, including a concessionaire facility and NPS operation collectively known as "Brooks Camp", is the most visited destination within the park. The camp lies 35 miles southeast of King Salmon near the Brooks River outlet, a 1.5- mile long river that drains from Brooks Lake into Naknek Lake. Access to this seasonal use area is by float plane or boat. The Brooks River divides the area into two parts that lie north and south of the river. The north side of the river includes the Brooks Lodge, guest cabins, visitor center, ranger station, auditorium, maintenance shop, incinerator building, generator building and numerous staff cabins and tent platforms. The south side, referred to as Lake Brooks side, includes a parking lot, park housing, the Valley of Ten Thousand Smokes Road, and bear viewing platforms. Visitor to Brooks Camp are generally campers, lodge guests, and day visitors from other lodges in the region. Most of these visitors participate in one or more of the following activities: fishing in the Brooks River, observing and photographing brown bears, taking a bus tour to the Valley of Ten Thousand Smokes, sight-seeing, or using Brooks Camp as a staging area for backcountry trips.

One of the highlights of the visitor experience is the trip to the Valley of Ten Thousand Smokes. This unique, geologic phenomenon is seen by a majority of visitors to Brooks Camp. The Valley is the primary area used for backpacking. The Valley Road is a 23-mile gravel road that connects Brooks Camp with the Valley of Ten Thousand Smokes. This road is used daily during the summer by a concessionaire to transport visitors via bus from Brooks Camp to the Valley of Ten Thousand Smokes.

River kayaking and floating are popular on the Nonvianuk and Alagnak rivers. The Savonoski loop, which includes Bay of Islands, Grosvenor Lake, Grosvenor and Savonoski rivers, and the Iliuk Arm of Naknek Lake, is a popular route for backcountry boaters.

Lake Camp, because of its proximity to King Salmon and a 10-mile gravel road, is a popular activity site for visitors from King Salmon and the Naknek area. Most of these visitors are day users mainly using the site for boat launching and fishing. There are no roads beyond Lake Camp into the interior of the park.

Trapping and sport hunting are not allowed in the park; however, these activities are authorized in the preserve and Alagnak Wild River. Along the Shelikof Strait coast, visitors engage in several activities, including camping, bear viewing, sport fishing, and harvesting of razor clams for personal use.

3.9 CULTURAL RESOURCES

Significant cultural resources in KATM consist of prehistoric and historic archeological sites related to the occupation of the area before the 1912 volcanic eruption. Post-eruption historic resources are neither as abundant nor as significant as archeological resources because of the 1912 eruption and the natural deterioration of abandoned structures. Those historic structures

that have survived are primarily cabins associated with trapping and fox-farming activities in the area.

Twenty-nine historic structures are included in the List of Classified Structures for KATM. Of those, only 10% are listed in good to fair condition. 31% are in poor condition, and 59% are in unknown condition. Fure's cabin, a trapper's cabin in the Bay of Islands area along Naknek Lake displaying exceptional construction techniques, is listed on the National Register of Historic Places. It is in excellent condition, well-protected, and well-documented. Additional park historic properties listed on the National Register include the Kukak Bay Historical Archeological District, the Brooks River Historic Ranger Station, and the Brooks River Boat Storage House. The Brooks Lake Fisheries Research and Management Historic District has been determined eligible for the National Register and concurred with by the State Historic Preservation Officer in 2010.

Archeological resources are important both in terms of concentration and contribution to the knowledge of Alaskan prehistory. Archeological surveys have been confined to the Pacific coast of the park and to the areas of greatest visitor activity. A large percentage of the park has been unexplored archeologically.

Currently, the park cultural sites inventory lists 106 known or suspected archeological sites in KATM. Of the known sites, twenty-five have been recognized as being nationally significant and have been listed on the National Register of Historic Places. They reveal the impressiveness of the archeological record in this region. The remaining sites have not been evaluated.

Many of the evaluated sites have been included in one of three Archeological Districts located within the park. The Brooks River Archeological District contains 22 sites and 750 house depressions, making it one of the greatest known concentrations of prehistoric houses in Alaska. KATM is also one of the four places know to contain winter houses. The Brooks River Archeological District and Amalik Bay Archeological District are designated National Historic Landmarks (NHLs), the highest level of protection afforded cultural resources in the National Park Service.

There are several identified cultural landscapes in KATM: The Brooks River Archeological District Cultural Landscape, concurred with as being eligible for the National Register by the State Historic Preservation Officer in 2006; Brooks Camp Cultural Landscape was concurred with as being eligible for the National Register by the SHPO in 2011. Other identified cultural landscapes in the park include the: Brooks Lake Complex; Valley of 10,000 Smokes Road; Old Savonoski; and Fure's Bay of Islands and American Creek.

3.10 WILDERNESS

Alaska's national parks contain the largest areas of undeveloped wilderness lands in the United States of America. They encompass some of the best examples of the wide diversity of ecosystems in Alaska including mountain summits, rolling tundra, massive ice fields, beaches, boreal forest and coastal rainforest on a scale not possible elsewhere in the USA. Their size and

scope give them a national and international recognition as wilderness resources. They also protect significant wildlife habitat, archeological resources, and opportunities for subsistence and recreational activities. The Wilderness Act of 1964 (P.L. 88-577) describes wilderness as an area "untrammeled by man…retaining its primeval character and influence, without permanent improvements of human habitation… [with] outstanding opportunities for solitude or a primitive and unconfined type of recreation."

Four qualities of wilderness character, as adapted from Landres et al. (2008a and 2008b), are considered in this EA:

- Untrammeled – Wilderness is essentially unhindered and free from modern human control or manipulation. This quality is degraded by modern human activities or actions that control or manipulate the components or processes of ecological systems inside the wilderness.

- Natural – Wilderness ecological systems are substantially free from the effects of modern civilization. This quality is degraded by intended or unintended effects of modern people on the ecological systems inside the wilderness since the area was designated.

- Undeveloped – Wilderness retains its primeval character and influence, and is essentially without permanent improvement or modern human occupation. This quality is degraded by the presence of structures, installations, habitations, and by the use of motor vehicles, motorized equipment, or mechanical transport that increases people's ability to occupy or modify the environment.

- Solitude or Primitive and Unconfined Recreation – Wilderness provides outstanding opportunities for solitude or primitive and unconfined recreation. This quality is degraded by settings that reduce these opportunities, such as visitor encounters, signs of modern civilization, recreation facilities, and management restrictions on visitor behavior.

Section 701 of ANILCA designated 3,384,358 acres of KATM as wilderness, and directed that this wilderness be managed in accordance with the Wilderness Act of 1964, except as otherwise expressly provided for in ANILCA (NPS, 1986). Additional lands, consisting of approximately 643,448 acres, were determined eligible for wilderness designation and are managed under the terms of ANILCA to maintain the wilderness character and values of the lands until designation recommendations have been proposed. The full wilderness review process required under ANILCA section 1317(b) has not yet been completed on those eligible lands. Although an EIS was 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 eligible wilderness acreage managed under NPS policies that protect wilderness character until Congress can act.

3.11 LOCAL ECONOMY

KATM is located approximately 290 miles southwest of the city of Anchorage. Encompassing a total gross area of 4,093,076 acres (NPS, 2011a), the park extends for approximately 100 miles along the Shelikof Strait to the west of Kodiak Island. It is not accessible by road. However, the

park may be accessed by air taxi or boat. Daily flights from Anchorage provide regular access to the village of King Salmon. Located approximately seven miles to the west of KATM, King Salmon serves as a gateway point for the park and as the location of park headquarters.

KATM is located in four sparsely populated boroughs on the northern tip of the Alaska Peninsula. The largest segment of KATM is located in the Lake and Peninsula Borough, with substantially smaller segments located in the Bristol Bay, Kodiak Island, and Kenai Peninsula Boroughs. Demographic characteristics for these boroughs for the year 2010 are presented in Table 3-1. These boroughs along with the municipality of Anchorage, which serves as a transportation hub and the home of several businesses providing commercial services to the KATM, represent the region of interest for the effects associated with the alternatives considered.

Table 3-1. Demographic Characteristics for the Katmai Region of Interest.

Borough	Area (sq. mi.)	Population 2009	Persons per sq. mi.	Households	Per capita Income	Below poverty	Minority
Lake and Peninsula	23,652.0	1,399	0.1	465	$16,450	22.1%	25.5%
Kodiak Island	6,549.6	13,147	2.1	4,6054	$26,862	10.6%	41.3%
Bristol Bay	503.8	682	2.0	274	$28,662	5.6%	45.7%
Kenai Peninsula	16075.3	53,052	3.4	19,603	$26,940	9.7%	14.3%
Anchorage	1,704.7	280,389	171.2	103,602	$33,436	13.5%	30.3%

Source: USCB, 2009; USCB 2011b

The region of interest includes several small communities, located in the area surrounding the KATM boundary that may be directly affected by KATM activity. These include: Naknek, population 544; South Naknek, population 79; King Salmon, population 374; Levelock, population 69; Igiugig, population 50; and Kokhanok, population 170 (USCB, 2011a). Although somewhat removed from the KATM boundary, the cities of Homer, population 5,003, and Kodiak, population 6,130 (USCB, 2011a), might also serve as deployment sites in the event of a coastal fire incident and are included as part of the region of interest.

The local economy of the four boroughs that contain Katmai National Park and Preserve is characterized by a mixture of education services, agriculture, forestry and fisheries, retail trade and transportation activities (USCB, 2009). In July of 2011, the four boroughs supported a combined labor force of 41,216, of which 38,364 were employed. Unemployment rates varied from a low of 1.0 percent in Bristol Bay to 7.8 percent in Kenai Peninsula. July is generally the peak month for employment in the four boroughs. Employment statistics for the four boroughs are presented in Table 3-2.

Tourism and recreational activity associated with KATM continue to make a major contribution to the local economy of the four boroughs and the municipality of Anchorage, as well as to the larger regional economy of the State of Alaska. Direct and indirect spending by park visitors includes such items as food and lodging, fees, rentals, guide and outfitting services; transportation, scenic and sightseeing tours and other retail purchases. Visitor spending contributes to the local economy, supporting direct park employment, as well as local and regional businesses located outside the park and commercial services provided by private

concessioners inside the park. Estimates by the NPS of visitor spending and the economic impacts of visitor spending and the NPS payroll on local economies for the years 2006 to 2009 are presented in Table 3-3.

Table 3-2. Employment Statistics for the Katmai Boroughs.

Borough	Total Labor force	Total Employment	Unemployment Rate	Leading Economic Sectors by Employment
Lake and Peninsula	1,591	1,516	4.7%	Education Services; Transportation; Agriculture, Forestry and Fisheries
Kodiak Island	7,151	6,690	6.4%	Education Services; Retail Trade; Agriculture, Forestry and Fisheries
Bristol Bay	3,109	3,077	1.0%	Education Services; Retail Trade; Transportation
Kenai Peninsula	29,365	27,081	7.8%	Education Services; Retail Trade; Agriculture Forestry and Fisheries

Source: BLS, 2011; USCB, 2009

Table 3-3. Visitor Spending for Katmai National Park (CY 06 through CY 09)*

Year	Recreation Visits	All Visitors	Non local Visitors	Jobs Supported	Labor Income	Value Added
2006	68,690	$3,461,000	$3,316,000	66	$1,151,000	$1,780,000
2007	82,634	$17,155,000	$16,947,000	286	$8,746,000	$15,032,000
2008	82,000	$17,091,000	$16,860,000	284	$8701,000	$14,955,000
2009	43,035	$9,601,000	$9,488,000	93	$2,386,000	$3,920,000

*Also includes data for visitation to Aniakchak National Monument
Source: Stynes, 2007; 2008; 2009; 2011.

In a separate study prepared for the National Parks Conservation Association and the National Park Service (Fay and Christensen, 2010), direct spending by visitors inside KATM in 2007 was estimated at $12,335,897. Furthermore, Katmai visitors spent an estimated additional $38,838,306 in the larger Alaska economy. These expenditures generated an additional $73 million in industrial output, as well as 647 jobs, $23 million in labor income and an added value of $37 million to the Alaska economy.

KATM operations are supplemented by nine local and regional business concessions authorized to provide commercial services within the park (NPS, 2008c). In 2010, a single concessioner provided lodging and food services at Grosvenor Lake and Brooks Lodge, along with rental equipment, guide services and transportation. Seven concessioners provided support for guided sport fishing and one operated hunt guide services (NPS, 2010a). Other services available through concessioners in the park include retail operations; rentals, guide and outfitting services; transportation, and scenic and sightseeing tours.

There are also more than 300 businesses located outside the park, in the State of Alaska, and throughout the rest of the United States, that are authorized to provide visitor services to KATM (NPS, 2011b). Services provided include: air taxi, air tours, wildlife viewing, boating,

backpacking, canoe, hunting, fishing, and guide services for the park. In 2010, 107 commercial use authorizations were issued for KATM. Of these, the four largest categories were for guided bear viewing, sport fishing, photography, and air taxis (NPS, 2010a).

3.12 SUBSISTENCE

Public Law 96-487, The Alaska National Interest Lands Conservation Act (ANILCA, Title VIII, 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 customary trade." The State of Alaska defines subsistence as the "noncommercial, customary and traditional uses of fish and wildlife resources for direct personal or family use (ADFG, 2010). Subsistence preference is given to all rural residents of Alaska without distinguishing between native and non-native populations.

Subsistence living patterns and resource use practices are an integral part of the history of Alaska and persist throughout the state as part of its contemporary culture (Wolf and Walker, 1987). The land now included in Katmai National Park and Preserve has been used for multiple generations by the residents of Native villages and other Alaskan rural communities for subsistence hunting, fishing and gathering (NPS, 2010b). Many native residents left the area to resettle in other communities in the Alaska Peninsula after the eruption of Mt. Katmai in 1912. However, beginning around 1918, residents began returning to the area to reestablish many of the cultural practices prevalent before the eruption (Norris, 2002). For many current residents of the villages and boroughs surrounding KATM, subsistence is the preferred lifestyle and source of food; although some residents also participate in wage employment in other sectors of the local economy (LPB, 2011).

ANILCA Section 101 (c) states that the purpose of the Act is to provide the opportunity for rural residents engaged in a subsistence way of life to continue to do so. In the contemporary period, residents of several nearby villages as well as the surrounding region currently engage in subsistence uses of the preserve. Subsistence management regulations permit subsistence activities only in the National Preserve, not in the National Park (36 CFR Section 242.7). Resident populations closest to KATM are found in the villages of Kokhanok, Igiugig, Levelock, Naknek, South Naknek, and King Salmon. Rural residents of the four surrounding Alaska boroughs in which the KATM is located (Lake and Peninsula, Kodiak Island, Bristol Bay and Kenai Peninsula) also make subsistence use of the preserve. Because individuals or groups may often travel some distance from their village or community for specific harvests of game or fish, or gather other special items, some portion of the subsistence users of the preserve may come from other more distant regions of Alaska.

The Alaska Department of Fish and Game has determined that the current rural subsistence harvest is about 354 pounds of food per person per year (ADFG, 2010). In addition to food, other subsistence uses include clothing, fuel, transportation, construction, household goods,

ceremonial items and arts and crafts. Estimates indicate that subsistence harvests provide between 40 and 90 percent of the protein consumed by residents of the Lake and Peninsula Borough, in which the largest segment of the preserve is located (LPB, 2011). The predominate species harvested within the preserve and in the surrounding area are salmon, moose and caribou. Other important subsistence harvests include plant resources such as berry and root and firewood/log harvests (LPB, 2011).

3.13 PRIVATE INHOLDINGS

Approximately 96 percent of KATM is federally owned. Numerous state-owned, private inholdings, and Native allotments occur on the remaining four percent within the park boundary. Native allotments are lands conveyed to Native individuals under the Alaska Native Allotment Act of 1906. There is a special role for the Secretary of the Interior, and delegated to the Bureau of Indian Affairs (BIA), regarding allotments: they are generally in a "restricted" status, in which BIA approval must be obtained before the land can be sold or other major actions taken that affect the land. Native allotments are a maximum of 160 acres and are currently provided a full suppression level of fire protection.

Small parcels are used for private residential, recreational, and subsistence purposes. Lodges are used commercially as bases for sport fishing activities. For example, privately owned Native Corporation lands are located at the west end of Kukaklek Lake and the west end of Naknek Lake. Inholdings occur along the Alagnak Wild River corridor. Lodges exist on inholdings at Kulik River, Battle Lake, and Enchanted Lake, and cabins exist on many inholdings.

Major landholders include the Bristol Bay Native Corporation, Katmailand, State of Alaska, Igiugig Native Corporation, Alaska Peninsula Corporation, Paug-Vik Inc., U.S. Air Force, and the Russian Orthodox Church in America (NPS, 1986). There are several thousand acres of Native allotments, and other small tracts. Management on these lands should be in keeping with the legislative purposes and goals of KATM, but NPS regulations may not apply to them.

In ALAG, there are 26,418 acres of federal land, 1,982 acres of private land, and 2,265 acres of state land, for a total of 30,665 acres (Gilbert, 2011). The state lands are the bed of the Alagnak River. The private lands are 550 acres of Native village corporation lands, and the rest are Native allotments which are strung out along the river banks.

In the Preserve, there are 333,401 acres of federal land, 8,417 acres of private land, and 76,881 acres of state land, for a total of 418,699 acres (Gilbert, 2011). The state lands are the beds of Kukaklek Lake and Nonvianuk Lake, and the upper part of the Alagnak River. The private lands are primarily Native village corporation lands that lie on the west end of Kukaklek Lake.

In the park, there are 3,611,397 acres of federal land, 12,809 acres of private land, and 50,172 acres of state land, for a total of 3,677,378 acres (Gilbert, 2011). The state lands are part of the bed of the Naknek River and a block of uplands on the northeast part of the park at Cape Douglas. The private lands are mainly Native village corporation lands and Native allotments on

the west end of the park, as well as some Native allotments and other small private tracts scattered throughout the park.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter provides an evaluation of the potential effects or impacts of each of the alternatives on the resources described in the issue statements presented in Chapter 1, Purpose and Need for Action. The chapter is organized by alternative. The information is based on readily available environmental information and information from NPS resource specialists.

4.2 METHODOLOGY

For each issue selected for detailed analysis (see section 1.3.1) 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 on the basis of type (adverse or beneficial), context, duration, 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.

Overall, the NPS based the following impact analyses and conclusions on the review of existing literature and KATM studies, information provided by experts within the NPS and other agencies, professional judgments, and park staff insights.

Context of Impact
Context is the setting within which an impact is analyzed, such as local, park-wide, or regional. CEQ requires that impact analyses include discussions of context. Localized impacts are those that affect the resource area only on the project site or its immediate surroundings, and would not extend park-wide or into the region.

Duration of Impact
Temporary impacts would occur only during the time that fire management activities are being conducted. In the interim between these activities, resource conditions would return to pre-activity conditions. Short-term impacts would extend beyond the time of project activities, but would not last more than one to two years. Long-term impacts would extend for several years and beyond the life of the project even if the actions causing the impacts were to cease; they can potentially continue indefinitely, in which case they could also be described as permanent.

Direct and Indirect Impacts
Direct effects are impacts caused by the alternative(s) at the same time and in the same location as the action. Indirect effects are impacts caused by the alternative(s) that occur later in time or farther in distance than the action, but still reasonably foreseeable. An indirect impact could occur because of a change to another resource or impact topic.

Intensity of Impact
Impact intensity is the degree to which a resource would be beneficially or adversely affected by an action. Impact intensities are quantified as negligible, minor, moderate, or major. Table 4-1 presents a summary of impact level thresholds.

Table 4-1. Summary Impact Levels.

Negligible	Minor	Moderate	Major
Minimal impact on the resource would occur; any change that might occur would be barely perceptible and not be easily measurable.	Change in a resource would occur, but no substantial resource impact would result; the change in the resource would be detectable but would not alter the condition or appearance of the resource.	Noticeable change in a resource would occur and this change would alter the condition or appearance of the resource, but the integrity of the resource would remain intact.	Substantial impact or change in a resource area would occur that is easily defined and highly noticeable and that measurably alters the condition or appearance of the resource; the integrity of the resource may not remain intact.

4.2.1 Cumulative Impacts

A cumulative impact is described in the Council on Environmental Quality's regulation 1508.7 as follows:

Cumulative impacts are the impacts that result from incremental impacts of the action when added to other past, present, and reasonably foreseeable actions, regardless of what agency (federal or nonfederal) or person undertakes such other action. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over time.

Each cumulative impact analysis is additive, considering the overall impact of the alternative when combined with effects of other actions, both inside and outside the park, that have occurred or that would likely occur in the foreseeable future.

To determine potential cumulative impacts, past, present, and reasonably foreseeable future potential actions and developments within and surrounding Brooks Camp were considered by the planning team. The primary area considered for cumulative impacts is the Naknek River drainage basin, including Lake Brooks and part of Naknek Lake. The area considered for socioeconomic cumulative impacts was broader, primarily focused on the Bristol Bay Borough, including the communities of King Salmon and Naknek. Figure 4-1 shows the location of facilities in KATM.

KATM is a remote park. Brooks Camp is only accessible by air or boat, and it is surrounded by federal lands (with a few native allotments). Virtually all of the actions considered in the cumulative impact analysis were NPS actions. No new actions or developments are foreseen adjacent to the Brooks Camp area that would affect park resources and uses. No changes in

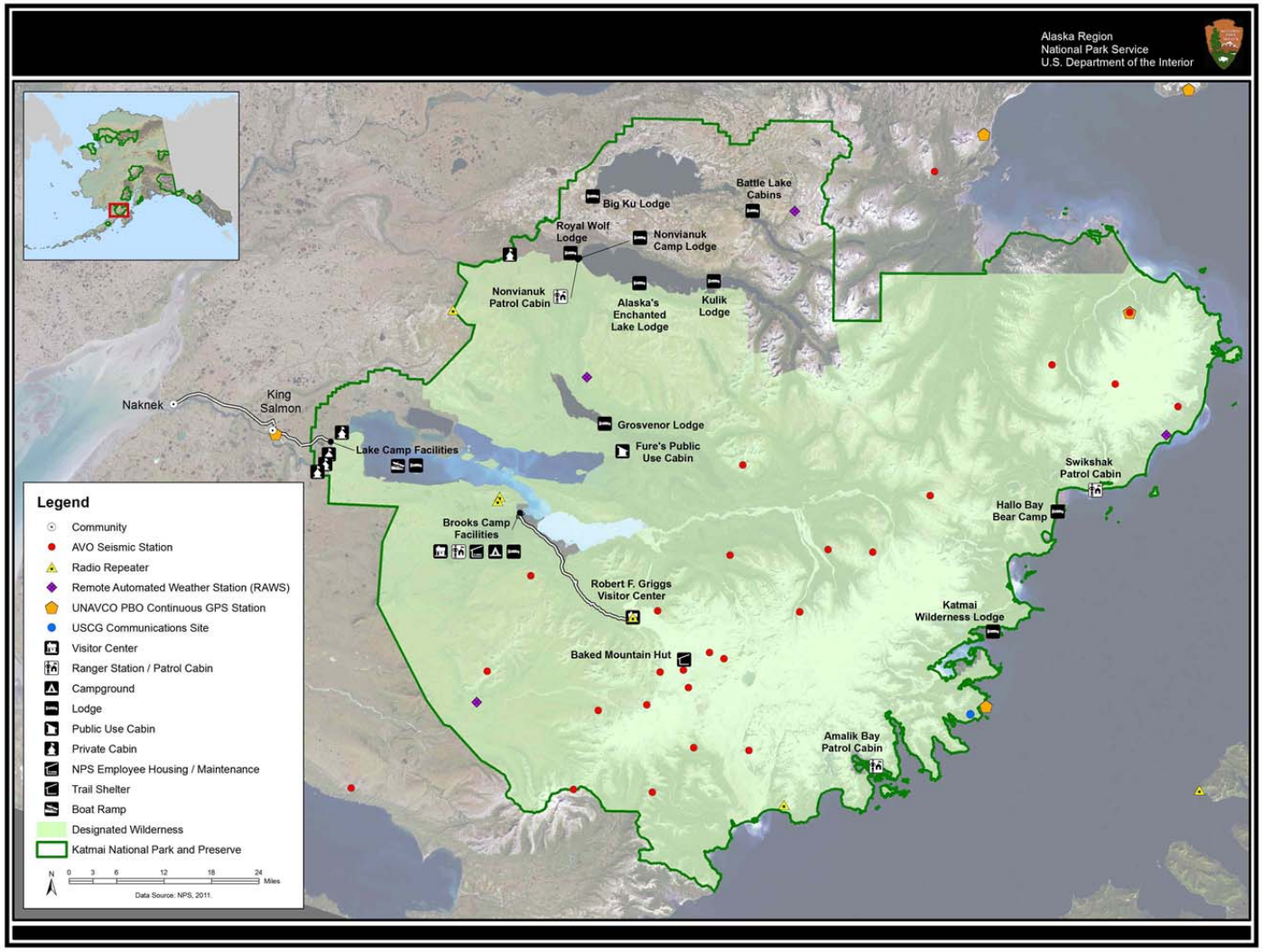

Figure 4-1. Location of facilities in KATM.

landownership and management of adjacent lands are expected to occur that would directly or indirectly affect the area. No new uses of the area or changes in transportation to Brooks Camp are considered likely, independent of what is proposed in the alternatives. Brooks Camp visitation has risen in the recent past, but it is not known how much use will increase in the future.

Past Actions

Past NPS actions considered in the cumulative impact analysis include the following:

- past actions that have occurred in the Brooks Camp area (e.g., initial construction of visitor and operational facilities, installation of the floating bridge, and improvements to the Brooks Camp picnic area)
- past, present and future operation of the above facilities and infrastructure, including repairs
- Other remote developments in the park include cabins, lodges and camps. Actions related to maintenance of these facilities arise periodically. Locations and names of these remote facilities are identified on Figure 4-1, Location of Facilities at KATM.

Present and Future Actions

The development of the Valley Road Administrative Area and removal of the facilities at Lake Brooks and Brooks Camp are ongoing and future actions that are considered in the cumulative impact analysis, while the relocation of Brooks Camp to the Beaver Pond Terrace area is considered as a future action.

Of all the present and future actions considered in this cumulative impact analysis, the relocation of Brooks Camp would have by far the highest potential for creating an additive impact to the alternatives considered in this environmental assessment.

For the cumulative impact analysis it is expected that visitation at Brooks Camp would not substantially change over the time frame being analyzed.

Valley Road Administrative Area (VRAA)
The VRAA complex will include maintenance facilities and employee housing which will be replaced or relocated from Brooks Camp and Lake Brooks. The goal is to reduce administrative activity at Brooks Camp in order to protect natural and cultural resources, reduce the potential for bear/human encounters, and address failing utilities and infrastructure. The placement of facilities at the VRAA will take place in a sequential process as funding and labor become available. The replacement or relocation of facilities at the VRAA will include site planning, layout, utility installations, and construction activities. The existing gravel pit along the Valley of Ten Thousand Smokes (VTTS) Road will be used as a gravel source.

Maintenance Facility. The NPS has taken steps to relocate some maintenance facility operations to the south side of the river to address implementation goals identified in the Development Concept Plan (DCP)/Environmental Impact Statement (EIS) (NPS, 1996). In 2008, site

development for the new maintenance building area within the VRAA was initiated. The area is intended to serve as the core area for electrical, water and sewer line utilities for the south side of Brooks Camp. In addition, the Lake Brooks generators and fuel storage will be relocated to the new maintenance facility area. During 2008, the access road and gravel pad were constructed. The gravel pad is approximately 250 feet by 200 feet, has a 400 foot long access road, and will support the new maintenance facilities. This project is expected to be completed in 2013 (NPS, 2009b).

Housing. Employee housing will be located on a single loop road, which will be constructed adjacent to the recently constructed gravel pad for the new maintenance facility. The west side of the loop will contain service buildings, a community building, and housing for NPS employees, while the east side of the loop will contain building sites and service facilities for the Brooks Lodge concessioner. This layout incorporates long sweeping curves to enhance visibility for potential bear encounters. The loop maintains its role as an infrastructure corridor, minimizing the impact of development on the forest vegetation. The utilities (water, wastewater, power, heat) will run on a central spine; the building placement on each side of the path will allow branching of the utility lines (NPS, 2009b).

A driveway will connect the head of the loop with the VTTS Road. The gravel roadway will be approximately 1,800 feet long and 11 feet wide. A utility corridor/foot trail approximately 280 feet long and 8 feet wide will connect with the maintenance facility (NPS, 2009b).

The project site will be cleared of the existing trees and stripped of the organic materials only as required for the construction of the access road, housing units, and utilities. Approximately six acres will be cleared. Vegetation clearing for building construction or relocation will occur in phases and only when a facility is ready to be sited. A 30-foot fire perimeter will be maintained around all structures (NPS, 2009b).

Lake Brooks Facilities

Maintenance facilities at Lake Brooks consist of several small sheds totaling approximately 2,300 square feet of interior floor space, and approximately 32,000 square feet (0.73 acre) of yard space, all of which are located immediately adjacent to the 1 mile (14-feet wide) road from Lake Brooks to Brooks Camp. All facilities on the shore of Lake Brooks, including housing, will be removed and the area revegetated, except the historic fisheries cabin. Other structures associated with the fisheries cabin will either be preserved and adaptively reused or removed. The cabin will be retained and used as a visitor contact station and shuttle stop during times when floatplanes land on Lake Brooks (NPS, 1996). Any of these structures nominated for the National Register of Historic Places will undergo consultation with the State Historic Preservation Office before any adverse action is taken.

Beaver Pond Terrace Area

Brooks Camp (including the lodge) will be moved to the Beaver Pond Terrace area south of the Brooks River. Proposed facilities as described in the 1996 Brooks River Area DCP will include a lodge and related facilities, campground, and interpretive facilities. A one lane, hardened gravel access road (about 0.5 mile long and 14 feet wide) would be constructed to connect the VTTS Road with the Beaver Pond Terrace area (NPS, 1996).

Another reasonably foreseeable future action is "hardening" of the existing barge landing beach with mats.

North Side of Brooks River
After relocation of Brooks Camp the only facilities on the north side of the river would be the existing floatplane access, ranger/visitor contact station, and day use facilities (pit toilet and picnic area).

Note: The cumulative impact analysis does not address the future of the national register listed ranger station, boat house and other potential historic structures in the area. Although the 1996 DCP called for the relocation of Brooks Camp, the above structures were subsequently determined to be historic structures. It is premature to analyze what would happen to these facilities in this current document. Before the actual relocation of Brooks Camp, the future of the structures will be reevaluated and the effects of these options will be assessed.

4.3 ALTERNATIVE 1: FULL WILDLAND FIRE SUPPRESSION (NO ACTION)

4.3.1 Air Quality

Wildland fires would be suppressed using an appropriate management response (i.e., strategies and tactics that include direct attack, indirect attack, confine and contain and monitoring), and some smoke would be generated. It is not possible to accurately predict the number of acres burned and amount of smoke generated.

Direct adverse impacts to air quality from wildland fire under this alternative would include release of particulates and smoke into the airshed and the potential for a slight (not measurable) increase in fugitive dust from suppression activities. Smoke particulates could remain suspended in the atmosphere for a few days to several months. Very small particulates can travel great distances and add to regional haze problems. Inversions could occur and smoke from fires may linger in the valleys for a period of time. There could 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. On a regional basis, effects to air quality would generally include minor, short-term, adverse impacts as quantities of pollutants, primarily particulates, are released to the atmosphere and travel beyond park boundaries. Indirect adverse effects from these air emissions would include reduced visibility, 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.

Some air pollutants would be generated by use of gasoline-powered equipment in mechanical fuel reduction projects. The adverse effect of these pollutants on air quality, given the small size of the projects and infrequency of activity, would be localized, temporary, and negligible.

The increased risk of catastrophic wildland fire, which could result from the exclusion of the area's natural burn cycle, could eventually lead to large acreages burned, large amounts of smoke production, and greater impacts on air quality.

Cumulative Impacts
Cumulative effects of pollutants from sources such as vehicles, aircraft, campfires, and heavy equipment used for development of the Valley Road Administrative Area or the relocation of Brooks Camp could have short-term, adverse impacts on air quality. Volcanic eruptions and fires on adjacent public and private land could have short-term, adverse impacts on air quality.

The cumulative impact on air quality from such actions would be adverse and minor to moderate. Alternative 1 would contribute minor, adverse cumulative impacts on air quality. Combined with known past, current and future projects and actions, there would be minor to moderate adverse cumulative impacts on air quality.

Conclusion
Generally, the impact of Alternative 1 on air quality would be adverse, short-term, localized to regional, and negligible to minor when wildfires are suppressed. However, in the case of a catastrophic wildfire, impacts to air quality would be adverse, short-term, localized to regional, and moderate.

4.3.2 Water Quality

Water quality can be affected by both fires and fire management activities. Small fires and fires of low intensity would be expected to have very little effect on water quality. Fires that become large could have adverse, minor to moderate, and short to long-term effects on water quality due to increased ash and woody debris deposited into waterways. This type of deposition could increase turbidity downstream from the fire. Loss of vegetation could lead to increased erosion and sediment loading in surface water resources in the park. However, these effects are considered normal and natural in fire-adapted ecosystems and would be within the normal range of variability. It is when high severity fires burn large portions of a watershed that impacts could exceed the natural range of variability and cause adverse effects, as in a catastrophic fire that could occur under this suppression only alternative. An event that exceeds the natural range of variability could cause sediment loading that is substantially higher than historic rates and the transport capacity of the affected channels, initiating channel adjustments that may require a substantial duration of time for recovery.

Through changes in soil and vegetation cover, fire influences the volume of water and the rate at which water flows in watersheds. Some slopes are steep or extremely unstable and some soils are highly erodible because of the underlying geology and parent material. If highly erodible soils are located on steep slopes or in geologically unstable areas, fire can have severe consequences on a watershed if vegetation cover is removed and heavy rains fall on bare slopes.

Effects on water quality from fire suppression have the potential to be more severe than other fire management techniques depending on the intensity of the fire and the location of the fire in relation to perennial streams or riparian areas. These effects are related to maintenance of roads,

construction of fire lines with hand tools or heavy equipment, installation of water tanks, installation of fire camps, trampling of soils by personnel and equipment at fire lines and camps, and use of aerial water drops or chemical suppressants or retardants. These effects are generally indirect effects on water quality from runoff from erosion of soils disturbed by these activities.

Fireline construction may result in soil erosion, increased sedimentation, and alteration of spatial drainage patterns. The risk of this impact is greater along steep-sloped banks that are adjacent to streams. These potential impacts would be greatly reduced by using the mitigation measures identified in Section 2.7, and the park would adhere to Interagency Standards for Fire and Fire Aviation Operations (2009) for use of suppression chemicals.

Use of chemical suppressants can have direct effects if the chemicals enter surface water. Aircraft delivering chemical drops would attempt to avoid hitting water bodies. All structures (historic or otherwise) would be protected using standard methods including construction of fire lines, fuel reduction and pretreatment with water and/or foam. No foam would be applied within 300 feet of any intermittent or perennial stream. If chemical suppressants and retardants enter surface water, they could have moderate to substantial adverse effects on water quality depending on the water body, but the effect would be short-term and would persist until high flows would dilute any remaining chemicals.

Streams available for water drafting would be identified as part of preparation for suppression. Dipping from streams using helicopters may occur as well. In a wildfire emergency, it is possible that streams or lakes would be used for dipping if a wildfire is close and aircraft can safely access these sites. The effects on water quantity (surface water) from water drafting and dipping for wildfire suppression would likely be negligible.

Catastrophic fires and associated suppression actions have the potential for substantial adverse effects on water resources related to erosion of burned areas in the first rains following the fire. Depending on the location of a catastrophic fire, the adverse effects on water quality from erosion of bare soil could be moderate or greater. Catastrophic wildfire has the potential for substantial adverse effects on water quality in park streams both from direct effects of burned materials entering streams and over a longer term, from erosion of bare soils and subsequent sedimentation of streams.

Higher intensity fires are expected to cause more sedimentation and ashflow events following heavy rains because more vegetation has been removed and will take longer to reestablish and stabilize bare soils. Soils that are severely burned also may become hydrophobic, which in turn can increase runoff, suspended sediments, and ash. Wildland fire within riparian zones may remove vegetation that traps sediment in runoff from adjacent upland systems, increasing chances for water quality degradation. Removal of streamside vegetation could also cause increases in water temperatures resulting from losses of shade and a reduction in cover habitat for fish.

Most mechanical reductions of hazard fuels would not be conducted adjacent to water resources. Where they may be near water sources, the potential direct adverse impacts of mechanical fuel reductions would include trampling of stream banks or similar disturbances by felled and/or

dragged trees and by foot or equipment traffic. These effects can be mitigated by avoidance, where possible, and immediate rehabilitation. The indirect adverse effects of mechanical fuel reduction may be slightly increased stream flow since there would be less vegetation and thus less transpiration on the treated area.

Cumulative Impacts
Erosion and sedimentation of surface water from construction during development of the Valley Road Administrative Area, the relocation of Brooks Camp, and the removal of facilities from Lake Brooks could have adverse impacts on water quality. Additional impacts on water quality could occur from erosion of hiking trails, runoff from the VTTS Road and other roads, accidental fuel spills, and fuel leaks from float planes landing on water bodies.

The cumulative impact on water quality from such actions would be adverse and minor. Alternative 1 would contribute minor to moderate, adverse cumulative impacts on water quality. Combined with known past, current and future projects and actions, there would be minor to moderate adverse cumulative impacts on water quality.

Conclusion
Alternative 1 would have adverse, short- to long-term, localized, and minor to moderate effects on water quality from wildfire suppression depending on the nature and intensity of wildland fire. Catastrophic wildfire has the potential for substantial adverse effects on water quality from direct effects of burned materials entering streams and from erosion of bare soils and subsequent sedimentation of streams.

4.3.3 Vegetation

Under Alternative 1, impacts on vegetation would occur from wildfire, from construction of fire lines, and from suppression actions. It is not possible to predict the acreage of vegetation that might be affected by wildfire and associated suppression.

Preparation activities for wildfire suppression include cutting vegetation along fire lines, fire line construction with chainsaws and hand tools, installation of fire hoses and setting up and filling portable water tanks at strategic locations. Fire line construction would vary according to fuel type and time of year to ensure firefighter safety. Where fire lines are constructed they would be dug with hand tools to mineral soil to a width of no more than four feet and rehabilitated after the fire by replacing the topsoil. Where ladder fuels occur near the ground that could allow fire to move higher into the forest canopy, they would be cleared by cutting back brush and trees and removing lower limbs.

Wildland fire suppression activities would result in the mortality of plants and trees in the areas where suppression has taken place. These adverse impacts would be expected to be minor because the loss of individual members of a given plant species would not jeopardize the viability of the populations on and adjacent to the park and would be limited to the area of treatment only. These impacts would also be short-term as native vegetation is expected to recolonize after wildland fire events have occurred.

Fire suppression activities that result in soil disturbance (e.g. thinning, building of firelines, or inadvertently denuding the soil of vegetation) would make those disturbed areas more susceptible to invasive plant infestations. Disturbed areas would be monitored to guard against such infestations and may be planted with native vegetation. Coupled with mitigation measures aimed at reducing soil damage, fire suppression activities that result in soil disturbance would also help reduce the extent of existing exotic species infestations in the park.

The greatest effect on vegetation in the park under Alternative 1 would result from a catastrophic wildfire. The potential for catastrophic wildfire would increase over the long-term due to full suppression of wildfires. With all fires suppressed, the likelihood of wildfire moving out of one vegetation type into another would increase. Long-term fire exclusion could change the diversity of vegetation communities on a landscape scale, resulting in the elimination of natural fuel breaks, heavier fuel loading, and an increase in the possibility that fires outside the range of natural variability for the region could occur.

Mechanical fuel reduction and construction of fuel breaks would involve cutting trees, brush, and tree limbs that could provide ladder fuels along a 100-foot wide strip around structures, piling of woody vegetation, and removal or burning of the slash. Attempts would be made to leave all trees that have broken or deformed tops as these may develop into wildlife habitat. Cut trees and limbs would be piled away from live trees and large logs and snags. Loss of vegetation would occur with mechanical fuel reduction, but it would be primarily concentrated in developed areas where vegetation has already been disturbed.

Wetlands can be affected by both fire and fire management activities. Due to the greater amount of moisture available, wetlands have longer fire return intervals than adjacent upland plant communities. Under most conditions, wetlands at KATM would be too wet to carry fire. However, under very dry conditions, wildfires can burn within wetlands. These fires would likely be of high severity due to the type of fuels present within wetlands (e.g., light herbaceous species and non-fire adapted species such as willow). However, wildfires normally produce a mosaic of vegetation structure that may increase the diversity of habitats within wetlands.

Small fires and fires of low intensity would be expected to have very little effect on wetlands. Fires that become large could have greater effects on wetlands due to loss of vegetation and increased ash and woody debris deposited into waterways. This type of deposition could affect wetlands downstream from the fire. However, these effects are considered normal and natural in fire adapted ecosystems. It is when high severity fires burn large portions of a watershed that impacts could exceed the natural range of variability and cause adverse effects, as in a catastrophic fire that could occur under this suppression only alternative.

The response to wildfire usually requires the construction of firelines. Fireline construction may result in soil erosion, increased sedimentation, and alteration of spatial drainage patterns that could affect wetlands. The risk of this impact is greater along steep-sloped banks adjacent to streams and wetlands. These potential impacts would be greatly reduced by using the mitigation measures identified in Section 2.6.

Mechanical fuel reduction would not occur within wetlands.

The large acreage of spruce beetle kill and alder die-off within Katmai's lakes region raises concerns that the risk of catastrophic fires may increase with the outbreaks as the dead, dry trees become available fuel for fires and potential understory growth of grasses may increase flashy fuels in beetle kill areas. Additionally, when the trees start falling to the ground a number of years after the beetle attack, the build-up of fuels could burn hot and become difficult to control. Uncharacteristic, stand-replacing fires have occurred in other areas, such as central Idaho, in spruce stands following ten years of spruce beetle outbreaks (USFS, 2000). Currently there is a lack of information on potential fire behavior in spruce beetle kill forests in Alaska. However recent observations from the Kenai Peninsula, indicate that the increased grass (*Calamagrostis canadensis*) underneath the beetle killed dead spruce has influenced fire behavior. The extent of beetle kill areas could have important implications for wildland fire and fire management at Katmai as well.

Cumulative Impacts

Vegetation in parts of the park has been cleared for construction of buildings, roads, trails, and other facilities. Development of the Valley Road Administrative Area and relocation of Brooks Camp to the Beaver Pond Terrace area would clear the project sites of the existing trees and brush only as required for the construction of the facilities. Besides the actual footprint of facilities, plants in the immediate surrounding areas have been impacted by trampling from pedestrian and vehicle traffic. Dispersed vegetation impacts have also been caused by off-trail pedestrian traffic. Concentrated areas of off-trail pedestrian traffic often take the form of unofficial social trails where vegetation is often denuded.

The backcountry installations in the park, including radio communications sites, seismic stations, and remote automatic weather stations impact very small areas of vegetation. The area of vegetation trampling from foot traffic and helicopter landings during maintenance of these sites would both be minimal and limited to the area immediately surrounding the stations.

Relocation of Brooks Camp and removal of structures from the shore of Lake Brooks would allow for revegetation of decommissioned areas, which would have beneficial effects on native vegetation.

The cumulative impact on vegetation from such actions would be adverse and minor. Alternative 1 would contribute minor to moderate, adverse cumulative impacts on vegetation. Combined with known past, current and future projects and actions, there would be minor to moderate, adverse cumulative impacts on vegetation.

Conclusion

Impacts of Alternative 1 on vegetation and wetlands would be adverse, minor to moderate, and short- to long-term depending on the nature and intensity of wildland fire and suppression activities. Catastrophic wildfire would have adverse effects on vegetation that could be moderate or greater, depending on the extent of the fire.

4.3.4 Fish and Aquatic Habitat

Direct, long-term effects on fish and aquatic habitat could occur from suppressing wildland fires. High severity fires and heavy fuel and slash accumulations in riparian zones are factors that contribute to fish mortality. Effects to fish and fish habitat would be long-term, minor to moderate, and adverse.

Retardants used to suppress fires can cause fish mortality by degrading water quality and causing fish mortality. Wildfire suppression guidelines limit the use of fire retardant to areas more than 300 feet from perennial streams to the extent practicable and within aircraft safety requirements. The policy states "Avoid aerial application of retardant or foam within 300 feet of waterways and any ground application of wildland fire chemicals into waterways."

Accidental spills of fire-fighting chemicals in streams could cause substantial fish kills depending on the stream size and flow rate. Hamilton et al. (1998) describe 14 different fire-retardant and foam-suppressant chemicals in terms of composition and application. The long-term retardants are ammonia based and are considered to be relatively non-toxic to terrestrial organisms and of low to moderate toxicity to aquatic organisms. However, certain chemicals do contain components such as sodium ferrocyanide as an anticorrosive agent and may pose an environmental hazard in the presence of sunlight (Little and Calfee, 2004). Cyanide exposure from the use of fire retardants may cause significant toxicity to fish. The USFS (2007) EA on the aerial application of fire retardants also discusses foam and retardant impacts on fish and aquatic habitats.

The number of retardant drops and orientation to the stream are key factors in fish mortality. Because the park would consider fish-bearing streams when developing suppression activities and fire retardants would be limited to areas more than 300 feet from streams to the extent practicable, it is not anticipated that large impacts would occur. This 300 foot buffer around streams would cause fire retardants to become diluted by plants, soils, roots, and debris before reaching fish habitat.

Indirect, adverse effects on fish and aquatic habitat would occur from an increase in sedimentation due to vegetation removal. The amount of sedimentation that would occur depends on the intensity and size of the fire, the amount of soil disturbed from suppression activities such as construction of fireline, as well as climatic conditions. If a rain event occurs immediately after a fire, sediment from ash or disturbed soils would be washed into fish-bearing streams. Fire lines would be rehabilitated immediately after fire suppression to reduce the potential for erosion and runoff into streams. 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. Hand lines would be rehabilitated immediately after fire suppression to reduce the potential for erosion and

runoff into streams. Impacts from sedimentation are expected to be minor to moderate. Some individual fish or groups may be affected by sedimentation, but fish populations would not be jeopardized.

Elevated levels of sediment, above background values, can be detrimental to aquatic biota (Birtwell, 1999). Suspended sediment and interfere with feeding for visual feeders. Negative effects of turbid water include abrasion of gill membranes, impairment of feeding, and fatal impacts to small aquatic animals that are food for fish. Deposited sediment can be harmful to fish habitat. Some harmful impacts of sediment deposits are:

- The small spaces between gravel particles become clogged, preventing the free flow of oxygenated water and the removal of waste products from developing eggs deposited in the gravels. This often suffocates the eggs and results in their death, and may make gravel beds unsuitable for the future incubation of eggs.
- The habitat of bottom-dwelling organisms, such as crayfish and insects, is destroyed. Fish rely on these organisms for food.
- The sheltered areas between boulders and gravel particles are eliminated. Young fish need these areas to survive.

Any drafting of water from anadromous fish bearing streams would require a fish screen on the drafting hose to protect sensitive fish species.

Catastrophic fires and associated suppression actions have the potential for substantial adverse effects on water resources, and thus fish and aquatic habitat, related to erosion of burned areas in the first rains following the fire. Depending on the location of a catastrophic fire, the adverse effects on fish and aquatic habitat from erosion of bare soil would be moderate or greater due to the sedimentation impacts discussed above. Catastrophic wildfire has the potential for significant adverse effects on park streams both from direct effects of burned materials entering streams and over a longer term, from erosion of bare soils and subsequent sedimentation of streams.

Higher intensity fires would be expected to cause more sedimentation and ashflow events following heavy rains because more vegetation has been removed and will take longer to reestablish and stabilize bare soils. Soils that are severely burned also may become hydrophobic, which in turn can increase runoff, suspended sediments, and ash. Wildland fire within riparian zones may remove vegetation that traps sediment in runoff from adjacent upland systems, increasing chances for water quality degradation. Removal of streamside vegetation could also cause increases in water temperatures resulting from losses of shade and a reduction in cover habitat for fish.

Cumulative Impacts

Erosion and sedimentation of surface water from construction during development of the Valley Road Administrative Area, the relocation of Brooks Camp, and the removal of facilities from Lake Brooks could have adverse impacts on surface water, and thus fish and aquatic habitat. Additional impacts could occur from erosion of hiking trails, runoff from the VTTS Road and other roads, accidental fuel spills, and fuel leaks from float planes landing on water bodies. There are also impacts on individual fish from the recreational fishing of salmon and other

species; however, these fisheries are managed so as not to adversely affect overall fish populations.

The cumulative impact on fish and aquatic habitat from such actions would be adverse and minor. Alternative 1 would contribute minor to moderate, adverse cumulative impacts on fish and aquatic habitat. Combined with known past, current and future projects and actions, there would be minor to moderate, adverse cumulative impacts on fish and aquatic habitat.

Conclusion
Alternative 1 would have adverse, short- to long-term, localized, and negligible to moderate effects on fish and aquatic habitat from wildfire suppression and mechanical fuel reduction depending on the nature and intensity of wildland fire.

4.3.5 Wildlife and Habitat

Under Alternative 1, impacts to wildlife from wildland fire suppression and mechanical fuel reduction would depend on a number of variables, including vegetation type, condition of the habitat, and climatic conditions. Adverse impacts on wildlife habitat could occur if fire lines were placed in sensitive areas or if non-native invasive species were brought into the area. Non-native invasive species can have an impact on wildlife habitat quality. Wildlife would be affected by removal of trees, logs and snags used for nest and den sites; from drifting smoke; from noise and disturbance from personnel and equipment used for suppression, including helicopters; and noise and disturbance from preparation for suppression including installing water tanks, constructing fire lines, and removing hazardous fuels.

Fire management actions could result in the temporary displacement of wildlife due to noise and human presence or individual mortality of wildlife species. These adverse impacts would not jeopardize the viability of the populations in the park, and thus would be minor. Generally, fire determines wildlife habitat patterns and populations by increasing the amount, availability, and palatability of foods for herbivores; regulating yields of nut and berry-producing plants; regulating insect populations, which are important food sources for many birds; and controlling the scale of the total vegetative mosaic through fire size, intensity, and frequency.

Impacts to bird species would be similar to those on other wildlife species within the park. Temporary alteration of habitat as a result of fire suppression and fuels treatments could result in temporary, small-scale displacement of individuals from nesting or foraging sites. These impacts would not jeopardize the viability of bird populations.

Mechanical fuel treatments would remove certain plant species or parts of plants (e.g., limbs) to reduce the potential for wildfires around structures and archeological sites. Fuels reductions would be implemented with care within sensitive habitats and, to the extent possible, outside the breeding seasons of sensitive wildlife species. These treatments, however, would be used on a limited basis and concentrated in a small portion of the park that is already impacted by development. Impacts of mechanical fuel reduction, therefore, are not expected to have a large effect on wildlife species.

Catastrophic wildfires have the potential for significant short-term adverse effects on park wildlife populations from loss of many individuals and long-term indirect effects due to loss of habitat. The effects would vary from minor to severe depending on the size and intensity of the fire and the species affected. The adverse effects of catastrophic wildfire would be greater than the benefits to some wildlife species in the decades following a catastrophic fire from the loss of habitat. Over the long-term, the fire suppression has the potential for moderate or greater adverse effects as fuels increase the potential for catastrophic wildfire.

Cumulative Impacts

Wildlife habitat in parts of the park has been cleared for construction of buildings, roads, trails, and other facilities. Development of the Valley Road Administrative Area and relocation of Brooks Camp to the Beaver Pond Terrace area would clear the project sites of the existing trees brush only as required for the construction of the facilities, thus destroying and reducing wildlife habitat. Wildlife would be disturbed during construction activities and displaced over the long-term as these new areas are developed. On the other hand, relocation of Brooks Camp and removal of structures from Lake Brooks would allow for revegetation of decommissioned areas, which would have beneficial effects re-establishment of wildlife habitat. Wildlife, particularly brown bears, would be better protected and the potential for bear/human encounters would be reduced as visitation in the area would be reduced and relocated.

Besides the actual footprint of facilities, habitat in the immediate surrounding areas has been impacted by trampling from pedestrian and vehicle traffic. The backcountry installations in the parks, including seismic stations, radio repeaters, and remote automatic weather stations impact very small areas of wildlife habitat. Park visitation in the backcountry, and the presence of field crews maintaining monitoring stations, could cause localized, temporary displacement of wildlife and disturbance of wildlife habitat. The area of wildlife habitat disturbed by foot traffic and helicopter landings during maintenance activities at these stations would be minimal and limited to the area immediately surrounding the stations. Public use cabins and private lodges, facilities and visitation at Brooks Camp, ranger stations, and aircraft shuttling visitors to and from the park also add to existing impacts on wildlife and wildlife habitat. These actions have resulted in long and short-term habitat loss, displacement of wildlife, and increased human-wildlife conflicts.

The cumulative impact on wildlife and habitat from such actions would be adverse and moderate. Alternative 1 would contribute minor to moderate, adverse cumulative impacts on wildlife and habitat. Combined with known past, current and future projects and actions, there would be minor to moderate, adverse cumulative impacts on wildlife and habitat.

Conclusion

Alternative 1 would have negligible to moderate, short- to long-term, adverse effects on wildlife and wildlife habitats associated with fire suppression and mechanical fuel treatments depending on the nature and intensity of wildland fire. Catastrophic wildfire would have adverse effects on wildlife and habitat that would range from moderate to severe, depending on the extent of the fire.

4.3.6 Visual Quality

Although there would be full fire suppression under this alternative, until fires could be extinguished, smoke, particulate matter, and dust emissions would degrade visibility in the park and surrounding area. Smoke particulates could remain suspended in the atmosphere for a few days to several months. Very small particulates can travel great distances and add to regional haze problems, but decreased visibility from smoke would be a short-term, localized, adverse effect.

Through careful application of mechanical clearing to reduce hazardous fuels, minor visual impacts may occur in the form of thinning vegetation. Mechanical removal of hazardous fuels would be managed to create as little visual impact or change in scenic vistas as possible.

The increased risk of catastrophic wildland fire, which could result from the exclusion of the area's natural burn cycle, could eventually lead to large acreages burned, large amounts of smoke production, and greater impacts on visual quality.

Cumulative Impacts

Visual quality is affected by the presence and operation of human installations in the backcountry as described under Cumulative Impacts in Section 4.2.1. Additionally, few hikers and other backcountry visitors view existing seismic, climate, and communications stations, which continue to have a minor impact on the pristine visual quality of the park. During the summer months, however, many pilots and passengers can see the existing monitoring stations, as well as Brooks Camp, private lodges, and other structures. Development of the Valley Road Administrative Area and relocation of Brooks Camp to the Beaver Pond Terrace area would alter the visual quality of those areas. Volcanic eruptions and fires on adjacent public and private land could also have short-term, adverse impacts on visual quality from reductions in visibility due to ash and smoke.

The cumulative impact on visual quality from such actions would be adverse and minor. Alternative 1 would contribute minor to moderate, adverse cumulative impacts on visual quality. Combined with known past, current and future projects and actions, there would be minor, adverse cumulative impacts on visual quality.

Conclusion

The direct adverse impacts of Alternative 1 on visual quality would include short episodes of increased particulates and decreased visibility. These direct adverse impacts would be short-term, localized, and negligible to minor. Indirect and longer-term adverse impacts include contributions to regional haze and the possibility of wind-blown dust near the burned areas. However, in the case of a catastrophic wildfire, impacts to visual quality would be adverse, short-term, localized to regional, and moderate.

4.3.7 Visitor Experience

Wildfires would have short-term, adverse effects on visitor experience from smoke that reduces visibility and causes health problems, from closures of areas of the park for safety, and from burned vegetation.

Wildfires requiring suppression response could disrupt recreational opportunities and visitation during the incident. These adverse impacts would likely be short-term and include such possibilities as certain areas being closed to public entrance, facilities being closed or inaccessible, and opportunities (such as wildlife viewing or hiking) being disrupted by the fire, smoke, or associated management activities.

Wildfires would require notification and possible evacuation of visitors. In the event of a wildfire, visitor protection rangers would attempt to locate any visitors in areas that might be affected by the wildfire.

Some visitors would be disappointed to see blackened areas following a wildfire. This would be a short-term, adverse, localized effect that would persist until vegetation regrows. Blackened areas usually green up within weeks to months (and no later than the following spring). The visitor experience would improve when green vegetation grows back and wildflowers emerge in the spring.

Mechanical removal of hazardous fuels would be conducted during periods of low visitation or in areas of restricted public access and managed to create little visual impact or change in scenic vistas. Visitor access in the park would not be curtailed; consequently, there would be no direct adverse impacts to visitors. Indirect adverse effects would include the sound of chainsaws and other equipment for very short periods of time and a somewhat changed scene as fuels near park facilities and historic structures are reduced.

The risk of catastrophic fire would increase over the long-term under Alternative 1. There would be greater adverse effects on visitor experience primarily related to the effects of large wildfires on vegetation, visibility, and air quality rather than to suppression actions. Moderate adverse effects would be possible if a large wildfire occurred and damaged or destroyed facilities, cultural resources, or other recreational sites (e.g., trails), or caused substantial natural resource damage that could take several years to restore.

Cumulative Impacts

Facilities and development in the past that have been established at KATM, such as Brooks Camp, the VTTS Road, backcountry lodges, and Lake Camp facilities, have had beneficial effects on the visitor experience as they have provided access to the park and allowed visitors to enjoy amenities while in the backcountry.

Development of the Valley Road Administrative Area and relocation of Brooks Camp to the Beaver Pond Terrace area would have beneficial effects on the visitor experience as these changes would reduce the potential for bear/human encounters and address failing utilities and

infrastructure. Some visitors, however, may be disappointed that the main visitor facilities would no longer be located at Brooks Camp.

Park visitors encountering existing seismic equipment, radio repeaters, GPS sites, remote automatic weather stations, and other installations in the backcountry, and exposed to noise from aircraft flying over and landing to install or maintain equipment, would have a diminished visitor experience as they may expect a pristine environment.

The cumulative impact on visitor experience from such actions would be beneficial and moderate. Alternative 1 would contribute minor, adverse cumulative impacts on visitor experience. Combined with known past, current and future projects and actions, there would be moderate, beneficial cumulative impacts on visitor experience.

Conclusion
There would be short-term, localized, adverse effects on the visitor experience from smoke, closures, and burned vegetation in the park in case of wildfires. These effects would be negligible to minor, depending on the location and size of wildfires.

4.3.8 Cultural Resources

Fire can directly affect historic properties by damaging or altering elements or attributes of cultural materials that make them significant. Direct damage from fire can be the result of burning, heat, or smoke. Fire intensity and burn severity vary with fuel type and fuel loading and is generally greater under conditions with heavier fuels and fuel loads. While fire intensity and burn severity generally increase with heavier fuel loads, fuel arrangement plays a significant role in fire behavior as the presence or absence of ladder and intermediary fuels will allow or prevent fire from entering the tree crowns or igniting large heavy fuels such as down logs. Surface fires are usually associated with prescribed burns (see Alternative 3), whereas crown fires occur primarily during wildfires. Ground fires with high burn severity can even damage subsurface cultural materials.

The effects of fire on cultural resources are largely focused on two aspects, protection of historic structures and protection of archeological resources. With regard to archeological resources, the effects of fire on surface and subsurface artifacts vary with fuel loading and fire behavior. More intense fire on surface artifacts may cause scorching, fracturing, charring, and spalling. The effects are far less if artifacts are buried under as little as 1 cm of soil.

Under this alternative, fire management activities that occur during wildfire suppression that may adversely affect historic properties include staging of equipment and personnel, construction of fire control lines by hand or with heavy equipment, vegetation-thinning, water drops and use of fire retardants, burning out from control lines or setting backfires, and post-burn mop-up and rehabilitation. These suppression and fire control line tactics have the potential to displace archeological surface materials, expose buried archeological materials during hand-line construction, or disturb materials immediately below the surface due to earth moving or compaction. The indirect effects include exposure of artifacts to erosion following a fire, and loss of vegetation may reveal artifacts previously obscured by vegetation.

Mechanical reduction of hazardous wildland fuels would be conducted near park facilities, visitor use areas, and historic structures. Woody material would be hand-piled for later removal. There would be no direct adverse impacts of mechanical hazardous fuels reduction actions to structures, but there may be exposure of archeological materials due to ground disturbance associated with the activities. Indirect adverse impacts would include exposure of artifacts to erosion. Indirect beneficial impacts would include reducing the threat of wildland fire near historic structures and reducing the potential damage of vegetation encroachment on the resources.

Protection of historic and non-historic structures would be accomplished by the creation of defensible zones adjacent to those determined to be at high risk. The direct adverse impact of wildland fire on historic buildings could be destruction or damage to the structures if fire contacts the structures directly. The indirect impacts would include smoke impacts. The direct adverse impact of fire suppression on historic structures would be limited to the potential to damage such structures by contact with firefighting equipment. Indirect adverse impacts include the possibility of damaging the historic integrity of sites. Soil disturbance near structures can channel water and possibly erode footings and base supports for structures. Occasionally, trees may also become weakened and pose a threat to historic structures as a hazard tree. Given the proposed hazard fuel reduction projects near historic structures, the direct and indirect adverse effects of fire suppression on historic structures would be reduced.

In the event of a wildland fire, measures would be taken to limit damages to cultural resources. Unplanned events would be conducted in coordination with the park Cultural Resources staff. If cultural resources are threatened by an unplanned event, Cultural Resources staff would be consulted to help mitigate the impacts of suppression efforts.

Any direction from park cultural resources management staff regarding protection of cultural resources during wildland fires would be considered and protection would be provided as possible. Pre-planning efforts between cultural resources management staff and fire staff could produce products (for example, cultural resource site types priority lists and agreements) that may be adopted by fire managers.

Wildfire events or mechanical fuel treatment all occur on a landscape level and can affect cultural landscapes. In all instances impacts such as vegetation removal, fire control line construction, and ignition activities impact the landscape. Fire control lines result in visible scars on the landscape and can contribute to erosion. Vegetation removal can be beneficial since the historic scene can be maintained or restored by removing encroaching vegetation. However, care is needed when thinning near historical habitation areas where planted vegetation, such as orchard trees and ornamental plants is part of the cultural landscape and should not be removed. Staging of equipment and fire control line construction have the potential to create disturbance in sensitive areas.

Preplanned responses as identified by designated site protection levels also helps mitigate potential damage. The “Avoid” option helps with protection of some archeological resources.

Cumulative Impacts
KATM contains historic and archeological sites which evidence rich cultural histories of prehistoric habitation, early native Alaskan camps and villages, and Russian and American exploration. Impacts to historic and prehistoric resources associated with human activities in the park include exposure of buried sites, changes in artifact condition, destruction of artifacts or structures, loss of context of artifacts, site covering, and contamination of sites. For example, significant impacts to cultural resources in the Brooks Camp area have occurred from underground storage tank fuel leaks (NPS, 2004). Some looting and vandalism of archeological sites have occurred along the outer coast and other locations. Other actions that affect cultural resources are visitor use (hiking, camping), construction projects, and maintenance and repairs to roads, trails, and other facilities. All of these activities are conducted under the same general guidelines for identifying and protecting cultural resources so that long-term adverse effects are avoided to the greatest extent practicable. Additionally, natural erosion, and exposure over time contribute to cumulative effects on archeological resources and historic structures.

The cumulative impact on cultural resources from such actions would be adverse and minor to moderate. Alternative 1 would contribute minor, adverse cumulative impacts on cultural resources. Combined with known past, current and future projects and actions, there would be minor to moderate, adverse cumulative impacts on cultural resources.

Conclusion
Under Alternative 1, adverse impacts to cultural resources would be negligible to moderate with short- to long-term duration depending on the nature and intensity of any wildfire and subsequent fire suppression response and rehabilitation activities. The effects on historic structures from mechanical fuel reduction would be localized, short-term to long-term, minor to moderate, and beneficial.

4.3.9 Wilderness

Direct and indirect impacts caused by fire management activities would affect wilderness characteristics (untrammeled, natural, undeveloped, solitude or primitive and unconfined recreation). These impacts would be caused by such activities as construction of firelines, ignition operations, water or retardant drops, creation of helispots, creation of spike camps, and approved use of equipment such as aircraft, chainsaws, and portable pumps that may be used for fire suppression. Suppression of fires also affects wilderness characteristics by purposely removing a natural process from the landscape, which has created and maintains these wilderness characteristics. The impacts of any fire management actions on wilderness character would be mitigated using MIST.

Pending findings in the project MR/MT for operations in wilderness, fuels treatments using mechanized equipment would generally not, but may, occur in wilderness. Limited manual treatment using hand tools could occur and hand-operated power tools may occur on a case by case evaluation. These fuels management activities would focus on the reduction of fuel loads immediately surrounding fire-sensitive features, such as structures and cultural resources.

Rehabilitation actions taken after a fire has been suppressed may also have the direct or indirect effect of altering wilderness character by increasing noise levels during rehabilitation work and changing the character of the site with the rehabilitation measures.

Cumulative Impacts
Twenty-three seismic stations, seven remote automated weather stations, three NPS radio repeater sites, two GPS sites, a USCG navigation site, one public use cabin, and three patrol cabins are among the backcountry installations in KATM that are located in designated and eligible wilderness. These human developments are relatively small and the cumulative effects on the resources and values of the vast area of wilderness and eligible wilderness at the park are minimal. Aircraft used to access these sites for maintenance, as well as aircraft used to bring visitors to the backcountry and for patrols of wilderness contribute to the disruption of solitude.

The cumulative impact on wilderness from such actions would be adverse and minor. Alternative 1 would contribute minor to moderate, adverse cumulative impacts on wilderness. Combined with known past, current and future projects and actions, there would be minor to moderate, adverse cumulative impacts on wilderness.

Conclusion
The direct and indirect effects of Alternative 1 would be both short- and long-term, localized, adverse, and minor to moderate as a result of fire suppression activities and not allowing fire to have its natural and historic role in the wilderness landscape.

4.3.10 Local Economy

Effects associated with this alternative would be expected to be generally negligible to minor and may be both beneficial and adverse to local and regional businesses located outside the park and to commercial services operating within the park. Wildland fires can affect the local and regional economy in two primary ways. Fire events can provide additional opportunities for businesses in the regional economy, but may also deter visitors to the park, thereby reducing income to local businesses from visitor spending. A direct effect may be associated with expenditures for labor, equipment and other goods and services purchased directly from the local economy as part of the effort to suppress fires of natural origin. These effects would be, for the most part, temporary and limited to the duration of any particular fire event.

A second source of effect is associated with the direct and indirect impact of spending by park visitors in both the local economy and in the larger regional economy of the State of Alaska. These expenditures may include food and lodging, fees, rentals, guide and outfitting services; transportation, scenic and sightseeing tours and other retail purchases.

Visitor spending contributes to a substantial impact on the local economy, supporting direct park employment, as well as local and regional businesses located outside the park and commercial services provided by private concessioners inside the park. Other induced effects to the local economy include additional spending of income earned directly or indirectly from employment in businesses benefiting from visitor spending associated with KATM. In 2009, total visitor spending was estimated at $9.6 million. KATM visitor spending in the local economy supported

an estimated 93 jobs, adding approximately $2.4 million in labor income and contributing approximately $3.9 million in additional value to the local economy. Estimates by the NPS of the economic impacts of visitor spending and the NPS payroll on local economies for the years 2006 to 2009 are presented Section 3.11.

The potential for KATM visitation rates and associated visitor spending to be affected by a wildland fire event depends on the size, location, and extent of the fire. Losses to the local economy are somewhat offset by additional spending associated with fire personnel and associated material and equipment purchases necessary to fight the fire. Labor, equipment and materials required for repair and restoration following a fire event may also partially offset any losses experienced in the local economy by reduced visitor spending. However, wildland fires would have a minor adverse effect on visitation and visitor spending that may result from temporary park closures during fire events and longer term effects associated with the damage, destruction or loss of access to park resources.

Full suppression of all wildland fires would have the beneficial effect of reducing the potential for these events to adversely affect visitation and visitor spending. Effects would be generally beneficial. Some potential risk of catastrophic fire as a result of altering the natural burn cycle of the area may contribute to a potential adverse effect over the longer term. Catastrophic fires would reduce visitation, and correspondingly, visitor spending in the local and regional economies. A potentially minor adverse effect may be experienced by the local economies associated with these adverse effects. The severity of impact and duration would depend on the extent of damage and the time required to restore the affected area to its previous condition.

Cumulative Impacts

KATM is located in a remote area of Alaska and surrounded by a small number of sparsely populated communities with comparatively localized economies. Past and current actions have been primarily directed toward improving visitor facilities and operational infrastructure. No new actions, changes in land ownership, or other uses of the area are anticipated that would contribute to the overall cumulative effect to the local economy.

The cumulative impact on the local economy on the local economy would be generally beneficial and negligible. Alternative 1 would contribute negligible to minor, temporary benefits to the local economy with some potential for minor adverse effects associated with fire suppression. Combined with known past, current and future projects and actions, there would be negligible, adverse or beneficial impacts.

Conclusion

The impact to the local economy associated with this alternative would be generally short-term, negligible to minor, and beneficial in reducing the potential loss of visitor spending associated with wildfire events. However, some potential risk of moderate, longer term, adverse impacts may be associated with the risk of catastrophic wildfire as the result of disrupting the area's natural burn cycle.

4.3.11 Subsistence

In general, the short term effects associated with suppression of all wildland fires under this alternative would be minor and would be beneficial, in some instances, to protecting sources of subsistence harvest. However, over the longer term wildland fires may have more serious effects. The increased likelihood of larger and more devastating fires at some time in the future under this alternative may have a potentially adverse impact to specific resources. Any impacts would be confined to the area of the Katmai preserve as subsistence practices are not permitted in the park.

Subsistence practices are an important component of the lifestyles of the rural populations of the Lake and Peninsula Borough in which most of the Katmai preserve are located. Local residents rely heavily on fish, wildlife, and plants for economic support or to supplant income from other sources. Subsistence practices also support the social structures of local villages and communities by providing a means for the acquisition, exchange and distribution of goods between family relatives, other community members or other villages (LPB, 2011). Wildland fires can be destructive to natural vegetation and wildlife habitat that is central to the economies of these subsistence populations.

The impact of wildland fires on subsistence resources is dependent on the nature of the specific resource, the significance of the resource to the user population, the scale and location of the specific fire event, and the means employed in fighting the fire. The majority of species harvested for subsistence purposes are land based and would be affected by the burning or scorching associated with a wildland fire. Salmon harvests would be essentially unaffected, except in those areas where fire damage occurs along streams, results in surface water contamination, or obstructs access to fishing areas.

Full suppression of all wildfires would have the generally beneficial effect of reducing the potential for a fire to damage or destroy a valued resource. Some temporary, adverse impact may be associated with fire fighting actions that may cause ground disturbance (vehicles, fire line construction, movement of fire fighting personnel, etc.) or as the result of mechanical or chemical techniques employed (retardant drops). However, the increased risk of catastrophic fire from altering the area's natural burn cycle would be expected to increase the long term risk to valued subsistence resources.

Cumulative Impacts

The majority of past, present, and reasonably foreseeable future actions and developments involve areas of KATM that lie outside the preserve, where subsistence practices are not permitted, and would not be expected to have an additive or cumulative effect on subsistence practices within the preserve. Subsistence resources in the surrounding region outside KATM are, however, under some pressure from development, especially those associated with the proposed Pebble Copper mine (LPB, 2011). As a result, the importance of maintaining resources that lie within the preserve is increased.

The cumulative impact on subsistence resources and practices from other actions both inside and outside the park would be generally negligible to minor and beneficial. Alternative 1 would

contribute a negligible to minor, beneficial impact on subsistence resources and practices. Combined with known past, current and future projects and actions, there would be minor, beneficial impact to subsistence resources.

Conclusion
The actions proposed under this alternative involve the immediate suppression of all wildland fires in KATM. Depending on the nature of the fire event and the importance of the specific resource to subsistence populations, the overall impact of this alternative would be generally negligible to minor and beneficial in preventing further damage to valued resources from fires of natural origin. However, some negligible to minor short-term adverse impact may be associated with fire-fighting actions taken in response to individual fires. Over the longer term, the increased risk of catastrophic fire could contribute to a more moderate adverse impact to specific resources.

4.3.12 Private Inholdings

Private inholdings and native allotments could be affected by wildfires that originate in the park. These inholdings are currently provided a full suppression level of fire protection, which would continue under this alternative. There is a risk that wildfires that begin in the park could have direct adverse effects on inholdings if the fires burn private property or threaten human health and safety. Private inholdings would be most affected by smoke and reduced visibility from large wildfires. The health effects and change in visibility from smoke would range from negligible to moderate or more, depending on the location, size, and duration of the wildfire. However, fires would be fully suppressed in all areas of the park and the risk of such impacts on private inholdings would be low, except in the case of catastrophic wildfire that would threaten human health and safety and private property.

Cumulative Impacts
Actions that have had and would continue to have effects on private inholdings include noise from over-flights of aircraft used for transporting visitors to backcountry locations in KATM and from park operations, and possible trespass on private land by park visitors. The landowners should manage these lands in keeping with the legislative purposes and goals of KATM, but NPS regulations may not apply to them.

The cumulative impact on private inholdings from such actions would be adverse and negligible. Alternative 1 would contribute minor, adverse cumulative impacts on private inholdings. Combined with known past, current and future projects and actions, there would be minor, adverse cumulative impacts on private inholdings.

Conclusion
Alternative 1 would have short-term, negligible to minor, beneficial, localized impacts on private inholdings from protection with full wildfire suppression. In the long-term, however, a catastrophic wildfire could have moderate, adverse impacts on private inholdings if full suppression is not possible or rapid. Temporary, adverse, minor effects would occur from smoke reaching inholdings from nearby fires.

4.4 ALTERATIVE 2: USE OF WILDLAND FIRE

4.4.1 Air Quality

Air quality impacts would be largely the same as those described under Alternative 1. Certain wildland fires would be managed for the accomplishment of resource management goals, including the preservation of fire in its natural role. This would reduce the possibility of catastrophic fire thereby reducing the chance for intense decreases of air quality.

The park would comply with any federal, state and local requirements, and appropriate smoke permits would be obtained for planned projects. The park would implement planned projects under prescriptions to minimize smoke effects on visitors, firefighters, adjoining lands and neighbors, natural and cultural resources, and roads. Fire management actions on unplanned wildland fires would also minimize those effects as much as possible. The greatest threat to air quality would be smoke impacts on sensitive receptors (e.g. residences, visitors).

The possible use of heavy machinery, such as mowers, and tools such as chainsaws for mechanical fuels treatments and wildfire suppression would also contribute to negligible increases in fossil fuel emissions in the area of their use.

Cumulative Impacts
Cumulative effects of pollutants from sources such as vehicles, aircraft, campfires, and heavy equipment used for development of the Valley Road Administrative Area or the relocation of Brooks Camp could have minor, short-term, adverse impacts on air quality. Volcanic eruptions and fires on adjacent public and private land could have minor to moderate, short-term, adverse impacts on air quality.

The cumulative impact on air quality from such actions would be adverse and minor to moderate. Alternative 2 would contribute minor, adverse cumulative impacts on air quality. Combined with known past, current and future projects and actions, there would be minor to moderate adverse cumulative impacts on air quality.

Conclusion
The impact of Alternative 2 on air quality would be adverse, short-term, localized to regional, and minor from the Use of Wildland Fire. Impacts on air quality would be greater than under Alternative 1 as unplanned ignitions would be allowed to burn longer than they would if they were suppressed, creating greater amounts of smoke.

4.4.2 Water Quality

The impacts on water quality under Alternative 2 would be similar to Alternative 1 for fire suppression and mechanical fuel reduction activities. In addition, the use of naturally ignited fires for resource benefit would perpetuate the historic fire regime at KATM, thus reducing the chances of catastrophic fires.

In employing UWF, there may be a slight increase in acres burned than would have occurred with only suppression, but there would be less surface disturbance since managers may choose to utilize natural and man-made barriers rather than use of fireline for aggressive suppression of fires. However, fireline may still be used, and there would be similar impacts as described in Alternative 1. Some of this acreage may be immediately adjacent to rivers and streams, so there could be potential runoff as a result of use of wildland fire management response. The direct adverse effects of fire itself on water resources would be negligible. Indirect adverse effects may include increases in water temperature if shading vegetation is burned, increases in sediment if fire removes vegetation immediately adjacent to water sources, and increased stream flow since there would be less vegetation and thus less transpiration on the burned areas. As in Alternative 1, the use of mitigation measures described in Section 2.6, controlling burn intensities, the use of natural boundaries rather than constructed firelines, and post-fire rehabilitation of firelines would reduce the potential for water quality impacts.

Depending on the location and intensity of the fire, there could be some soil erosion, but large increases in run-off are not likely. The amount of sediment entering streams and lakes would not be unnatural and would help maintain the natural diversity of aquatic species and habitat. Use of wildland fire in or adjacent to salmon streams would serve to maintain these areas as part of a naturally functioning ecosystem.

Cumulative Impacts

Erosion and sedimentation of surface water from construction during development of the Valley Road Administrative Area, the relocation of Brooks Camp, and the removal of facilities from Lake Brooks could have adverse impacts on water quality. Additional impacts on water quality could occur from erosion of hiking trails, runoff from the VTTS Road and other roads, accidental fuel spills, and fuel leaks from float planes landing on water bodies.

The cumulative impact on water quality from such actions would be adverse and minor. Alternative 2 would contribute negligible, adverse cumulative impacts on water quality. Combined with known past, current and future projects and actions, there would be minor adverse cumulative impacts on water quality.

Conclusion

Alternative 2 would have adverse, short-term, localized, and minor impacts on water resources from fire management activities, including UWF. The chances of catastrophic fires would be reduced under this alternative, thus decreasing impacts on water quality as compared to Alternative 1.

4.4.3 Vegetation

The impacts on vegetation and wetlands under Alternative 2 would be similar to Alternative 1 for fire suppression and mechanical fuel reduction activities. Certain wildland fires would be managed for the accomplishment of resource management goals, including the preservation of fire as a natural process and the reduction of burnable vegetation, therefore maintaining a naturally functioning ecosystem and reducing the chances of catastrophic fires. This alternative

would manage ignitions through UWF within established resource objectives to maintain the natural function of the ecosystems in KATM.

Allowing wildfires to burn can also enhance the cycling of nutrients by releasing nutrients bound in dead plant material, making them available for new plant growth. Fire encourages new growth of many plant species. Fire can also alter plant community composition. Burning can be used to clear the landscape of excess residual plants and, when used in conjunction with other management tools, to negatively impact nonnative plants or other species that dominate certain habitats to the extent that habitat quality is compromised.

Wildland fire that poses a potential threat to life, property, or sensitive resources would be suppressed, while implementation of UWF in remote portions of KATM would ensure the preservation of the area's natural fire ecology as well as the reduction of potentially dangerous fuel loads. Perpetuating a natural fire regime would have a beneficial effect on vegetation.

Wildfires managed for resource benefit would involve allowing some natural fire starts to burn across the landscape in a closely monitored fashion. Because partial or full suppression may be required as part of the response to any wildland fire, impacts could include the removal of vegetation for control lines, the development for short-term camps for crews working in the area, and use of natural opening for helicopter landing areas that could compact soils and trample or remove vegetation. Similar adverse impacts on vegetation during UWF could occur as described under Alternative 1. Controlling burn intensities, the use of natural boundaries rather than constructed fireline, and post-fire rehabilitation of firelines would mitigate the potential impacts to vegetation and wetlands.

Cumulative Impacts

Vegetation in parts of the park has been cleared for construction of buildings, roads, trails, and other facilities. Development of the Valley Road Administrative Area and relocation of Brooks Camp to the Beaver Pond Terrace area would clear the project sites of the existing trees brush only as required for the construction of the facilities. Besides the actual footprint of facilities, plants in the immediate surrounding areas have been impacted by trampling from pedestrian and vehicle traffic. Dispersed vegetation impacts have also been caused by off-trail pedestrian traffic. Concentrated areas of off-trail pedestrian traffic often take the form of unofficial social trails where vegetation is often denuded.

The backcountry installations in the park, including radio communications sites, seismic stations, and remote automatic weather stations impact very small areas of vegetation. The area of vegetation trampling from foot traffic and helicopter landings during maintenance of these sites would both be minimal and limited to the area immediately surrounding the stations.

Relocation of Brooks Camp and removal of structures from Lake Brooks would allow for revegetation of decommissioned areas, which would have beneficial effects on native vegetation.

The cumulative impact on vegetation from such actions would be adverse and minor to moderate. Alternative 2 would contribute minor, adverse and minor, beneficial cumulative

impacts on vegetation. Combined with known past, current and future projects and actions, there would be minor to moderate, adverse cumulative impacts on vegetation.

Conclusion
Impacts of Alternative 2 on vegetation and wetlands would be adverse, minor to moderate, and short- to long-term depending on the nature and intensity of wildland fire and fire management activities. There would also be long-term, minor to moderate, beneficial effects on native plant communities from UWF that enhances the survival of native species.

4.4.4 Fish and Aquatic Habitat

The impacts on fish and aquatic habitat under Alternative 2 would be similar to Alternative 1 for fire suppression and mechanical fuel reduction activities. Certain wildland fires would be managed for the accomplishment of resource management goals including the preservation of fire in its natural role and the reduction of burnable vegetation. This would allow more low-intensity wildland fires that would reduce the erosion along streams.

UWF would have little, if any, impact on fish bearing streams. Fires can result in immediate mortality to fish. Increased suspended sediment loads from rain events over areas covered in ash could degrade the water quality of fish habitat and cause fish mortality. It is anticipated that fires would burn themselves out in moist streamside areas, resulting in natural buffer strips which filter out products of erosion before they enter the stream. Impacts from building fire lines and rehabilitation would be similar to those described for such actions during fire suppression in Alternative 1.

Cumulative Impacts
Erosion and sedimentation of surface water from construction during development of the Valley Road Administrative Area, the relocation of Brooks Camp, and the removal of facilities from Lake Brooks could have adverse impacts on surface water, and thus fish and aquatic habitat. Additional impacts could occur from erosion of hiking trails, runoff from the VTTS Road and other roads, accidental fuel spills, and fuel leaks from float planes landing on water bodies. There are also impacts on individual fish from the heavy recreational fishing of salmon and other species; however, these fisheries are managed so as not to adversely affect overall fish populations.

The cumulative impact on fish and aquatic habitat from such actions would be adverse and minor. Alternative 2 would contribute minor, adverse cumulative impacts on fish and aquatic habitat. Combined with known past, current and future projects and actions, there would be minor, adverse cumulative impacts on fish and aquatic habitat.

Conclusion
Impacts of Alternative 2 on fish and aquatic habitat would be adverse, negligible to minor, and short- to long-term depending on the nature and intensity of wildland fire and fire management activities. The chances of catastrophic fires would be reduced under this alternative, decreasing impacts on fish and aquatic habitat as compared to Alternative 1.

4.4.5 Wildlife and Habitat

The impacts on wildlife and habitat under Alternative 2 would be similar to those described under Alternative 1. Additionally, certain wildland fires would be managed for the accomplishment of resource management goals, including the preservation of fire as a natural process and the reduction of burnable vegetation, therefore maintaining a naturally functioning ecosystem and reducing the chances of catastrophic fires.

Wildlife response to fire depends greatly on the characteristics of the fire such as size, severity, patchiness, and season of burning. Although some direct impacts of fire on wildlife may be important, the more important effects are the indirect effects on habitat through post-fire changes in vegetation structure and composition. For example, a low severity, discontinuous burn may generate substantial spatial heterogeneity within a landscape and potentially increase species diversity by creating a variety of different habitats. Conversely, a widespread, high severity fire may have the opposite effect, creating a more homogeneous environment across the landscape. Responses to fire are highly species specific. Following fire, some species may respond favorably and increase in numbers, while others may respond negatively and decrease.

Some small relatively sedentary animals, such as insects and small mammals, would be killed by allowing fires to burn with UWF. Some individuals that live close to the perimeter of a fire would be able to escape direct injury by moving out of the fire zone. Other individuals would be able to move out of the fire path but would be exposed to an increased threat of predation. Hunting success for predators including insectivorous birds, raptors, and small and medium-sized mammalian carnivores would increase in the area surrounding a burn unit as prey items move away from an active fire or become more visible from removal of vegetation cover.

Less severe wildfires, as would be managed with UWF, would have a short-term benefit for a few decades on some species of wildlife, such as cavity-nesting birds that use burnt snags, ungulates that browse on new growth that resprouts from some plants after fires, and some animals that favor more open habitats over dense forests.

Cumulative Impacts

Wildlife habitat in parts of the park has been cleared for construction of buildings, roads, trails, and other facilities. Development of the Valley Road Administrative Area and relocation of Brooks Camp to the Beaver Pond Terrace area would clear the project sites of the existing trees brush only as required for the construction of the facilities, thus destroying and reducing wildlife habitat. Wildlife would be disturbed during construction activities and displaced over the long-term as these new areas are developed. On the other hand, relocation of Brooks Camp and removal of structures from Lake Brooks would allow for revegetation of decommissioned areas, which would have beneficial effects re-establishment of wildlife habitat. Wildlife, particularly brown bears, would be better protected and the potential for bear/human encounters would be reduced as visitation in the area would be reduced and relocated.

Besides the actual footprint of facilities, habitat in the immediate surrounding areas has been impacted by trampling from pedestrian and vehicle traffic. The backcountry installations in the parks, including seismic stations, radio repeaters, and remote automatic weather stations impact

very small areas of wildlife habitat. Park visitation in the backcountry, and the presence of field crews maintaining monitoring stations, could cause localized, temporary displacement of wildlife and disturbance of wildlife habitat. The area of wildlife habitat disturbed by foot traffic and helicopter landings during maintenance activities at these stations would be minimal and limited to the area immediately surrounding the stations. Public use cabins and private lodges, facilities and visitation at Brooks Camp, ranger stations, and aircraft shuttling visitors to and from the park also add to existing impacts on wildlife and wildlife habitat. These actions have resulted in long and short-term habitat loss, displacement of wildlife, and increased human-wildlife conflicts.

The cumulative impact on wildlife and habitat from such actions would be adverse and moderate, but also beneficial and minor. Alternative 2 would contribute minor, adverse cumulative impacts on wildlife and habitat, as well as minor beneficial impacts. Combined with known past, current and future projects and actions, there would be minor, adverse cumulative impacts on wildlife and habitat.

Conclusion
Alternative 2 would have negligible to moderate, short- to long-term, adverse effects on wildlife and wildlife habitats associated with fire management activities depending on the nature and intensity of wildland fire. Long-term benefits to wildlife from prevention of catastrophic wildfires would be substantial, to the extent that fire management actions prevent catastrophic wildfires, and minor to moderate, long-term benefits from restoration and maintenance of natural habitat.

4.4.6 Visual Quality

Visual quality impacts from smoke and mechanical clearing of hazardous fuels would be similar to those described under Alternative 1, other than the effects of a catastrophic wildfire. Certain wildland fires would be managed for the accomplishment of resource management goals, including the preservation of fire in its natural role. Thus, there would be more smoke and impacts to visibility under this alternative as fires would be allowed to burn.

Blackened areas or landscapes would impact visual quality in the short-term following a fire; however, in the long-term effects would be beneficial as ultimately an area would be more natural in setting and viewscape.

Cumulative Impacts
Visual quality is affected by the presence and operation of human installations in the backcountry as described under Cumulative Impacts in Section 4.2.1. Additionally, few hikers and other backcountry visitors view existing seismic, climate, and communications stations, which continue to have a minor impact on the pristine visual quality of the park. During the summer months, however, many pilots and passengers can see the existing monitoring stations, as well as Brooks Camp, private lodges, and other structures. Development of the Valley Road Administrative Area and relocation of Brooks Camp to the Beaver Pond Terrace area would alter the visual quality of those areas. Volcanic eruptions and fires on adjacent public and private land could also have short-term, adverse impacts on visual quality from reductions in visibility due to ash and smoke.

The cumulative impact on visual quality from such actions would be adverse and minor. Alternative 2 would contribute minor, adverse cumulative impacts on visual quality. Combined with known past, current and future projects and actions, there would be minor, adverse cumulative impacts on visual quality.

Conclusion
The direct adverse impacts of Alternative 2 on visual quality would include short episodes of increased particulates and decreased visibility. These direct adverse impacts would be short-term, localized, and minor. Indirect and longer-term adverse impacts would include contributions to regional haze and the possibility of wind-blown dust near the burned areas. Areas blackened by fires would have short-term, adverse, localized, minor to moderate impacts on visual quality, but long-term, beneficial, minor to moderate effects as vegetation recovers.

4.4.7 Visitor Experience

Impacts on visitor experience from wildfire suppression and wildland fire use would be similar to those effects described under Alternative 1, without the risk of a catastrophic fire.

Smoke from USF could adversely affect the experience of backcountry campers. The intensity of the effect would be greatest immediately downwind of the fire but could be more widespread, depending on meteorological conditions.

Direct adverse impacts of wildland fire use may include minor displacement of some visitor activities, but that would be limited to a few hours or days over the course of a year in total. There would be an incremental increase in smoke in scenic views, odor production, temporary restrictions in access to some areas, and temporarily blackened vegetation from increases in burned acreage by wildland fires managed under an appropriate management response. Smoke production would be of limited duration, usually lasting a few hours to a few days. Exceptions may occur when meteorological conditions, such as an inversion, exist and smoke may linger for a longer period of time. Blackened areas usually green up within weeks to months.

The presence of fire, smoke, and blackened areas presents an opportunity for education and interpretation of natural values and processes which may provide a long-term, beneficial effect.

Cumulative Impacts
Facilities and development in the past that have been established at KATM, such as Brooks Camp, the VTTS Road, backcountry lodges, and Lake Camp facilities, have had beneficial effects on the visitor experience as they have provided access to the park and allowed visitors to enjoy amenities while in the backcountry.

Development of the Valley Road Administrative Area and relocation of Brooks Camp to the Beaver Pond Terrace area would have beneficial effects on the visitor experience as these changes would address the potential for bear/human encounters and address failing utilities and infrastructure. Some visitors, however, may be disappointed that the main visitor facilities would no longer be located at Brooks Camp.

Park visitors encountering existing seismic equipment, radio repeaters, GPS sites, remote automatic weather stations, and other installations in the backcountry, and exposed to noise from aircraft flying over and landing to install or maintain equipment, would have a diminished visitor experience as they may expect a pristine environment.

The cumulative impact on visitor experience from such actions would be beneficial and moderate. Alternative 2 would contribute minor, adverse cumulative impacts on visitor experience. Combined with known past, current and future projects and actions, there would be moderate, beneficial cumulative impacts on visitor experience.

Conclusion
There would be short-term, localized, adverse, negligible to minor effects on the visitor experience from smoke, closures, and burned vegetation in the park with UWF, fire suppression, and mechanical clearing.

4.4.8 Cultural Resources

Impacts on cultural resources would be similar to those described for Alternative 1. In addition to fire suppression and mechanical fuel reduction, this alternative would implement UWF. With UWF, acreage burned may increase, but natural and man-made barriers would be used in addition to constructed firelines. This would reduce the potential impacts to surface and subsurface archeological resources, as well as reducing the risk of high intensity catastrophic fires that could damage archeological as well as historic structures.

Cultural resource sites located near wildland fire would be provided with point-protection tactics throughout the management of the fire.

Cumulative Impacts
KATM contains historic and archeological sites which evidence rich cultural histories of prehistoric habitation, early native Alaskan camps and villages, and Russian and American exploration. Impacts to historic and prehistoric resources associated with human activities in the park include exposure of buried sites, changes in artifact condition, destruction of artifacts or structures, loss of context of artifacts, site covering, and contamination of sites. For example, significant impacts to cultural resources in the Brooks Camp area have occurred from underground storage tank fuel leaks (NPS, 2004). Some looting and vandalism of archeological sites have occurred along the outer coast and other locations. Other actions that affect cultural resources are visitor use (hiking, camping), construction projects, and maintenance and repairs to roads, trails, and other facilities. All of these activities are conducted under the same general guidelines for identifying and protecting cultural resources so that long-term adverse effects are avoided to the greatest extent practicable. Additionally, natural erosion, and exposure over time contribute to cumulative effects on archeological resources and historic structures.

The cumulative impact on cultural resources from such actions would be adverse and minor to moderate. Alternative 2 would contribute minor, adverse cumulative impacts on cultural

resources. Combined with known past, current and future projects and actions, there would be minor to moderate, adverse cumulative impacts on cultural resources.

Conclusion
Under Alternative 2, adverse impacts to cultural resources would be negligible to moderate with short- to long-term duration depending on the nature and intensity of any wildfire and subsequent fire management response and rehabilitation activities. The effects on historic structures from mechanical fuel reduction would be localized, short-term to long-term, minor to moderate, and beneficial.

4.4.9 Wilderness

Under Alternative 2, UWF would help confine large wildfires and lessen the potential for disruption or change of wilderness character associated with suppression actions. Impacts associated with UWF would include increased noise and visual distractions associated with management activities within wilderness.

Effects on wilderness character:

Untrammeled – Fire is an ecological process that would be controlled and manipulated by fire managers under this alternative. The implementation of UWF and the suppression of naturally ignited fires would degrade the untrammeled quality of wilderness. The trammeling of wilderness due to fire management activity would create opportunities to safely and effectively manage naturally occurring wildfires with a reduced suppression response. In these instances, the short-term trammeling of wilderness due to management action would be outweighed by enhancing the untrammeled quality of the park over the long-term.

Natural – UWF and mechanical fuel reduction would enhance the natural quality of wilderness through the maintenance and management of natural processes of fire. The maintenance of natural communities and protection of flora and fauna at risk from unwanted fire impacts and from aggressive suppression response would enhance the natural quality of wilderness in the long-term.

Undeveloped – The presence and associated noise of mechanized and hand operated equipment deemed necessary for fire management activities (e.g., chainsaws, portable pumps, weed cutters) would temporarily affect the undeveloped quality of wilderness. However, these impacts would be short-lived and last only as long as the equipment is present in wilderness.

Solitude or Primitive and Unconfined Recreation – Opportunities for solitude or primitive and unconfined types of recreation should be relatively unaffected, except on a temporary basis. During fuels management activities and UWF, visitors may be excluded from certain areas for safety reasons. Fire management activities may require the use of motorized equipment that may disturb this wilderness quality temporarily, but would last only as long as the equipment is present in wilderness.

Cumulative Impacts
Twenty-three seismic stations, seven remote automated weather stations, three NPS radio repeater sites, two GPS sites, a USCG navigation site, one public use cabin, and three patrol cabins are among the backcountry installations in KATM that are located in designated and eligible wilderness. These human developments are relatively small and the cumulative effects on the resources and values of the vast area of wilderness and eligible wilderness at the park are minimal. Aircraft used to access these sites for maintenance, as well as aircraft used to bring visitors to the backcountry and for patrols of wilderness contribute to the disruption of solitude.

The cumulative impact on wilderness from such actions would be adverse and minor. Alternative 2 would contribute minor, adverse cumulative impacts on wilderness. Combined with known past, current and future projects and actions, there would be minor, adverse cumulative impacts on wilderness.

Conclusion
Alternative 2 would result in minor to moderate, short-term, localized, adverse impacts on wilderness during and immediately after fire management actions, and changes to wilderness character would be small. Allowing wildland fires to burn in wilderness would enhance and maintain many wilderness characteristics. In the long-term, fewer fires would need to be suppressed, resulting in fewer direct impacts associated with protection actions, and there would be minor to moderate beneficial effects on wilderness.

4.4.10 Local Economy

The potential short-term impacts associated with wildland fire suppression under this alternative would be similar to those described for Alternative 1. However, management of natural ignitions for the accomplishment of resource management goals could, in some cases, result in fires of longer duration thereby increasing the potential for negligible to minor adverse effect to visitation rates and a corresponding indirect adverse effect on visitor expenditures in the local economy. Any potential decrease in visitor spending could partially be offset by increased spending on fire management practices and subsequent requirements for repair or restoration of the affected area following the fire. Overall effects would be generally negligible to minor, of short duration and beneficial. However, some negligible adverse effect may be experienced as a result of potential decreases in visitation rates during fire events.

Visitation rates could be impacted by wildfire in the short-term. Where natural ignitions are managed for effect, these conditions may contribute to some minor adverse impact. Short-term impacts would be experienced as the result of management actions such as visitor evacuations, entry restrictions, and other strategies removing visitors from affected areas. However, any fire posing a threat to life or property would be immediately suppressed, thereby reducing the potential for adverse economic effect. Temporary disruptions during fire events, such as smoke, increased activity of fire personnel, and possible closures may also result in temporary inconvenience to visitors, but would not be expected to perceptibly alter visitor spending in the local economy over the longer term. The potential effects of natural ignitions would be expected to occur most frequently during the warmer and dryer part of the season. This period also

represents the peak tourist season, as well as the period of peak employment in the local economy.

Although mechanical fuel reduction is expensive and labor intensive, the additional costs associated with mechanical treatments under this alternative could benefit local economies through increases in local spending to support work crews as well as higher incomes to local contractors. However these expenditures, while beneficial, would be limited to the duration of individual fuel reduction projects and would not be expected to substantially contribute to increased indirect and induced employment or income in the regional economy.

Cumulative Impacts

Impacts associated with this alternative would be generally similar to those described for Alternative 1. As a result, the potential cumulative impact associated with this alternative when added to other past, present or reasonably foreseeable actions in the region of interest would be expected to be negligible, temporary and generally beneficial for the KATM local economy.

Conclusion

Overall, impact to the local and regional economies associated with the fire management practices and mechanical treatments anticipated under this alternative would be generally similar to that described under Alternative 1. Visitation rates, and corresponding visitor spending, would not be expected to change perceptibly under this alternative. Some increase in local spending for labor and equipment and supplies for fire management activities and mechanical fuel reduction may be expected to offset any decreases in visitor spending experienced in the local economy. Economic impacts associated with this alternative would be expected to be generally negligible to minor, beneficial and of short duration, with some potentially negligible adverse impact associated with temporary disruptions of visitor activity and corresponding business activity inside the park.

4.4.11 Subsistence

Impacts associated with the suppression of wildland fires under this alternative would be similar to those described under Alternative 1, and would be generally minor and beneficial in some circumstances. In those areas where fires are managed for the accomplishment of resource management goals, some potential for increased adverse impact to subsistence resources would be possible. However, utilization of wildland fire would be based on a determination of the potential ecological, social, legal and public safety and welfare consequences of the fire. As a result, any potential for increased adverse impact would be negligible.

As with Alternative 1, the impact of wildland fires on subsistence resources is dependent on the nature of the specific resource, the significance of the resource to the user population, the scale and location of the specific fire event, and the means employed in fighting the fire. UWF would be considered on a case by case basis. One of the stated purposes for the establishment of KATM is to protect the resources related to subsistence needs (ANILCA, Section 202(2)). As a result, the protection of subsistence resources would be a major concern in any management decision regarding UWF.

Any potential for adverse impact to subsistence resources would therefore be expected to be negligible to minor, depending on the circumstances of any particular event. A potential for increased longer term protection of subsistence resources from the effects of catastrophic wildfire may be anticipated as a result of the reduction of hazardous accumulations of burnable vegetation.

Cumulative Impacts
Cumulative effects under this alternative would be similar to those described for Alternative 1. Alternative 2 would contribute a minor, beneficial impact in the short term, as well as a negligible, longer term benefit associated with the slight reduction in the risk of catastrophic wildfire. The cumulative impact on subsistence resources and practices from these actions, when considered with known past, current and future projects and actions, would be generally beneficial and minor in the short term and negligible to moderate in the longer term.

Conclusion
This alternative would result in an overall minor, beneficial impact to subsistence users and resources through management and control of naturally occurring wildland fires to preserve the natural role of fire. UWF fire to control and reduce hazardous accumulations of burnable vegetation would reduce the risk of future catastrophic fire, thereby decreasing the longer term threat to valuable subsistence resources.

4.4.12 Private Inholdings

Private inholdings and native allotments are currently provided a full suppression level of fire protection, which would continue under this alternative, as in Alternative 1. UWF would have no direct effect on inholdings as fires would not be allowed to burn on or directly adjacent to these lands. Indirect impacts would include drifting smoke from a managed burn, but the smoke would be temporary. There would be indirect benefits to private inholdings from reducing the risk of wildfires in the park with wildland fire use, particularly catastrophic events.

Cumulative Impacts
Actions that have had and would continue to have effects on private inholdings include noise from over-flights of aircraft used for transporting visitors to backcountry locations in KATM and from park operations, and possible trespass on private land by park visitors. The landowners should manage these lands in keeping with the legislative purposes and goals of KATM, but NPS regulations may not apply to them.

The cumulative impact on private inholdings from such actions would be adverse and negligible. Alternative 2 would contribute minor, adverse and minor, beneficial cumulative impacts on private inholdings. Combined with known past, current and future projects and actions, there would be minor, adverse cumulative impacts on private inholdings.

Conclusion
Alternative 2 would have short-term, negligible to minor, beneficial, localized impacts on private inholdings from protection with full wildfire suppression. In the long-term, wildland fire use would reduce the risk of catastrophic wildfire and provide minor to moderate, beneficial effects.

Temporary, adverse, minor effects could occur from smoke reaching inholdings from nearby managed fires.

4.5 ALTERNATIVE 3: PRESCRIBED FIRE AND USE OF WILDLAND FIRE (PREFERRED ALTERNATIVE)

4.5.1 Air Quality

Air quality impacts would be largely the same as those described under Alternative 1 and Alternative 2. Additionally, prescribed fire would be used for reducing hazardous fuel loads and would occur in only a small percentage of the park, in Critical and Full FMUs. Smoke events associated with prescribed burns would be short-lived – on the order of a few hours to a few days. Ignition design and timing can minimize smoke production and avoid periods where inversions are likely so that burning would not generate much smoke. The park would coordinate with the State to ensure all applicable smoke management practices are implemented and to alert the State that a prescribed burn would be occurring.

The direct adverse impacts of Alternative 3 on air quality would include short episodes of increased particulates and decreased visibility. These impacts would be short-term, localized, and negligible to minor. Indirect and longer-term adverse impacts would include contributions to regional haze and the possibility of wind-blown dust near the burned areas. The indirect long-term adverse impacts on air quality would be short-term and negligible in a regional context.

Cumulative Impacts
Cumulative effects of pollutants from sources such as vehicles, aircraft, campfires, and heavy equipment used for development of the Valley Road Administrative Area or the relocation of Brooks Camp could have minor, short-term, adverse impacts on air quality. Volcanic eruptions and fires on adjacent public and private land could have minor to moderate, short-term, adverse impacts on air quality.

The cumulative impact on air quality from such actions would be adverse and minor to moderate. Alternative 3 would contribute minor, adverse cumulative impacts on air quality. Combined with known past, current and future projects and actions, there would be minor to moderate adverse cumulative impacts on air quality.

Conclusion
The impact of Alternative 3 on air quality would be adverse, short-term, localized to regional, and minor from UWF and prescribed fire. Impacts on air quality would be greater, but not appreciably, than under Alternative 1 as unplanned ignitions would be allowed to burn longer than they would if they were suppressed, and than Alternative 2 as there would be the addition of prescribed fire.

4.5.2 Water Quality

A full range of management actions would be allowed under Alternative 3, including suppression, UWF, prescribed fire, and mechanical fuel reduction. Impacts would be similar to those described for Alternatives 1 and 2.

Prescribed broadcast burning under Alternative 3 would not occur in areas immediately adjacent to rivers and streams, and associated control lines can be quickly rehabilitated as part of the prescribed burn plan implementation. The direct adverse effects of prescribed burning would be negligible; fire would not itself affect water resources. The potential indirect adverse effects may include slight increases in water temperature if shading vegetation is burned, slight increases in sediment if fire removes vegetation immediately adjacent to water sources, and slightly increased stream flow since there would be less vegetation and thus less transpiration on the burned areas. Prescribed fire would be managed to avoid or minimize the potential indirect impacts by maintaining, wherever possible, an unburned strip along the water source.

Much of the prescribed burning in the park would likely consist of pile burning associated with hazard fuels disposal around cabins and may be the more common type of prescribed fire utilized. Pile burning associated with the fuel breaks would have negligible effects on water quality because piles would be located in flat areas away from streams or high in the watersheds. No piles would be burned within 300 feet of any intermittent or perennial stream.

Cumulative Impacts

Erosion and sedimentation of surface water from construction during development of the Valley Road Administrative Area, the relocation of Brooks Camp, and the removal of facilities from Lake Brooks could have adverse impacts on water quality. Additional impacts on water quality could occur from erosion of hiking trails, runoff from the VTTS Road and other roads, such as the housing loop road, accidental fuel spills, and fuel leaks from float planes landing on water bodies.

The cumulative impact on water quality from such actions would be adverse and minor. Alternative 3 would contribute negligible, adverse cumulative impacts on air quality. Combined with known past, current and future projects and actions, there would be minor adverse cumulative impacts on air quality.

Conclusion

Under Alternative 3, adverse impacts caused by fire protection, management of wildfires, and fuels management activities would be negligible to moderate and short to long-term in nature. Greater flexibility to manage wildfires for resource benefit and multiple objectives would promote the natural role of fire across the landscape. The potential for wildfires outside the range of normal variability would be minimized, benefitting water resources over the long-term.

4.5.3 Vegetation

The proposed fire management actions under Alternative 3, including UWF, prescribed burning, reduction of hazardous fuel levels, and preparation for suppression actions are intended to reduce the long-term potential for wildfire, particularly catastrophic wildfire.

This alternative would promote maintenance of the historic fire regime to the greatest extent because it would use the widest array of fire management tools to allow more fire on the landscape. Although prescribed fire would be used primarily to reduce fuel loadings, it could be used to achieve a broader range of resource objectives, and along with UWF, could in the long-term reduce the severity and intensity of wildfire in the park, which in turn could reduce impacts to vegetation.

Vegetation removal through cutting and burning would be a direct adverse effect on vegetation. These effects would be localized around the perimeters of prescribed fire areas and structures. There would be short-term recurring effects to vegetation from prescribed fire, from preparation of fire lines for prescribed fires, and from annual clearing around structures. The adverse effects on vegetation from prescribed fire would be negligible because the vegetation that is removed would be undesirable or common in the park and the region and is routinely removed for general maintenance of facilities.

Prescribed burning would have long-term beneficial impacts on vegetation. Prescribed fires could serve to restore proper ecosystem function in systems that have evolved with regular fire-return intervals because fire plays an essential role in maintaining serial stages of succession. Generally, fire controls plant species and communities by triggering the release of seeds; altering seedbeds; temporarily eliminating or reducing competition for moisture, nutrients, heat and light; stimulating vegetative reproduction of top-killed plants; stimulating the flowering and fruiting of many shrubs and herbs; selectively eliminating invasive and exotic components of a plant community; and influencing community composition and successional stage through its frequency and/or intensity. Since lack of fire favors fire-intolerant species over fire-dependent ones, plant habitat and diversity would be improved with the reintroduction of fire. Fuel loadings would be reduced. After a prescribed burn, the area would be monitored for the presence of exotic species, which, if spotted, would be removed.

Much of the prescribed burning in the park would likely consist of pile burning associated with hazard fuels disposal around cabins and may be the more common type of prescribed fire utilized. Pile burning would not affect vegetation as cut trees and limbs would be piled on bare surfaces or away from live trees and large logs and snags.

Cumulative Impacts

Vegetation in parts of the park has been cleared for construction of buildings, roads, trails, and other facilities. Development of the Valley Road Administrative Area and relocation of Brooks Camp to the Beaver Pond Terrace area would clear the project sites of the existing trees brush only as required for the construction of the facilities. Besides the actual footprint of facilities, plants in the immediate surrounding areas have been impacted by trampling from pedestrian and vehicle traffic. Dispersed vegetation impacts have also been caused by off-trail pedestrian

traffic. Concentrated areas of off-trail pedestrian traffic often take the form of unofficial social trails where vegetation is often denuded.

The backcountry installations in the park, including radio communications sites, seismic stations, and remote automatic weather stations impact very small areas of vegetation. The area of vegetation trampling from foot traffic and helicopter landings during maintenance of these sites would both be minimal and limited to the area immediately surrounding the stations.

Relocation of Brooks Camp and removal of structures from Lake Brooks would allow for revegetation of decommissioned areas, which would have beneficial effects on native vegetation.

The cumulative impact on vegetation from such actions would be adverse and minor to moderate. Alternative 3 would contribute minor, adverse and minor beneficial cumulative impacts on vegetation. Combined with known past, current and future projects and actions, there would be minor to moderate, adverse cumulative impacts on vegetation.

Conclusion

The impacts on vegetation of Alternative 3 would be adverse and beneficial, negligible to moderate, and short- to long-term as it would best promote the natural role of fire and minimize the potential for eventual changes in vegetation communities that are outside the range or natural variability. These effects on vegetation would be considered adverse over the short-term to the extent that vegetation is removed, but beneficial over the long-term from removal of undesirable hazard fuels. Although vegetation impacts would be somewhat greater due to the increased fire management activities, Alternative 3 would attain the widest range of beneficial uses.

4.5.4 Fish and Aquatic Habitat

The impacts on fish and aquatic habitat under Alternative 3 would be similar to those described under alternatives 1 and 2. Additionally, prescribed fire would be used for reducing hazardous fuel loads and resource management objectives. Along with use of wildland fire, these management approaches are intended to reduce the long-term potential for catastrophic wildfire.

Prescribed burning is not expected to be a threat to fish bearing streams. Prescribed burns may present some increased risk due to possible mobilization of silt-laden runoff from prescribed burn sites; however, care would be taken to avoid erosion adjacent to streams.

Most planned fire management activities do not have the potential to affect fish because they would not occur in the vicinity of fish-bearing perennial streams. Work near anadromous fish-bearing streams during spawning seasons would be restricted to prevent disturbance to spawning salmon and trout. Fish and aquatic habitats would be adversely affected due to minor amounts of short-term sedimentation from ash from prescribed burning. An unknown and unquantifiable but presumably small number of individual fish would be affected. The effect would be localized, temporary, and minor.

Riparian shading would not be altered by an understory burn that does not reduce forest canopy. The amount of ash sediment mobilized by rain that falls onto burned areas would be minimized

by intact forest canopy; large woody debris remaining after a low intensity burn; and spotty burn pattern due to high moisture content of fuels and unburned riparian areas. A stream quality monitoring program would be used to assess the effects of the prescribed burn on water quality.

Cumulative Impacts

Erosion and sedimentation of surface water from construction during development of the Valley Road Administrative Area, the relocation of Brooks Camp, and the removal of facilities from Lake Brooks could have adverse impacts on surface water, and thus fish and aquatic habitat. Additional impacts could occur from erosion of hiking trails, runoff from the VTTS Road and other roads, accidental fuel spills, and fuel leaks from float planes landing on water bodies. There are also impacts on individual fish from the heavy recreational fishing of salmon and other species; however, these fisheries are managed so as not to adversely affect overall fish populations.

The cumulative impact on fish and aquatic habitat from such actions would be adverse and minor. Alternative 3 would contribute minor, adverse cumulative impacts on fish and aquatic habitat. Combined with known past, current and future projects and actions, there would be minor, adverse cumulative impacts on fish and aquatic habitat.

Conclusion

Impacts of Alternative 3 on fish and aquatic habitat would be adverse, negligible to minor, and short- to long-term depending on the nature and intensity of wildland fire and fire management activities, similar to Alternative 2.

4.5.5 Wildlife and Habitat

The impacts on wildlife and habitat under Alternative 3 would be similar to those described under alternatives 1 and 2. Additionally, prescribed fire would be used for reducing hazardous fuel loads and resource management objectives. The preservation of fire as a natural process and the reduction of burnable vegetation would contribute to maintaining a naturally functioning ecosystem and reducing the chances of catastrophic fires.

Prescribed burning would have an immediate effect on wildlife and wildlife habitat by removing plant material, exposing soil, stimulating growth of some plants, and killing or reducing the vigor of some plants. Some direct mortality of sedentary animal species could occur during prescribed fires. Animals may be displaced to other adjacent habitats. However, prescribed burning can also enhance the cycling of nutrients by releasing nutrients bound in dead plant material, making them available for new plant growth. Fire encourages new growth of many plant species, which provide browse for some wildlife species. Fire can also alter plant community composition. Burning can be used to clear the landscape of excess residual plants and, when used in conjunction with other management tools, to negatively impact non-native plants or other species that dominate certain habitats to the extent that habitat quality is compromised. The ability to alter plant species composition and abundance can provide a variety of habitat conditions which better meet the resource needs of wildlife species. These impacts would be long-term and beneficial.

Preparation for prescribed fires and fuel reduction projects remove snags and dead and downed wood in addition to live standing vegetation and large brush. Snags, hollow trees, and large downed logs are used by cavity-nesting birds and small and medium-sized mammals including rodents and carnivores. To preserve habitat for these animals during prescribed burning, snags and downed logs of certain size would be protected to the greatest extent practicable.

Wildlife protections would include timing restrictions of prescribed fires to avoid disturbance from noise and smoke during the breeding and nesting season and restrictions on size of vegetation cut to protect nesting (birds), denning (mammals), and foraging habitat. For migratory bird protection on the Alaska Peninsula, the recommended time periods to avoid vegetation clearing are: Forest or Woodland, April 10-July 15; Shrub or Open, May 1-July 15; Seabird Colonies, May 10-September 15; and Raptor and Raven Cliffs, April 10-August 10 (USFWS, 2007).

Cumulative Impacts

Wildlife habitat in parts of the park has been cleared for construction of buildings, roads, trails, and other facilities. Development of the Valley Road Administrative Area and relocation of Brooks Camp to the Beaver Pond Terrace area would clear the project sites of the existing trees brush only as required for the construction of the facilities, thus destroying and reducing wildlife habitat. Wildlife would be disturbed during construction activities and displaced over the long-term as these new areas are developed. On the other hand, relocation of Brooks Camp and removal of structures from Lake Brooks would allow for revegetation of decommissioned areas, which would benefit wildlife habitat. Wildlife, particularly brown bears, would be better protected and the potential for bear/human encounters would be reduced as visitation in the area would be reduced and relocated.

Besides the actual footprint of facilities, habitat in the immediate surrounding areas has been impacted by trampling from pedestrian and vehicle traffic. The backcountry installations in the parks, including seismic stations, radio repeaters, and remote automatic weather stations impact very small areas of wildlife habitat. Park visitation in the backcountry, and the presence of field crews maintaining monitoring stations, could cause localized, temporary displacement of wildlife and disturbance of wildlife habitat. The area of wildlife habitat disturbed by foot traffic and helicopter landings during maintenance activities at these stations would be minimal and limited to the area immediately surrounding the stations. Public use cabins and private lodges, facilities and visitation at Brooks Camp, ranger stations, and aircraft shuttling visitors to and from the park also add to existing impacts on wildlife and wildlife habitat. These actions have resulted in long and short-term habitat loss, displacement of wildlife, and increased human-wildlife conflicts.

The cumulative impact on wildlife and habitat from such actions would be adverse and moderate, but also beneficial and minor. Alternative 3 would contribute minor, adverse cumulative impacts on wildlife and habitat, as well as minor beneficial impacts. Combined with known past, current and future projects and actions, there would be minor, adverse cumulative impacts on wildlife and habitat.

Conclusion
Alternative 3 would have negligible to moderate, short- to long-term, adverse effects on wildlife and wildlife habitats associated with fire management activities. Alternative 3 would best promote the natural role of fire with the largest range of fire management actions, and minimize the eventual changes in wildlife habitat that are outside the normal range of variability. In the long-term, there would be minor to moderate beneficial impacts on wildlife and habitat.

4.5.6 Visual Quality

Visual quality impacts from smoke and mechanical clearing of hazardous fuels would be similar to those under Alternatives 1 and 2. Additionally, prescribed fire would be used for reducing hazardous fuel loads and resource management objectives. Smoke events associated with prescribed burns would be short-lived, on the order of a few hours to a few days. Ignition design and timing can minimize smoke production and avoid periods where inversions are likely so that burning would not generate much smoke. Prescribed burns would occur in only a small percentage of the park, in Critical and Full FMUs. Thus, prescribed burns would not contribute more than a negligible amount of visual degradation.

The degree of effect of prescribed burns on visibility would be greatest at Brooks Camp and Lake Camp, compared to other areas in the park, because burning in these areas would be close to the primary visitor use areas.

Cumulative Impacts
Visual quality is affected by the presence and operation of human installations in the backcountry as described under Cumulative Impacts in Section 4.2.1. Additionally, few hikers and other backcountry visitors view existing seismic, climate, and communications stations, which continue to have a minor impact on the pristine visual quality of the park. During the summer months, however, many pilots and passengers can see the existing monitoring stations, as well as Brooks Camp, private lodges, and other structures. Development of the Valley Road Administrative Area and relocation of Brooks Camp to the Beaver Pond Terrace area would alter the visual quality of those areas. Volcanic eruptions and fires on adjacent public and private land could also have short-term, adverse impacts on visual quality from reductions in visibility due to ash and smoke.

The cumulative impact on visual quality from such actions would be adverse and minor. Alternative 3 would contribute minor, adverse cumulative impacts on visual quality. Combined with known past, current and future projects and actions, there would be minor, adverse cumulative impacts on visual quality.

Conclusion
The direct adverse impacts of Alternative 3 on visual quality would include short episodes of increased particulates and decreased visibility. These direct adverse impacts would be short-term, localized, and minor. Indirect and longer-term adverse impacts would include contributions to regional haze and the possibility of wind-blown dust near the burned areas. There would be additional impacts on visual quality due to the use of prescribed fire, but not appreciably. Areas blackened by fires would have short-term, adverse, localized, minor to

moderate impacts on visual quality, but long-term, beneficial, minor to moderate effects as vegetation recovers.

4.5.7 Visitor Experience

The effects on visitor experience from wildfires and wildland fire use would be similar to those described for Alternatives 1 and 2, with the addition of the occasional use of prescribed fire that would allow a relatively cost-effective means of reducing fuel loads where the presence of values to be protected prohibits the implementation of UWF.

Fire management actions related to prescribed fire would adversely affect visitor experience in the short-term. The degree of effect would be greatest at Brooks Camp, compared to other areas in the park, because prescribed fire would occur in the primary visitor area of the park. Prescribed fires would generally be scheduled at times when visitation is lower, and visitors would be alerted to temporary closures during burns. Health hazards to visitors from smoke from prescribed fires would be negligible because visitors would not be in smoky areas long enough to suffer adverse effects and because visitors who are sensitive to smoke would be warned about the fires.

Whether a prescribed fire has a negative or a positive effect on visitors and their experience depends on the attitude of visitors and their knowledge and understanding of the role of fire in ecosystems. Some visitors would appreciate the ecological rationale for conducting prescribed burns and their experience would not be adversely affected by short-term closures, reduced visibility from smoke, and the appearance of burned vegetation following a prescribed fire. Other visitors would be opposed to prescribed fires because of the potential for a wildfire from an escaped prescribed fire, the effects of smoke on visibility and health, and the appearance of burned areas immediately after a fire. This effect would persist for different lengths of time depending on the vegetation type that was burned and the severity of the fire.

Cumulative Impacts

Facilities and development in the past that have been established at KATM, such as Brooks Camp, the VTTS Road, backcountry lodges, and Lake Camp facilities, have had beneficial effects on the visitor experience as they have provided access to the park and allowed visitors to enjoy amenities while in the backcountry.

Development of the Valley Road Administrative Area and relocation of Brooks Camp to the Beaver Pond Terrace area would have beneficial effects on the visitor experience as these changes would reduce the potential for bear/human encounters and address failing utilities and infrastructure. Some visitors, however, may be disappointed that the main visitor facilities would no longer be located at Brooks Camp.

Park visitors encountering existing seismic equipment, radio repeaters, GPS sites, remote automatic weather stations, and other installations in the backcountry, and exposed to noise from aircraft flying over and landing to install or maintain equipment, would have a diminished visitor experience as they may expect a pristine environment.

The cumulative impact on visitor experience from such actions would be beneficial and moderate. Alternative 3 would contribute minor, adverse cumulative impacts on visitor experience. Combined with known past, current and future projects and actions, there would be moderate, beneficial cumulative impacts on visitor experience.

Conclusion
There would be short-term, localized, adverse, negligible to minor effects on the visitor experience from smoke, closures, and burned vegetation in the park with UWF, prescribed fire, fire suppression, and mechanical clearing.

4.5.8 Cultural Resources

Impacts on cultural resources would be similar to those described for Alternatives 1 and 2. In addition to fire suppression, UWF, and mechanical fuel reduction, this alternative would also implement prescribed fire.

The locations of some cultural resources are known precisely, e.g. historic structures. Some resources that have not been documented may be present in areas where wildfires break out, e.g. archeological sites that have become overgrown by vegetation or in areas that have never been surveyed. Potential impacts on cultural resources are more likely to result from a wildfire and subsequent suppression actions, rather than from prescribed fires that are planned for a specific area where cultural resources can be located prior to ignition and protected.

Impacts that can occur from prescribed broadcast burns include equipment and personnel staging, construction of fire control lines by hand, vegetation thinning, burning out from control lines and igniting the interior of units, and post-burn mop-up and rehabilitation. Construction of fire lines in prescribed fire units are the proposed actions that have the greatest potential for adversely affecting cultural resources. Light-hand tactics would reduce the probability that unknown resources would be damaged.

Head fires generate a smaller downward heat pulse than do backing fires. With prescribed burning, use of head fires can reduce any potential impact on unknown surface archeological resources. Fire prescriptions would be designed to minimize soil heating and thus avoid impacts to buried archeological resources. Prescribed fires would generally be designed to avoid cultural resources. If prescribed burning was proposed near the historic or archeological resources, the prescribed burn plan would specify actions to avoid or mitigate potential adverse impacts to known structures or features. Heat from typical surface fires would be insufficient to damage artifacts and other archeological materials in subsurface settings even if they are buried only a few centimeters below the ground surface. Fire may also expose archeological resources as vegetation is removed.

The effects of heating associated with prescribed fire are usually not severe. However, if fire burns with high intensity, then damage to buried artifacts is more likely. Damage to stone or ceramic resources could occur by scorching, fracturing, charring, and spalling if fire severity is quite high. Prescribed fires would be designed to avoid known archeological sites with surface organic material. Indirect adverse impacts include exposure of surface artifacts to erosion. Most

burned areas would "green up" within the same season or, at the latest, the next spring. Regrowth would then diminish the possibility of artifacts being eroded or stolen.

Pile burning creates variable conditions, including high fire intensity and burn severity, in small isolated patches. Some patches would burn hotter and would result in an adverse effect if the piles are burned within archeological site perimeters. Additionally, when vegetation is burned in piles too close to a historic structure, radiant heat or embers carried by convection may impact the structure.

Most prescribed burning would not be conducted near historic structures. When prescribed burning is proposed near historic structures, one or more of the mitigations would be included in the prescribed fire plan and implemented prior to ignition. With mitigations in place, there should be no direct adverse impacts to historic structures. Indirect adverse impacts would include smoke drifting into structures. Prescriptions using wind directions that move smoke away from structures would reduce or eliminate this effect.

Cumulative Impacts

KATM contains historic and archeological sites which evidence rich cultural histories of prehistoric habitation, early native Alaskan camps and villages, and Russian and American exploration. Impacts to historic and prehistoric resources associated with human activities in the park include exposure of buried sites, changes in artifact condition, destruction of artifacts or structures, loss of context of artifacts, site covering, and contamination of sites. For example, significant impacts to cultural resources in the Brooks Camp area have occurred from underground storage tank fuel leaks (NPS, 2004). Some looting and vandalism of archeological sites have occurred along the outer coast and other locations. Other actions that affect cultural resources are visitor use (hiking, camping), construction projects, and maintenance and repairs to roads, trails, and other facilities. All of these activities are conducted under the same general guidelines for identifying and protecting cultural resources so that long-term adverse effects are avoided to the greatest extent practicable. Additionally, natural erosion, and exposure over time contribute to cumulative effects on archeological resources and historic structures.

The cumulative impact on cultural resources from such actions would be adverse and minor to moderate. Alternative 3 would contribute minor, adverse cumulative impacts on cultural resources. Combined with known past, current and future projects and actions, there would be minor to moderate, adverse cumulative impacts on cultural resources.

Conclusion

Under Alternative 3, adverse impacts to cultural resources would be negligible to moderate with short- to long-term duration depending on the nature and intensity of any wildfire and subsequent fire management response and rehabilitation activities. The effects on historic structures from mechanical fuel reduction would be localized, short-term to long-term, minor to moderate, and beneficial. Adverse effects on cultural resources from planned fire management actions would be avoided through identifying the resources prior to disturbance and protecting the resources.

4.5.9 Wilderness

Under Alternative 3, impacts to wilderness would be similar to Alternative 2, but would also include prescribed fire. To the greatest extent possible, prescribed fire would be focused outside of wilderness; however, this fuel treatment may be necessary in wilderness for purposes of wildfire protection. Prescribed fire activities that would contribute to wilderness impacts include burning vegetation, fireline construction with motorized tools, and ignition operations to consume unburned fuels along the fireline.

Cumulative Impacts
Twenty-three seismic stations, seven remote automated weather stations, three NPS radio repeater sites, two GPS sites, a USCG navigation site, one public use cabin, and two patrol cabins are among the backcountry installations in KATM that are located in designated and eligible wilderness. These human developments are relatively small and the cumulative effects on the resources and values of the vast area of wilderness and eligible wilderness at the park are minimal. Aircraft used to access these sites for maintenance, as well as aircraft used to bring visitors to the backcountry and for patrols of wilderness contribute to the disruption of solitude.

The cumulative impact on wilderness from such actions would be adverse and minor. Alternative 3 would contribute minor, adverse cumulative impacts on wilderness. Combined with known past, current and future projects and actions, there would be minor, adverse cumulative impacts on wilderness.

Conclusion
Alternative 3 would result in minor to moderate, short-term, localized, adverse impacts on wilderness during and immediately after fire management actions, and changes to wilderness character would be small. Using prescribed fire and allowing wildland fires to burn in wilderness would enhance and maintain many wilderness characteristics. In the long-term, fewer fires would need to be suppressed, resulting in fewer direct impacts associated with protection actions, and there would be minor to moderate beneficial effects on wilderness. Including prescribed fire to the fire management toolkit would enhance these benefits incrementally as compared to Alternative 2.

4.5.10 Local Economy

The use of prescribed burns would reduce the risk of catastrophic fires or limit the severity of fires in selected areas of the park. This alternative would result in somewhat fewer wildland fires. The potential short-term, adverse impacts to visitation rates and visitor spending associated with a major fire event would be correspondingly reduced, as would the potential for a single catastrophic fire. The effects associated with this practice would be generally longer term and beneficial to local and regional businesses located outside the park and to commercial services occurring within the park. Additional expenditures for labor and equipment, supplies and other materials necessary for fire suppression or to manage prescribed fire events would also be expected to contribute a negligible to minor, short term, beneficial effect to the local economy.

Under this alternative visitation rates and visitor spending could be affected by an overall increase in the number of fires, including both naturally occurring and prescribed fires. Short-term impacts would include restrictions of use by visitors in areas affected by fire events, visitor evacuations, temporary closures, and other strategies. A corresponding short term, adverse effect on visitor spending, and indirectly on income to park concessioners and local and regional businesses, may be experienced. However, the majority of prescribed burns are not expected to result in major park closures. Prescribed burns would also be limited in size and duration and scheduled outside of the peak tourist season to minimize disruption. As a result, any adverse impact to visitor spending would be expected to be negligible and of temporary duration.

Fire management programs may also affect the local and regional economies through increased spending for personnel, equipment and materials employed in managing natural or prescribed burns. Additional indirect and induced income to the local community may be derived for spending by NPS and contractor personnel during fire events. Given the relatively sparse populations and small number of communities in the immediate vicinity of the park, these expenditures would be expected to have a negligible overall effect on the local or regional economy. A longer term beneficial effect may be associated with the reduction in naturally occurring fires, the risk of catastrophic fire, or the limitation in severity of fires that do occur. Fewer naturally occurring fires would have the potential to maintain or increase visitation rates and correspondingly, the level of visitor spending in the park and surrounding economies.

Cumulative Impacts

Cumulative effects under this alternative would be similar to those described for Alternatives 1 and 2. The impact of Alternative 3 when added to other past, present or reasonably foreseeable actions in the region of interest would be expected to be negligible, temporary and generally beneficial for the KATM local economy and the surrounding region.

Conclusion

The potential for impact associated with this alternative would be generally long-term and beneficial to the local economy by reducing the frequency and severity of naturally occurring fires. Any potentially adverse effects associated with the use of prescribed fires may be easily mitigated and would be expected to result in negligible, short term impact to the local and regional economies. Overall impact associated with Alternative 3 would be negligible to minor in the short term and minor in the longer term.

4.5.11 Subsistence

The impact to subsistence resources and practices in the Katmai preserve from wildfire suppression and mechanical reduction would be similar to those described in Alternatives 1 and 2. Effects would be generally beneficial. Some potential for negligible to minor, short-term adverse effects may be associated with land disturbances resulting from the fire-fighting techniques employed and the tools, other equipment, and personnel that may be used in any mechanical thinning processes.

The use of prescribed fires under this alternative would be expected to contribute only a negligible to minor, short term increase in potentially adverse impact when compared with the

other alternatives. However, a substantial, longer term benefit may be anticipated from the prescribed fire program as a result of the expected decrease in the risk of a major or catastrophic fire that may threaten valued subsistence resources. Potential effects would be confined to the preserve as subsistence practices are not permitted in the park.

Impacts associated with fire suppression activities, although generally beneficial in preventing damage to subsistence resources, could also have potentially adverse impacts. Naturally occurring fires are usually sudden events that must be addressed without the benefit of prior planning and a careful survey of the immediate setting of the fire. Although extinguishing the fire is generally beneficial for protecting threatened resources, some potential for adverse impact (ground disturbance, damage from mechanical or chemical techniques employed, etc.) may result from firefighting efforts. These adverse impacts are usually temporary and amenable to remediation.

Impacts from prescribed fires could be similar to those associated with natural ignitions. The use of prescribed fires would add a potential concern for increasing the number of small fires in KATM and correspondingly the extent of ground disturbing actions potentially affecting subsistence resources. However, the intensity and duration of prescribed fire is usually lower and the location and timing of the fire event can be carefully planned. Consultation with KATM resource specialists and local community advisors can be employed to minimize impacts from prescribed burning to subsistence resources in the area. Fires could be planned to avoid known habitats for valued species or special items, and scheduled so as not to interfere with particular harvests. As a result, the addition of prescribed fires as a fire management option under this alternative would not substantially increase the risk of potential damage to subsistence resources.

Cumulative Impacts

Cumulative effects under this alternative would be similar to those described for Alternative 1. In general, Alternative 3 would have a negligible to minor impact on subsistence resources and practices, in both the short and longer term. Combined with known past, current and future projects and actions, there would a negligible to minor beneficial impact on subsistence resources and practices.

Conclusion

The additional use of prescribed fires under this alternative could result in an increase in the number of smaller fires in KATM and the potential for additional ground disturbing activity that may threaten subsistence resources in the Preserve. Some temporary, minor adverse effect may be possible under this alternative. However, unlike naturally occurring fires, prescribed fires can be managed to avoid potential damage to subsistence resources. Any impact would also include the long-term, beneficial effect of reducing the risk of catastrophic fires which may have a more intense impact on subsistence resources. As a result, the employment of prescribed fire under this alternative would be expected to contribute a minor beneficial impact to subsistence resources, with some potential for minor, adverse impact associated with ground disturbing actions during fire management or suppression activity.

4.5.12 Private Inholdings

Private inholdings and native allotments are currently provided a full suppression level of fire protection, which would continue under this alternative, as in Alternatives 1 and 2. UWF and prescribed fire would have no direct effect on inholdings as fires would not be allowed to burn on or directly adjacent to these lands. Indirect impacts would include drifting smoke from a managed burn, but the smoke would be temporary. There would be indirect benefits to private inholdings to the degree that UWF, prescribed fire, and mechanical fuel removal reduce the risk of catastrophic wildfire.

Cumulative Impacts

Actions that have had and would continue to have effects on private inholdings include noise from overflights of aircraft used for transporting visitors to backcountry locations in KATM and from park operations, and possible trespass on private land by park visitors. The landowners should manage these lands in keeping with the legislative purposes and goals of KATM, but NPS regulations may not apply to them.

The cumulative impact on private inholdings from such actions would be adverse and negligible. Alternative 3 would contribute minor, adverse and minor, beneficial cumulative impacts on private inholdings. Combined with known past, current and future projects and actions, there would be minor, adverse cumulative impacts on private inholdings.

Conclusion

Alternative 3 would have short-term, negligible to minor, beneficial, localized impacts on private inholdings from protection with full wildfire suppression. In the long-term, UWF and prescribed fire would reduce the risk of catastrophic wildfire and provide minor to moderate, beneficial effects. Temporary, adverse, minor effects could occur from smoke reaching inholdings from nearby managed fires.

5.0 CONSULTATION & COORDINATION

5.1 PUBLIC INVOLVEMENT

This environmental assessment is available for public review and comment for 30 days. It is available online at the National Park Service Planning, Environment, and Public Comment (PEPC) website. Go the http://parkplanning.nps.gov to access the PEPC site. Public comments on this environmental assessment can also be provided on the PEPC website.

A press release announcing the public comment period and availability of the environmental assessment was issued by the National Park Service, Alaska Regional Office and announced over local public radio stations.

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APPENDIX A: WILDERNESS MINIMUM REQUIREMENT/MINIMUM TOOL ANALYSIS

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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.

Project Title: **Katmai/Alagnak Wildland Fire Management Plan**

Step 1: Determine if any administrative action is necessary.

Description: Briefly describe the situation that may prompt action.

A new wildland fire management plan (FMP) and environmental assessment (EA) is being developed for Katmai and Alagnak. The plan provides the guidance on how to manage wildland fires throughout the units, which includes all the designated and suitable wilderness areas of Katmai. The FMP is necessary to comply with Director's Order #18 (DO-18) and codifies the way fire would be managed. Alternatives analyzed include Alternative 1: Full Wildland Fire Suppression (No Action); Alternative 2: Use of Wildland Fire (land/resource management objectives including suppression strategy); and Alternative 3: Combination of Prescribed Fire and Use of Wildland Fire. Without an approved FMP, fire suppression strategies may not use resource benefits as a primary consideration, but they must consider the resource impacts. The new planning effort may allow fires to burn (use of wildland fire) or to intentionally ignite fires (prescribed burn).

Wilderness is different from other public lands, by law and agency policy. Fire management activities in wilderness must be conducted to meet wilderness management goals and objectives. Cost, convenience, and efficiency are not the key determining factors for fire management actions in wilderness. Firefighter and public safety and risk to adjacent lands are still key decision points for fire management in wilderness.

To determine if administrative action is necessary, answer the questions listed in A - F.

A. Describe Options Outside of Wilderness
Is action necessary within wilderness? Yes

Explain: Wildland fires have the potential to burn on designated and suitable wilderness areas. It is necessary to consider the entire management unit for the plan.

B. Describe 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 consideration of the Section 4(c) prohibited uses? Cite law and section. Yes

Explain: The Wilderness Act (16 USC 1131-1136) Section 4(c) provides an exception for "emergencies involving the health and safety of persons with the area." Section 4(d)(1) allows "measures may be taken in the control of fire..."

43 CFR 36.11 implements the provisions of ANILCA §1110 to provides special access to conservation system units in Alaska, inclusive of snowmachines, motorboats, airplanes, and nonmotorized means of surface transportation. It does not authorize helicopters nor off-road vehicles (ORVs).

C. Describe Requirements of Other Legislation

Is action necessary to meet the requirements of other laws? No

Explain:

D. Describe 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 agencies? Yes

Explain: National Park Service Wildland Fire Management Guidelines (DO-18) require that all parks with vegetation capable of sustaining fire develop a wildland fire management plan.

The National Park Service Wilderness Stewardship order (DO-41) describes fires in wilderness (section 6.7):

> …each park with burnable vegetation must have a Fire Management Plan (FMP) that defines the objectives, management requirements, and potential strategies and tactics for safely managing fire in order to meet overall land management and wilderness objectives. Wilderness character must be adequately protected during all fire management actions, beginning with the development of the FMP and continuing through the management of individual events. A MRA must be completed as part of the development of the park's FMP and companion environmental compliance document. It must address the necessity of certain fire management actions for both planned and unplanned ignitions in wilderness, and specify at a programmatic level the minimum activities (methods or tools) that are generally permitted. MRAs should also be completed to address specific activities (methods or tools) for individual planned ignitions, as well as for actions that may be needed to restore, stabilize, or rehabilitate an area following fire. For the long term management of unplanned ignitions, an incident specific MRA should be completed. It should periodically be reviewed throughout the incident to ensure that minimum activities (methods or tools) are being used to protect wilderness character. The application of Minimum Impact Suppression Techniques (MIST) is required for all fires in wilderness.

The General Management Plan for KATM (1986) recognizes the role of fire as an important process in the perpetuation of natural ecosystems within the park. It also specifies that the park's Fire Management Plan "will outline objectives, procedures and responsibilities for the management of fire within Katmai and, that the overall objective is to "Let fires burn except where property or people would be threatened." Further the GMP acknowledges the NPS commitment to cooperate in the development of fire management plans which include "establishment of priorities for the control of wildfires and use of prescribed fires."

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 a primitive and unconfined type of recreation, or unique components that reflect the character of this wilderness area?

Untrammeled: Yes

> **Explain:** Without a FMP, all fires would need to be suppressed. This would be an intentional control or manipulation of a natural process (naturally ignited fires). A FMP is needed to preserve the untrammeled quality of wilderness character and to determine the level, if any, of impact to the untrammeled quality that the park is willing to authorize during suppression or prescribed fire actions.

Undeveloped: Yes

Explain: Allowing wildland fires to burn (Alternative 2 or 3) would significantly reduce the use of tools and modes of transportation. A plan is needed to address impacts to this quality.

Natural: Yes

Explain: Without a FMP, all fires would need to be suppressed. Fire suppression degrades the natural quality of wilderness character. This could lead to greater disturbance to the ecosystem function of wilderness than allowing fires to burn. Naturally-ignited fires are a natural process and preserves wilderness character.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation: Yes

Explain: Depending on the alternative selected, the frequency that users of wilderness may encounter suppression/monitoring personnel or encounter areas of the park closed for health and safety would vary. A FMP addresses these opportunities for solitude throughout the park.

Other unique components that reflect the character of this wilderness: Not Applicable

Explain:

F. Describe Effects to the Public Purposes of Wilderness

Is action necessary to support one or more of the public purposes for wilderness (as stated in Section 4(b) of the Wilderness Act) of recreation, scenic, scientific, education, conservation, and historical use?

Recreation: Yes

Explain: A FMP would allow a range of management actions to allow or suppress fires that would allow safe recreational opportunities.

Scenic: No

Explain: Fires would affect the scenery of the Katmai landscape, however, that is not a primary reason for the planning effort.

Scientific: Yes

Explain: Fire is a natural, but infrequent process, in Katmai. Human suppression of all fires would not allow natural fire regimes to prevail.

Education: No

Explain: Although education/outreach may be a result of fire activities, it is not a primary reason for the planning effort.

Conservation: Yes

Explain: Fire is a natural, but in frequent process, in Katmai. The FMP would allow the greatest range in management actions for the protection of human health and infrastructure while allowing natural fire regimes to occur.

Historical use: No

Explain: No knowledge of fire used in the area to manage vegetation.

Step 1 Decision: Is any administrative action necessary in wilderness? Yes

In reviewing the Step 1 questions in A - F above, note that not all answers have equal weight in the Step 1 Decision: A-C and E have first priority; F has second priority; D has third priority. See Instructions for details.

Explain: A wildland fire management plan must holistically consider the entire management area and how fires will be managed based on protection of resources and wilderness values. Consequently, all of the designated and eligible wilderness areas within KATM would be considered under the plan.

If action is necessary, proceed to Step 2 to determine the minimum activity.

Step 2: Determine the minimum activity.

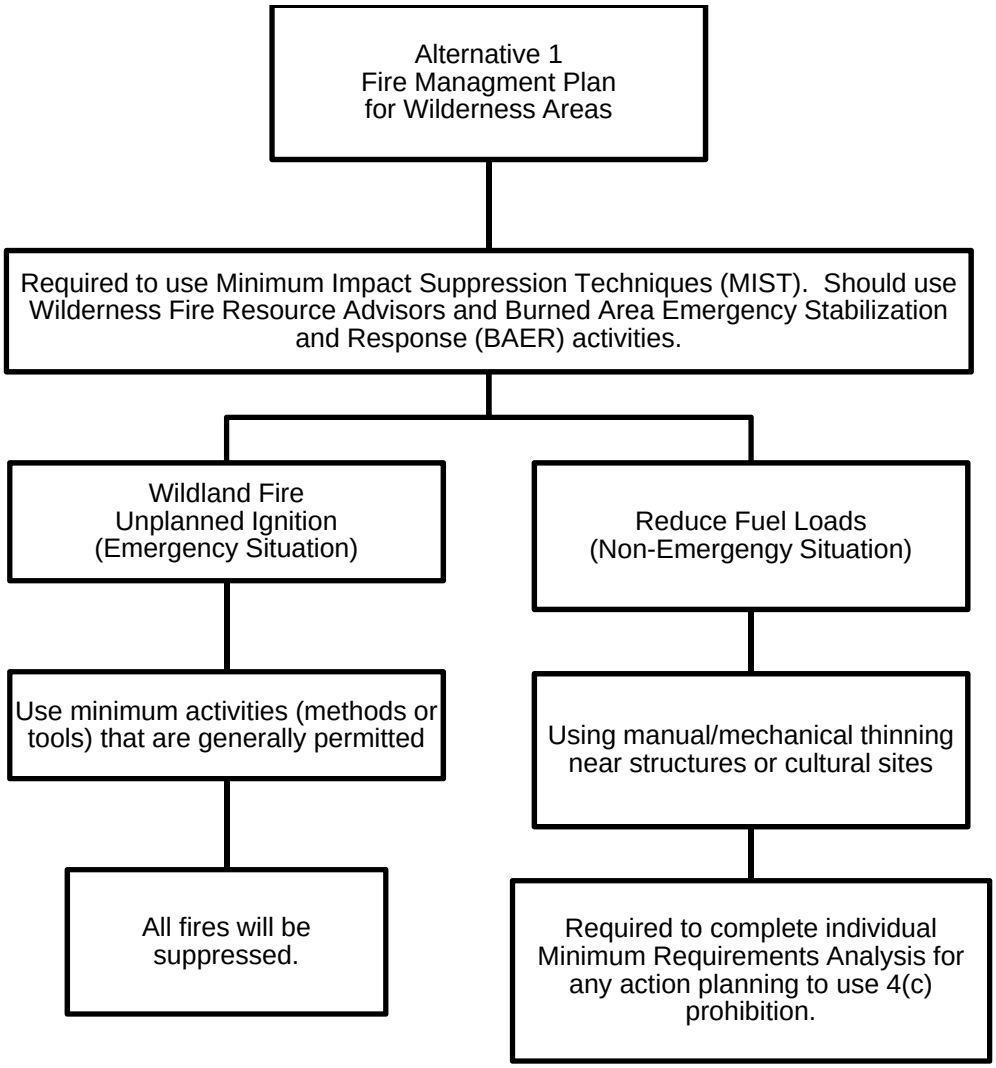
Please refer to the accompanying MRDG *Instructions* for an explanation of the effects criteria displayed below.

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.

Alternative # 1 – FULL WILDLAND FIRE SUPPRESSION (NO ACTION)

Description: Under this scenario, KATM would default to the de facto NPS fire management policies, which includes suppressing all fires regardless of source of ignition and location. No prescribed fire would be allowed. Suppression inside wilderness would still be subject to minimum requirements; however, there is a stronger potential that impacts could occur in wilderness.

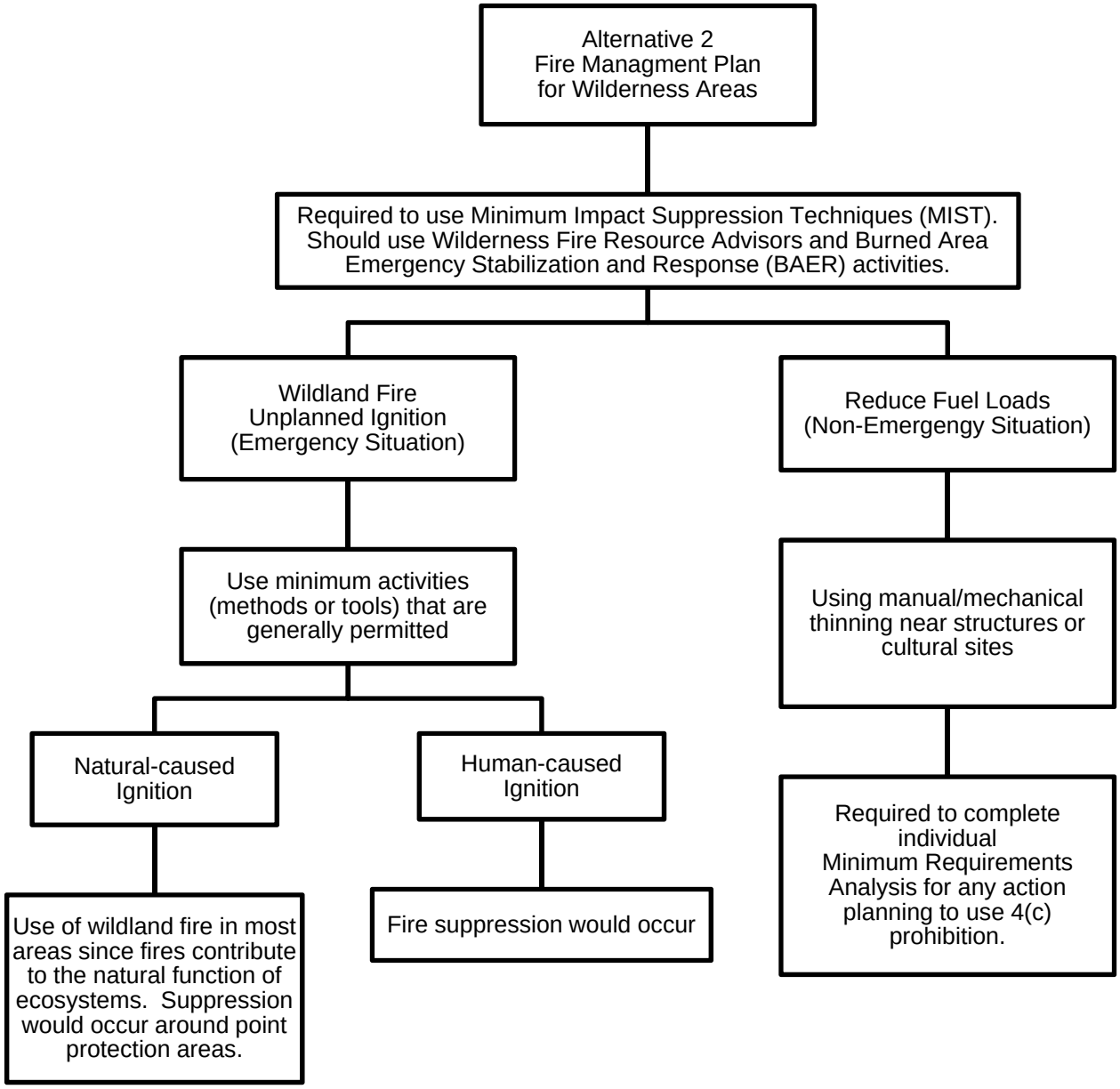


Effects: + positive, - negative, M mitigated

	Criteria	Beneficial effects	Adverse effects	+/- total
Wilderness Character	**Untrammeled**	•	• Suppression of naturally ignited fires intentionally manipulates ecosystem processes. • Suppression actions, such as retardant, ditching, and felling of trees, would be manipulating the wilderness areas. • Human ignited fires intentionally manipulate the wilderness.	---
	Undeveloped	•	• Fire suppression/monitoring could use mechanized equipment, motorized transport, and temporary installations, subject to minimum requirements.	-
	Natural	•	• Suppressing all fires excludes fire as a natural process.	-
	Solitude or a primitive and unconfined type of recreation	•	• Management activities could restrict visitor use of areas, lead to increased encounters with other people, and affect solitude through increased use of tools and transport.	-
	Other unique components	•	•	
Public Purposes of Wilderness	**Recreation**	• Fire suppression would reduce the time a fire burned and the extent of burning, which would allow recreational opportunities to continue with minimal interruption	• Suppression activities would likely close areas of the park and otherwise affect recreational opportunities	+/-
	Scenic	• Fire suppression would leave the landscape as minimally altered by fire as possible	•	+
	Scientific	•	• Fire suppression would not allow the natural fire regimes to prevail	-
	Education	•	•	
	Conservation	•	• Fire suppression would not allow the natural fire regimes to prevail	-
	Historical Use	•	•	
Other Criteria	**Heritage and Cultural Resources**	• Fire suppression would minimize the potential for historic resources to be burned.	•	+
	Maintaining Traditional Skills	•	•	
	Special Provisions	•	•	
	Economic and Time Constraints	• Use of motorized equipment and transport would make fire management more efficient	•	+
	Additional Wilderness-specific Comparison Criteria	•	•	
Safety	**Safety of Visitors, Personnel, and Contractors**	• Suppression of fires reduces risks for visitors and other personnel.	• Fires pose risk fire management staff that are mitigated through training and PPE.	+/M-

Alternative # 2 – USE OF WILDLAND FIRE (LAND/RESOURCE MANAGEMENT OBJECTIVES INCLUDING SUPPRESSION STRATEGY)

Description: Under this alternative, natural ignition fires could be allowed to burn in the majority of the wilderness under predetermined conditions to accomplish resource management goals. This would allow natural fire regimes to occur in areas of the park. Overall, this would allow more wildland fires to burn without human suppression.

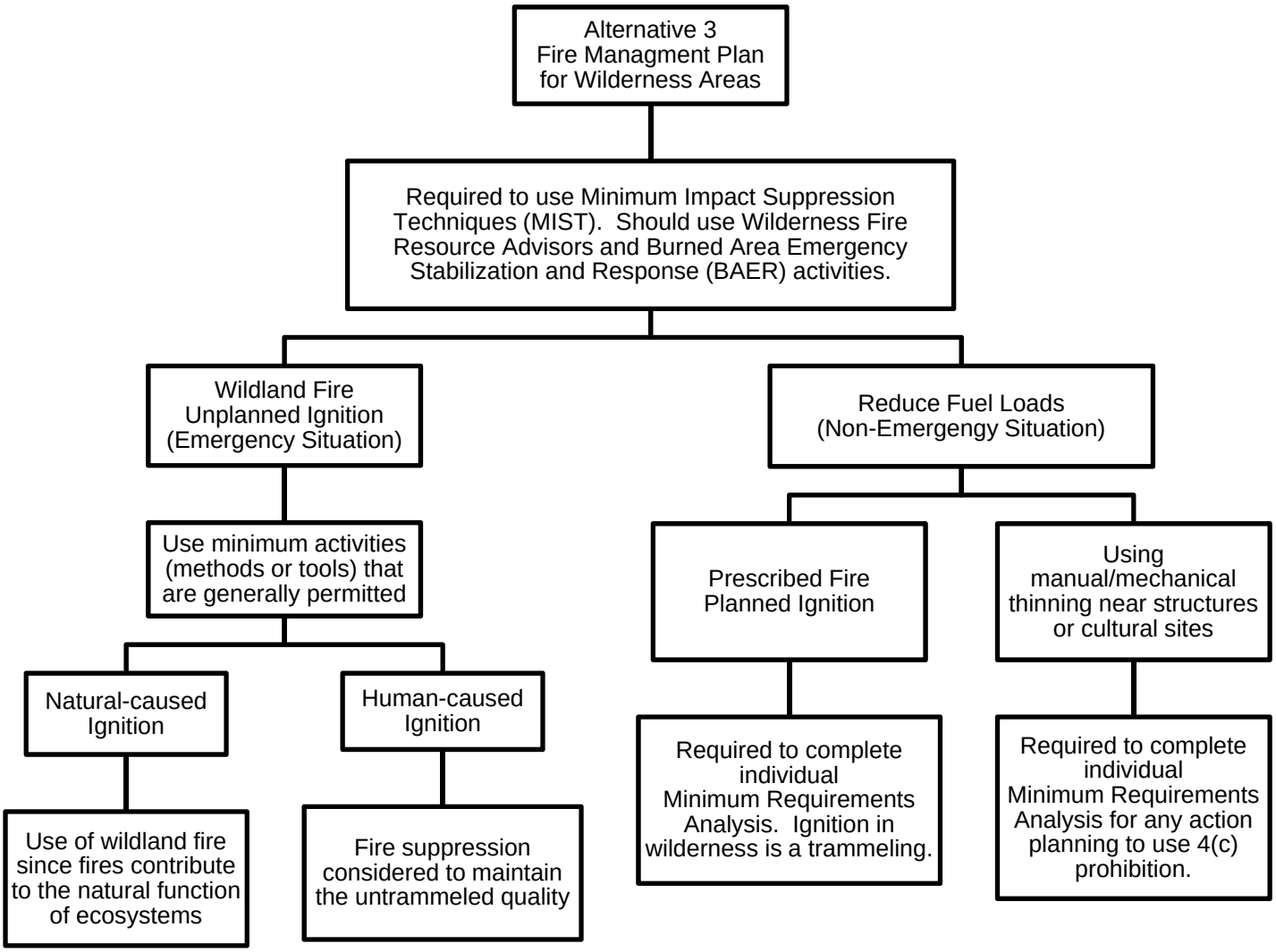


Effects: + positive, - negative, M mitigated

	Criteria	Beneficial effects	Adverse effects	+/- total
Wilderness Character	**Untrammeled**	• Allowing naturally ignited fires to burn maintains an untrammeled wilderness.	• Suppression actions, such as retardant, ditching, and felling of trees, would be manipulating the wilderness areas. • Human ignited fires intentionally manipulate the wilderness.	+/--
	Undeveloped	•	• Fire suppression/monitoring could use mechanized equipment, motorized transport, and temporary installations, subject to minimum requirements.	-
	Natural	• Natural fire regimes maintained, except where fires are suppressed to protect sensitive resources	•	+
	Solitude or a primitive and unconfined type of recreation	•	• Management activities could restrict visitor use of areas, lead to increased encounters with other people, and affect solitude through increased use of tools and transport. Compared to Alternative 1, the amount of land closed could be higher, but the number of interactions would likely be fewer.	-
	Other unique components	•	•	
Public Purposes of Wilderness	**Recreation**	•	• Allowing fires to burn would likely restrict access to larger areas of the park for health and safety concerns.	-
	Scenic	•	• Allowing fires to burn would cause greater visual changes to the landscape	-
	Scientific	• Wildland fire use would allow natural fire regimes to prevail	•	+
	Education	•	•	
	Conservation	• Wildland fire use would allow natural fire regimes to prevail	•	+
	Historical Use	•	•	
Other Criteria	**Heritage and Cultural Resources**	• Historic resources would likely still be in fire management units that would be defended from fire	•	+
	Maintaining Traditional Skills	•	•	
	Special Provisions	•	•	
	Economic and Time Constraints	• Use of motorized equipment and transport would make fire management more efficient	•	+
	Additional Wilderness-specific Comparison Criteria	•	•	
Safety	**Safety of Visitors, Personnel, and Contractors**	•	• Allowing fires to burn puts visitors at risk. • Fires pose risk fire management staff that are mitigated through training and PPE.	-/M-

Alternative # 3 – COMBINATION OF PRESCRIBED FIRE AND USE OF WILDLAND FIRE (NPS PREFERRED ALTERNATIVE)

Description: Under this alternative, natural ignition fires could be allowed to burn in the majority of the wilderness under predetermined conditions to accomplish resource management goals. This would allow natural fire regimes to occur in areas of the park. Overall, this would allow more wildland fires to burn without human suppression. Additionally, prescribed fires could be ignited to reduce fuel loads in areas of higher fire risk.



Effects: + positive, - negative, M mitigated

	Criteria	Beneficial effects	Adverse effects	+/- total
Wilderness Character	**Untrammeled**	• Allowing naturally ignited fires to burn maintains an untrammeled wilderness.	• Suppression actions, such as retardant, ditching, and felling of trees, would be manipulating the wilderness areas. • Human ignited fires intentionally manipulate the wilderness. • Prescribed fires (manager-ignited) is an intentional manipulation of the wilderness.	+/---
	Undeveloped	•	• Fire suppression/ monitoring/ prescribed burn could use mechanized equipment, motorized transport, and temporary installations, subject to minimum requirements.	-
	Natural	• Natural fire regimes maintained, except where fires are suppressed to protect sensitive resources	• Natural fire regimes not maintained in areas where natural fires are suppressed and in areas subject to prescribed burns	+/-
	Solitude or a primitive and unconfined type of recreation	•	• Management activities could restrict visitor use of areas, lead to increased encounters with other people, and affect solitude through increased use of tools and transport.	-
	Other unique components	•	•	
Public Purposes of Wilderness	**Recreation**	•	• Allowing fires to burn and igniting fires would likely restrict access to larger areas of the park for health and safety concerns.	-
	Scenic	•	• Allowing fires to burn and igniting fires would cause greater visual changes to the landscape	-
	Scientific	• Wildland fire use would allow natural fire regimes to prevail	• Prescribed burns would not allow natural fire regimes to prevail	+/-
	Education	•	•	
	Conservation	• Wildland fire use would allow natural fire regimes to prevail	•	+
	Historical Use	•	•	
Other Criteria	**Heritage and Cultural Resources**	• Historic resources would likely still be in fire management units that would be defended from fire	•	+
	Maintaining Traditional Skills	•	•	
	Special Provisions	•	•	
	Economic and Time Constraints	• Use of motorized equipment would make fire management more efficient	•	+
	Additional Wilderness-specific Comparison Criteria	•	•	
Safety	**Safety of Visitors, Personnel, and Contractors**	•	• Allowing fires to burn puts visitors at risk. • Fires pose risk fire management staff that are mitigated through training and PPE.	-/M-

Comparison of Alternatives

It may be useful to compare each alternative's positive and negative effects to each of the criteria in tabular form, keeping in mind the law's mandate to "preserve wilderness character."

+ positive; - negative; M mitigated

	Criteria	Alternative 1	Alternative 2	Alternative 3
Wilderness Character	**Untrammeled**	---	+/--	+/---
	Undeveloped	-	-	-
	Natural	-	+	+/-
	Solitude or a primitive and unconfined type of recreation	-	-	-
	Other unique components			
Public Purposes of Wilderness	**Recreation**	+/-	-	-
	Scenic	+	-	-
	Scientific	-	+	+/-
	Education			
	Conservation	-	+	+
	Historical Use			
Other Criteria	**Heritage and Cultural Resources**	+	+	+
	Maintaining Traditional Skills			
	Special Provisions			
	Economic and Time Constraints	+	+	+
	Additional Wilderness-specific Comparison Criteria			
Safety	**Safety of Visitors, Personnel, and Contractors**	+/M-	-/M-	-/M-
Wilderness Criteria Summary		6-	2+/4-	2+/6-
Public Purposes of Wilderness		2+/3-	2+/2-	2+/3-
Other Criteria Summary		2+	2+	2+
Safety Summary		+/M-	-/M-	-/M-
Overall Summary		5+/9-/M-	6+/7-/M-	6+/10-/M-

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: Fires pose a significant health and human safety risk. In emergency situations where lives are at risk, the incident commander/superintendent has the discretion to select management actions, such as tools, modes of transportation, and emergency closures, that will minimize risk to humans.

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: Alternative 2

Rationale for selecting this alternative (including documentation of safety criterion, if appropriate):
Alternative 2 is the minimum activity for managing fire in wilderness areas of Katmai. It is consistent with management of wilderness values for the unit by allowing natural fire patterns to prevail with minimal trammeling.

Alternative 3, the NPS preferred alternative, provides the most robust suite of fire management tools in non-wilderness areas. If selected, prescribed burns in wilderness areas would be subject to supplementary minimum requirements analysis to ensure the trammeling and other wilderness impacts are the minimal tool to manage the wilderness resources.

Monitoring and reporting requirements:
The plan and environmental assessment include guidelines to minimize impacts of fire management activities on wilderness, including the following mitigations:

- Wilderness Fire Resource Advisors will be assigned to all extended attack fires and Burned Area Emergency Stabilization and Response (BAER) activities, including those occurring in or near wilderness.
- Park wilderness coordinator will review fire management unit designations when they are revised.
- All fire suppressions in wilderness would follow Minimum Impact Suppression Tactics (MIST) as specified by NPS policy. Give preference to using methods and equipment that cause the least:
    - Alteration of the wilderness landscape.
    - Disturbance to the land surface or degradation of habitat or water quality
    - Disturbance to visitor solitude.
    - Reduction of visibility during periods of visitor use.
    - Adverse effect on other air quality related values.
    - Need for subsequent restoration or mitigation
- Fire camps and incident command centers will be located outside of wilderness, whenever feasible.
- Fire suppression activities in wilderness will minimize the unnatural effects
- The use of mechanized equipment will be scrutinized and must be defensible as necessary to suppress a wildfire with a clear threat to public health and safety, including firefighter safety. Within wilderness, chain saws, helicopters, heavy equipment, or pumps will only be used when essential to meet suppression objectives, but with due consideration to impacts on wilderness character and subject to minimum tool determination with the superintendent and incident commander making the ultimate decision.
- For fire management purposes, helicopters would use unimproved landing locations in wilderness.
- To the extent possible, non-emergency use of helicopter landings in wilderness will be avoided. If it cannot be avoided, the decision to use a landing spot in wilderness will be detailed in a Wilderness Minimum requirements analysis as well as an environmental compliance document (ie. the Environmental Assessment or Categorical Exclusion).
- All prescribed burns (non-emergency) will be pre-planned with an action specific Wilderness Minimum Requirements Analysis.

Non-emergency actions require supplementary minimum requirements analyses. Check any Wilderness Act Section 4(c) uses approved for emergencies following Superintendent/Incident Commander consideration for minimal tool:

☒	mechanical transport	☒	landing of aircraft
☒	motorized equipment	☐	temporary road
☒	motor vehicles	☒	structure
☒	motorboats	☒	installation

Record and report any authorizations of Wilderness Act Section 4(c) uses according to agency procedures.

Approvals	Signature	Name	Position	Date
Prepared by:		Whitney Rapp	Permit Coordinator	
Recommended:		Whitney Rapp	Wilderness Coordinator	
Recommended:				
Approved:		Ralph Moore	Superintendent	

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APPENDIX B: ANILCA SECTION 810(A) SUMMARY EVALUATION AND FINDINGS

INTRODUCTION

This section was prepared to comply with Title VIII, section 810 of the Alaska National Interest Land Conservation Act (ANILCA) of 1980. It summarizes the evaluations of potential restrictions to subsistence activities that could result from adopting and implementing a fire management plan for Katmai National Park and Preserve.

EVALUATION PROCESS

Section 810(a) states:

> "In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands... the head of 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 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 will involve the minimal amount of public lands necessary… and (C) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions."

ANILCA created new units and additions to existing units of the national park system in Alaska. Katmai National Park and Preserve was created by ANILCA Section 202(2) for the following purposes, among others: "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."

The potential for significant restriction of subsistence uses 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, ANILCA).

PROPOSED ACTION ON FEDERAL PUBLIC LANDS

The National Park Service (NPS) is proposing to implement Director's Order 18 (DO-18) (2008a) by establishing a Fire Management Plan (FMP) in Katmai National Park and Preserve (KATM). The following three alternatives are being considered:

Alternative 1: Full wildland fire suppression *(No Action)*
Alternative 2: Use of wildland fire
Alternative 3: Combination of prescribed fire and use of wildland fire *(NPS Preferred Alternative)*

These alternatives are described in Chapter 2 of the EA and assessed for their potential impacts to subsistence resource and uses in this analysis.

AFFECTED ENVIRONMENT

This section summarizes the affected environment as it pertains to subsistence resources and use.

Katmai National Park and Preserve (KATM) is on the northern end of the Alaska Peninsula approximately 225 miles southwest of Anchorage, 90 miles southwest of Homer and 35 miles northeast of King Salmon in the Lake and Peninsula Borough. The landscape in KATM is dominated by numerous large and small lakes; wetlands and open tundra; stands of black spruce, and thickets of alder, willow and dwarf birch. The area's primary subsistence resources include sockeye salmon, silver salmon, whitefish, pike, rainbow trout, moose, caribou, brown bear, bird eggs, ptarmigan, ducks, snowshoe hare, furbearing animals, berries and various plants.

ANILCA authorizes subsistence uses within Katmai National Preserve (Preserve) and on other Federal public lands in Alaska where specifically permitted, but not in Katmai National Park Park).[1] ANILCA also permits sport hunting in areas designated as national preserves. The Preserve contains 333,401 acres and is located within Game Management Unit (GMU) 9C. The Alagnak Wild River corridor and lands managed by the Bureau of Land Management and U.S. Fish and Wildlife Service share common boundaries with KATM and are the closest Federal public lands to the proposal area where Title VIII subsistence activities occur. Regional subsistence activities in the Preserve include hunting, fishing, trapping, berry picking and plant gathering.

Eligibility for the Federal Subsistence Program in the Preserve is determined primarily through customary and traditional (C&T) use determinations by the Federal Subsistence Board. When communities or areas have a positive C&T determination for a species in a particular game unit or fishery management area, only residents of those communities or areas have a Federal subsistence priority and are eligible to hunt, fish or trap that species in that game unit or fishery management area under Federal subsistence regulations. The following areas and communities have positive C&T use determinations for the following fish and game species in the Preserve most commonly utilized for subsistence.

[1] The one exception to this prohibition is the traditional red fish fishery permitted under 36CFR §13.66 (b) which allows descendants of Katmai residents who lived in the Naknek Lake and River drainage to harvest spawned-out sockeye salmon that have no significant commercial value.

Species	Residents with Positive Customary and Traditional Use Determinations
Brown Bear	Rural residents of 9C, Igiugig, Kakhonak, and Levelock
Caribou	Rural residents of Units 9B, 9C, 17 and Igiugig
Fox	All rural residents (For both hunting and trapping)
Lynx	All rural residents (For both hunting and trapping)
Moose	Rural residents of Units 9A, 9B, 9C and 9E
Ptarmigan	All rural residents
Rainbow Trout	Residents of the Kvichak/Iliamna-Lake Clark drainage
Salmon and Other Freshwater Fish	Residents of the Kvichak/Iliamna-Lake Clark drainage
Wolf	(Hunting) Rural residents of Units 6, 9, 10 (Unimak Island only), 11, 12, 12, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, and Chickaloon (Trapping) All rural residents
Wolverine	All rural residents (For both hunting and trapping)

In addition to Federally-qualified subsistence hunters and fishers, residents of the State of Alaska and nonresidents are permitted to hunt and fish in the Preserve under State of Alaska regulations, consistent with authorized methods and means, seasons and bag limits. Sport fishing is also allowed in the Park pursuant to 36 CFR 13.66 (a).

The NPS recognizes that patterns of subsistence use vary temporally and spatially depending on access, proximity to villages and traditional use areas, and the availability wildlife, fish and other renewable natural resources. A subsistence harvest in a given year may vary considerably from previous years because of difficulties accessing subsistence use areas due to increased fuel costs or poor travelling conditions. They are also influenced by factors that affect animal abundance such as weather, migration patterns, changes in habitat and natural population cycles. Chapter 3 of the EA describes the current status of fish and game species in KATM that may be impacted by the proposed alternatives.

SUBSISTENCE USES AND NEEDS EVALUATION

To determine the potential impact on existing subsistence activities, three evaluation criteria were analyzed relative to existing subsistence resources which could be impacted.

The evaluation criteria are:

- the potential to reduce important subsistence fish and wildlife populations by (a) reductions in numbers; (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:

Alternative 1: No Action Alternative
The No Action Alternative would suppress all ignitions, including those of natural origin, and not implement any prescribed fire activities. Reduction of flammable vegetation to reduce fuel loads would be performed around historic and/or archaeological sites and park boundary areas utilizing mechanical means such as chain or cross cut saws.

As discussed in Chapter 4, Alternative 1 would have negligible to moderate, short to long-term adverse effects on fish and wildlife and their habitats. The degree of any reductions or redistributions of fish and wildlife species used for subsistence would depend on the nature and intensity of wildland fire, and the level of human disturbance and habitat modification associated with fire suppression activities and mechanical fuel treatments.

In the long-term, full suppression of all wildfires could adversely alter habitats and available forage for wildlife species important for subsistence by limiting serial stages of succession and changing the diversity of vegetation. Additionally, the potential for catastrophic wildfire would increase due to fuel loading and the elimination of natural fuel breaks. This could result in moderate to severe adverse impacts to wildlife and wildlife habitat that could reduce or redistribute animal populations and affect access to subsistence resources.

Alternative 2:

Alternative 2 would utilize natural ignitions that occur in certain areas and meet predetermined conditions to accomplish resource management goals, including preserving the natural role of fire and reducing fuel loads. Prescribed fires would not be implemented and all human-caused fires would be suppressed. Reduction of flammable vegetation to reduce fuel loads would be performed around historic and/or archaeological sites and park boundary areas utilizing mechanical means such as chain or cross cut saws.

Chapter 4 identifies the overall potential for Alternative 2 to reduce or redistribute populations of fish important for subsistence as negligible to minor and potential impacts to wildlife populations as negligible to moderate; depending on the nature and intensity of wildland fire, and the level of human disturbance and habitat modification associated with fire management activities. The greatest potential for reducing or redistributing populations of fish and wildlife populations comes from catastrophic fires that could alter or destroy critical habitat areas. Alternative 2 would likely benefit wildlife by using naturally occurring wildfires to restore and maintain natural habitat conditions and reduce the likelihood of catastrophic fires.

Alternative 3:

Alternative 3 would allow a combination of prescribed fire and use of wildland fire, as determined by pre-established and incident-specific criteria. Wildland fires that do not pose a threat to life, property, or significant resources would be managed for the accomplishment of resource management goals including preserving the natural role of fire and reducing fuel loads. In certain cases, prescribed fire would be used to reduce hazardous fuel loads in Critical and Full fire management units and where

appropriate to protect life, property and park resources. Suppression would continue in or near developed areas and along KATM boundaries adjoining neighboring administrative units with different fire management objectives. Suppression would also be used to protect fire sensitive cultural and/or archaeological resources and in situations where insufficient resources are available to ensure the effective, long-term management of wildland fire to meet resource management objectives.

As with Alternatives 1 and 2, the potential for Alternative 3 to reduce or redistribute populations of fish and wildlife important for subsistence depends on the nature and intensity of wildland fire, and the level of human disturbance and habitat modification associated with fire management activities. Chapter 4 identifies the potential adverse impacts to fish and aquatic habitats as negligible to minor and the potential impacts to wildlife populations and habitat as negligible to moderate. Alternative 3 would promote the natural role of fire in habitat restoration and maintenance, which may result in long-term beneficial impacts to wildlife and wildlife habitat by maintaining serial stages of vegetation succession.

2) Restriction of Access:

Rights of access for subsistence activities on NPS lands are granted by §811 of ANILCA, however §816 allows temporary closures to subsistence in emergency situations that threaten public safety. Emergency closures necessary for reasons of public safety cannot exceed 60 days and may not be extended without public notice and public hearing. None of the proposed alternatives specifically restrict access of Federally-qualified subsistence users to areas of KATM used for hunting and other authorized subsistence activities, but wildfires that threaten public safety may, on occasion, necessitate temporary closures to restrict subsistence access.

3) Increase in Competition:

No Action Alternative

Alternative 1 would have negligible potential for increasing competition between Federally-qualified subsistence users and other hunters and fishers utilizing fish and wildlife resources in the Preserve.

Provisions of ANILCA and NPS regulations mandate that if and when it is necessary to restrict taking of fish or wildlife on NPS lands, subsistence users will have priority over other user groups. Implementation of this subsistence preference would reduce or eliminate any increased competition that might result from wildfire, prescribed fire, or fire suppression and fuel reduction activities. In addition, the superintendent may enact closures and/or restrictions if necessary to protect subsistence opportunities or to assure the continued viability of a particular fish or wildlife population.

Alternatives 2 and 3

The establishment and implementation of a fire management plan in KATM would not increase competition between Federally-qualified subsistence users and other hunters and fishers utilizing fish and wildlife resources in the Preserve. Subsistence area use maps compiled by the Alaska Department of Fish and Game (Fall et al. 2006; Krieg, et al. 2009; Holen, et al. 2011) indicate little use of the Preserve by communities with positive customary and traditional use determinations for species important for subsistence; making the likelihood of increased competition between Federally-qualified subsistence users and other hunters and fishers negligible.

Provisions of ANILCA and NPS regulations mandate that if and when it is necessary to restrict taking of fish or wildlife on NPS lands, subsistence users will have priority over other user groups.

Implementation of this subsistence preference would reduce or eliminate any increased competition that might result from wildfire, prescribed fire, or fire suppression and fuel reduction activities. In addition, the superintendent may enact closures and/or restrictions if necessary to protect subsistence opportunities or to assure the continued viability of a particular fish or wildlife population.

AVAILABILITY OF OTHER LANDS

The Alagnak Wild River corridor and lands managed by the Bureau of Land Management and U.S. Fish and Wildlife Service share common boundaries with KATM and are the closest Federal public lands to the proposal area where Title VIII subsistence occurs. There are other lands outside the Preserve where local rural residents may harvest subsistence resources under State of Alaska general hunting and fishing regulations including State, tribal and private lands.

ALTERNATIVES CONSIDERED

As noted above, users from communities having C&T for fish and wildlife resources in the Preserve use Preserve lands on a limited basis and generally hunt, fish and trap in areas closer to their homes that can be accessed more easily. The three alternatives described in the EA all pose similar levels of potential adverse impacts to Federally-qualified subsistence users, but the limited use of the Preserve for subsistence activities reduces the overall significance of any impacts.

The potential for adverse impacts to Federally-qualified subsistence users by Alternatives 2 and 3 are somewhat less than those described for the No Action Alternative. The most significant adverse impacts to subsistence resources and uses are those that would result from catastrophic fires. The full suppression of wildfire in Alternative 1 increases the possible intensity and severity of catastrophic fire by changing the diversity of vegetative communities, eliminating natural fuel breaks and creating heavier fuel loads. Alternatives 2 and 3 both include preservation of fire as a natural process and use it as a management tool to maintain naturally functioning ecosystems and reduce the likelihood of catastrophic fire. The use of prescribed fire in Alternative 3 may provide the greatest level of protection from catastrophic fires by allowing managers to proactively reduce fuel loads in targeted areas and maintain natural fire breaks to minimize the severity and intensity of wildfire on park lands.

FINDINGS

Subsistence area use maps compiled by the Alaska Department of Fish and Game show that KATM is not heavily used by Federally-qualified subsistence users with positive C&T findings to hunt and fish in the Preserve. This analysis concludes that establishing and implementing a fire management plan in KATM as outlined in Alternatives 2 and 3 has the potential to result in greater positive impacts to fish and wildlife than those likely to occur under the No Action Alternative. Furthermore, utilizing a combination of prescribed and wildland fire as proposed in Alternative 3provides more management opportunities and flexibility to promote the natural role of wildfire in restoring and maintaining habitat for critical subsistence species such as moose and caribou.

This analysis concludes that the proposed action outlined in Alternative 3 has the potential to result in more beneficial impacts to fish and wildlife species important for subsistence than Alternatives 1 and 2 and will not result in a significant restriction of subsistence uses.