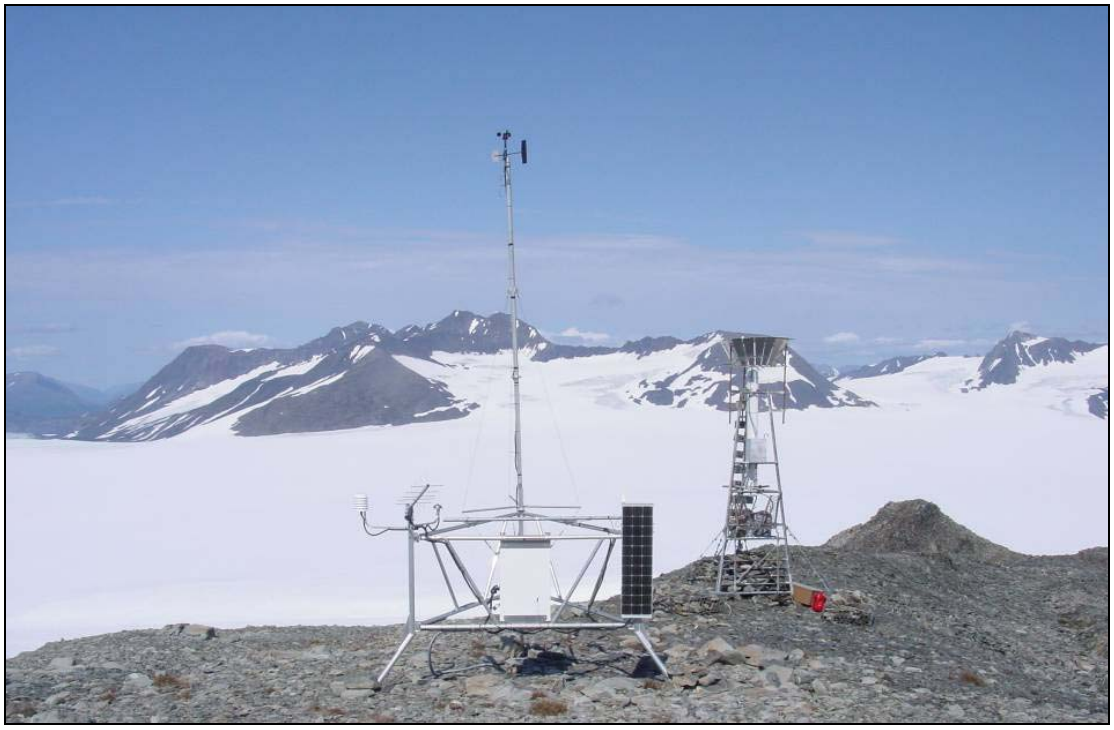
National Park Service
U.S. Department of the Interior

Southwest Alaska Network
Alaska

Climate Monitoring Program in Katmai National Park and Preserve, Kenai Fjords National Park, and Lake Clark National Park and Preserve

Environmental Assessment
February 2008



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ACRONYMS AND ABBREVIATIONS

ANILCA	Alaska National Interest Lands Conservation Act
ARPA	Archeological Resources Protection Act
AVO	Alaska Volcano Observatory
CEQ	Council on Environmental Quality
CGPS	Continuous Global Positioning System
CFR	Code of Federal Regulations
COOP	Cooperative Observer Program
CWOP	Citizen Weather Observer Program
CUA	Commercial Use Authorizations
DO	NPS Director's Order
EA	Environmental Assessment
FAA	Federal Aviation Administration
FTS	Forest Technology Weather System
GMP	General Management Plan
GOES	Geostationary Satellite Server
KATM	Katmai National Park and Preserve
KEFJ	Kenai Fjords National Park
LACL	Lake Clark National Park and Preserve
NEPA	National Environmental Policy Act
NPS	National Park Service
NHPA	National Historic Preservation Act
NRCS-SC	Natural Resource Conservation Service - Snowcourse Network
NSF	National Science Foundation
NWS	National Weather Service
PBO	Plate Boundary Observatory
PRISM	Parameter-elevation Regressions on Independent Slopes Model
RAWS	Remote Automated Weather Station
SAO	Surface Airways Observation network
SCAN	Soil Climate Analysis Network
SNOTEL	Snowfall Telemetry network
SOD	Summary of the Day
SWAN	Southwest Alaska Network
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United Stated Geologic Survey
WRCC	Western Regional Climate Center

CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.1 PURPOSE OF ACTION

The National Park Service (NPS) is considering expansion of the remote automated weather station (RAWS) network in three of the Southwest Alaska Network (SWAN) Parks: Katmai National Park and Preserve (KATM), Kenai Fjords National Park (KEFJ), and Lake Clark National Park and Preserve (LACL) (Figure 1-1). The proposed action would expand the RAWS program by establishing additional stations to collect basic climatological data including air and soil temperature, precipitation, relative humidity, wind speed and direction, solar radiation, and snow depth.

Climate, by determining the temperature and precipitation regimes for any ecosystem, is widely recognized as one of the most fundamental drivers of ecological condition. The physical characteristics of a region provide a foundation that defines fundamental parameters of that ecosystem. Changes in the physical environment, caused either by climate change or normal physical processes, can have significant impacts on the entire ecosystem. In order to properly monitor an ecosystem, the changes in the physical environment must be properly monitored and documented (Sousanes, 2006). In general, Alaska has a sparse dispersion of climate monitoring sites (Simpson et al., 2002). There are a few permanent long-term climate monitoring sites in the SWAN region, though most of them are biased towards low elevation areas of human habitation bordering the parks. There are large regions within SWAN parks with no climate monitoring stations at all.

New permanent RAWS would be established at as many as six locations in KATM, three locations in KEFJ, and four locations in LACL. These unmanned stations, consisting of a battery-powered weather instrumentation unit and separate snowfall measuring unit, would become part of the SWAN climate monitoring system providing baseline weather information and supporting climate trend analysis. The SWAN network consists of Katmai National Park and Preserve, Kenai Fjords National Park, Lake Clark National Park and Preserve, Aniakchak National Monument and Preserve, and Alagnak Wild River.

1.2 NEED FOR ACTION

The National Parks Omnibus Management Act, passed by Congress in 1998, directs the NPS "to establish baseline [resource] information and to provide information on the long-term trends in the condition of National Park System resources." The NPS established the Inventory and Monitoring Program to determine the status and trends in the condition of resources in 270 park units nation-wide. Thirty-two Inventory and Monitoring Networks were established to identify and monitor a set of Vital Signs to represent the overall health or condition of park resources specific to each network. Climate is a fundamental driver of ecological condition and the patterns of plant and animal communities found in NPS park units. Changes in climate will impact these ecosystems. Climate Monitoring has been identified as a Vital Sign for the SWAN.

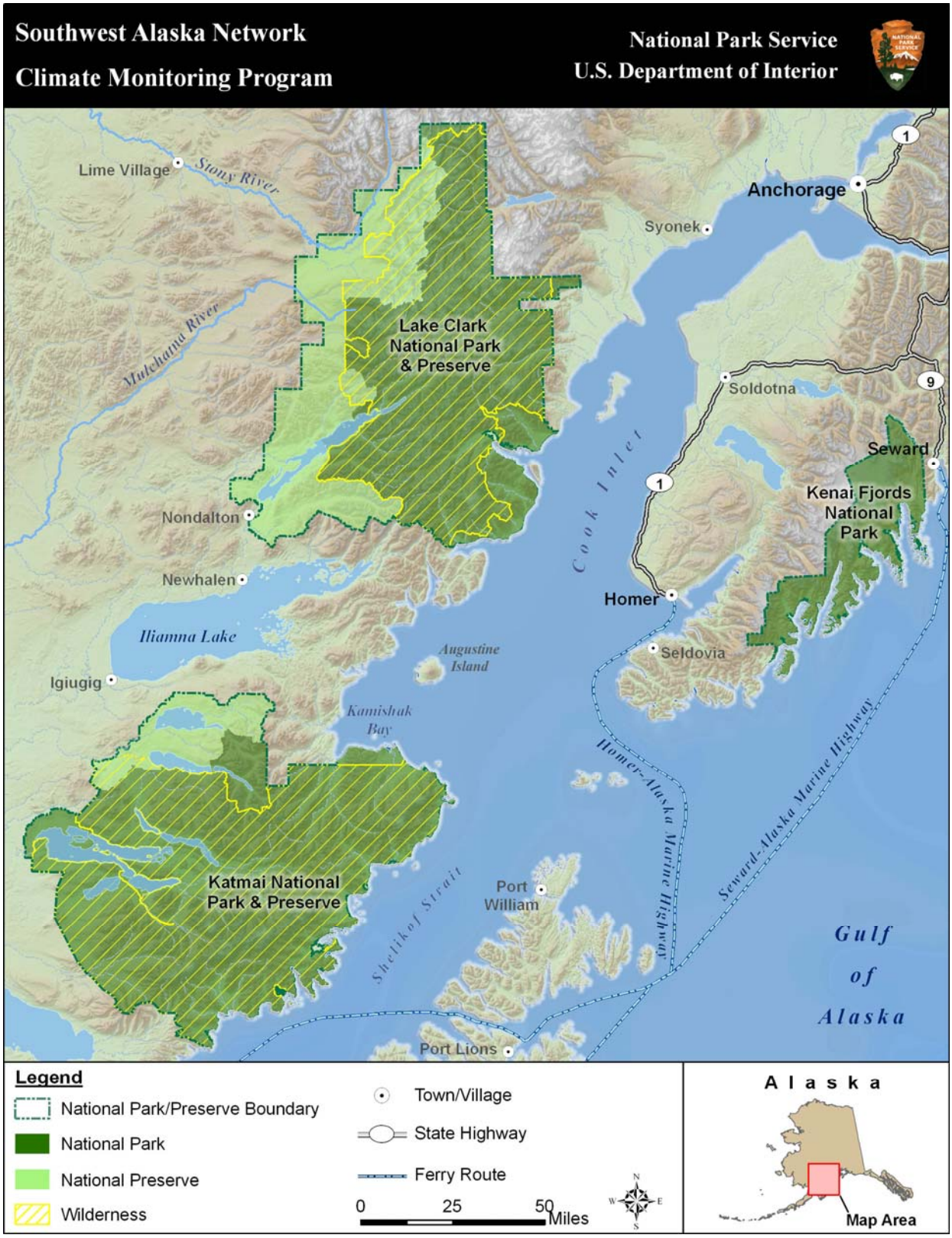

Figure 1-1. Vicinity map of the Southwest Alaska Network parks where weather stations are being proposed.

Deployment of permanent weather stations within the SWAN parks would allow the NPS to achieve the goal of the Climate Monitoring vital sign and track climate change and how these changes affect park resources. This information would contribute resource data for park management decisions and would also contribute to future efforts in broader-scale climate monitoring and modeling efforts.

The monitoring program has the opportunity to advance understanding of the ecosystems that encompass the network of parks. This understanding would come in the form of the monitoring data that would be collected, analyzed, interpreted, and reported. Further, the NPS recognizes that while scientific work has been conducted in each of the network parks, this information needs to be incorporated with NPS monitoring efforts to improve its understanding of the holistic functioning of ecosystems within the network. An understanding of ecosystem function is important because it will allow NPS to fulfill the legislative mandate to manage parks in a manner that leaves them unimpaired for the enjoyment of future generations. At the most basic level, the NPS cannot evaluate appropriate ecosystem function when bounds of natural variability are not known because it is not possible to identify when conditions are outside an expected range of variation. Similarly, in this situation, reliable identification of resource trends is also difficult (MacCluskie and Oakley, 2002).

One objective of the SWAN program is to monitor and record weather conditions at representative locations in order to identify long and short-term trends, provide reliable climate data to other researchers, and to participate in larger scale climate monitoring and modeling efforts. To better understand climate variation as well as possible long-term changes in ecosystems of the SWAN, new long-term weather stations are proposed for installation throughout the three parks in the coming years. Currently, no remote automated weather stations (RAWS) exist in KATM, two exist in LACL (one north of Telaquana and one in Port Alsworth), and one exists at KEFJ.

This environmental assessment (EA) analyzes the potential environmental impacts which could result from the proposed action and the No Action alternative. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, regulations of the Council of Environmental Quality (CEQ) (40 Code of Federal Regulations 1508.9), and the NPS NEPA compliance guidance handbook (Director's Order (DO)-12, *Conservation Planning, Environmental Impact Analysis, and Decision-making*).

1.3 PURPOSE AND SIGNIFICANCE OF THE PARKS

1.3.1 Katmai National Park and Preserve

Purpose: KATM was originally established as a national monument on September 24, 1918 by Presidential Proclamation No. 1487, 40 Stat. 185 to preserve the living laboratory of the 1912 volcanic eruption of Novarupta in the Valley of Ten Thousand Smokes (NPS, 2004a). The monument went through several enlargements in 1931, 1936, 1942, and 1969. The purposes of those enlargements were to preserve habitat for the protection of brown bears, moose and other wild animals; protect items of scientific and historical interest; protect islands off the Katmai Coast, and include all of Naknek Lake for protection of ecological and aquatic resources. Section

202(2)(a) of the Alaska National Interest Lands Conservation Act (ANILCA) of 1980 added land and redesignated the area as a national park and preserve. The purpose of the ANILCA expansion, in addition to the purposes of the previous appropriations, was protection of water habitats for salmon populations, and to protect scenic, geological, cultural, and recreational features.

Significance: KATM protects approximately 4 million acres of public land, which contains unique volcanic resources, lakes and streams, a coastline, and important wildlife species and habitat to be managed in a natural state.

KATM protects and preserves the region of the world's second most powerful volcanic eruption including the resulting Valley of the Ten Thousand Smokes.

KATM is inhabited by the largest protected population of brown bears in North American in habitat deemed critical for the brown bear's survival on the Alaska Peninsula.

KATM's lakes and streams support outstanding fisheries resources, in both abundance and diversity; these are considered the primary driving force of the Katmai ecosystem.

KATM contains approximately 3.38 million acres of designated wilderness for management under the provisions of the Wilderness Act of 1964 and in accordance to applicable ANILCA provisions.

Significant prehistoric and historic sites are located in KATM. ANILCA authorized subsistence used in KATM.

1.3.2 Kenai Fjords National Park

Purpose: KEFJ was first designated as a National Monument in 1978. It became a National Park on December 2, 1980 when Congress passed the ANILCA, Public Law 96-487. This enabling legislation states that KEFJ shall be managed for the following purpose:

> To maintain unimpaired the scenic and environmental integrity of the Harding Icefield, its out-flowing glaciers, and coastal fjords and islands in their natural state; and to protect seals, sea lions, other marine mammals, marine and other birds and to maintain their hauling and breeding areas in their natural state, and free of human activity which is disruptive to their natural processes. In a manner consistent with the foregoing, the Secretary is authorized to develop access to the Harding Icefield and to allow use of mechanized equipment on the icefield for recreation (NPS, 2004b).

Significance: KEFJ preserves unimpaired an active icefield / fjord ecosystem containing an abundance of terrestrial and marine wildlife.

KEFJ protects a dynamic landscape where visitors can experience up close glacial and biological change in a human timeframe.

KEFJ contains rugged scenery created by a combination of the only subsiding coastal mountain range in the United States and the raw weather of the north Pacific.

Relatively easy access to Kenai Fjords' varied resources makes them especially valuable for education, research, aesthetic, and recreational purposes.

1.3.3 Lake Clark National Park and Preserve

Purpose: Section 201(7)(a) of ANILCA provided for the establishment of LACL as follows:

> LACL, containing approximately two million four hundred thirty-nine thousand acres of public lands and Lake Clark National Preserve, containing approximately one million two hundred and fourteen thousand acres of public lands… The park and preserve shall be managed for the following purposes, among others: To protect the watershed necessary for perpetuation of the red salmon fishery in Bristol Bay; to maintain unimpaired the scenic beauty and quality of portions of the Alaska Range and the Aleutian Range, including active volcanoes, glaciers, wild rivers, lakes, waterfalls, and alpine meadows in their natural state; and to protect habitat for and populations of fish and wildlife including but not limited to caribou, Dall sheep, brown/grizzly bears, bald eagles, and peregrine falcons (NPS, 2004c).

Significance: LACL protects approximately 4 million acres of undisturbed public land representing a microcosm of Alaska ecological resources characterized by rugged mountain peaks and spires, glaciers, a coast, deep valleys and lakes, high tundra, wild rivers, and a wide cross-section of flora and fauna.

LACL contains two majestic and active volcanoes; Mt. Iliamna and Mt. Redoubt; rising above 10,000 feet from a coastal plain and listed on the National Register of Natural Landmarks.

LACL contains approximately 2.62 million acres of designated wilderness for management under the provisions of the Wilderness Act of 1964 (PL 88-577) and in accordance to applicable ANILCA provisions.

LACL contains portions of three designated Wild and Scenic Rivers (Chilikadrotna, Mulchatna, and Tlikakila) to be managed in their entirety free of impoundments and diversions, inaccessible by road, with their shorelines primitive and their waters unpolluted.

LACL contains the upper reaches of the Kvichak River system; the world's most productive spawning and rearing habitat for sockeye salmon which contributes approximately 50 percent of the sockeye salmon caught in Bristol Bay, 33 percent of the entire U.S. catch, and 16 percent of the total world catch.

Significant prehistoric and historic sites are scattered across widely diverse settings within LACL. ANILCA authorizes subsistence used in LACL.

1.4 LAWS, REGULATIONS, AND POLICIES

The following laws and associated regulations provided guidance for the development of this EA, design of the Preferred Alternative, analysis of impacts, and creation of mitigation measures to be implemented as part of the preferred alternative.

NPS Organic Act

The NPS Organic Act (1916) and the General Authorities Act (1970) prohibit impairment of park resources and values. The NPS 2006 Management Policies and Director's Order #55 use the terms "resources and values" to mean the full spectrum of tangible and intangible attributes for which the park was established and is 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 to enjoy them.

The evaluation of whether impacts of a preferred alternative would lead to an impairment of park resources and values is included in this EA. 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;
- essential 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 (GMP) or other relevant NPS planning documents.

NPS Omnibus Management Act

The NPS 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 units. Section 202 authorizes and directs the Secretary of the Interior to assure management of NPS units is enhanced 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.

NPS Management Policies

NPS Management Policies 2006 (NPS, 2006a) addresses the importance of and need for weather and climate monitoring efforts in a number of sections:

Section 4.7.2 *Weather and Climate* "parks containing significant natural resources will gather and maintain baseline climatological data for perpetual reference".

Section 4.2 *Studies and collections* "The Service will encourage appropriately reviewed natural resource studies whenever such studies are consistent with applicable laws and policies. These studies support the NPS mission by providing the Service, the scientific community, and the public with an understanding of park resources, processes, values, and uses that will be cumulative and constantly refined… Studies include projects conducted by researchers and scholars in universities, foundations and other institutions, tribal colleges and organizations, other federal and state agencies, and Service staff".

Section 2.3.1.5 *Science and Scholarship* "The collection and analysis of information about park resources will be a continuous process that will help ensure that decisions are consistent with park purposes."

Section 6.3.6 *Scientific Activities in Wilderness* "The statutory purposes of wilderness include scientific activities, and these activities are encouraged and permitted when consistent with the Service's responsibilities to preserve and manage wilderness".

Section 6.3.6.1 *General Policy* "The National Park Service has a responsibility to support the appropriate scientific activities in wilderness and to use science to improve wilderness management. The Service recognizes that wilderness can and should serve as an important resource for long-term research into, and study, and observation of, ecological processes and the impacts of humans on these ecosystems. The National Park Service further recognizes that appropriate scientific activities may be critical to the long- term preservation of wilderness".

"Scientific activities are to be encouraged in wilderness. Even those scientific activities (including inventory, monitoring, and research) that involve a potential impact to wilderness resources or values (including access, ground disturbance, use of equipment, and animal welfare) should be allowed when the benefits of what can be learned outweigh the impacts on wilderness resources or values. However, all such activities must also be evaluated using the minimum requirement concept and include documented compliance that assesses impacts against benefits to wilderness. This process should ensure that the activity is appropriate and utilizes the minimum tool required to accomplish project objectives".

Wilderness Act of 1964

The Wilderness Act of 1964 (Public Law 88-577, 16 USC §§ 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 B.

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

Pursuant to ANILCA the Department of the Interior issued special access regulations at 43 CFR Part 36. Helicopter use is addressed in 43 CFR 36.11(f)(4):

> The use of a helicopter in any area, other than at designated landing areas or pursuant to the terms and conditions of a permit issued by the appropriate Federal agency, or pursuant to a memorandum of understanding between the appropriate Federal agency and another party, or involved in emergency or search and rescue operations is prohibited.

1.5 PREVIOUS PLANNING FOR THE CLIMATE MONITORING PROGRAM

Existing Climate and Weather Networks

A network of climate monitoring sites currently exists in and around all three SWAN parks. Most stations are associated with at least one of seven major weather and climate networks. This network consists of (NPS, 2007a):

- National Weather Service (NWS) Cooperative Observer Program (COOP): The COOP network has been a foundation of the U.S. climate program for decades and continues to play an important role. Manual measurements are made by volunteers and consist of daily maximum and minimum temperatures, observation-time temperature, daily precipitation, daily snowfall, and snow depth. When blended with NWS measurements, the data set is known as SOD, or "Summary of the Day." The quality of data from COOP sites ranges from excellent to modest.

- Citizen Weather Observer Program (CWOP): The CWOP network consists primarily of automated weather stations operated by private citizens who have either an Internet connection and/or a wireless Ham radio setup. Data from CWOP stations are specifically intended for use in research, education, and homeland security activities. Although standard meteorological elements such as temperature, precipitation, and wind are measured at all CWOP stations, station characteristics do vary, including sensor types and site exposure.

- USDA/NRCS Snowcourse Network (NRCS-SC): The USDA/NRCS maintains a network of snow-monitoring stations in addition to SNOTEL (described below). These sites are known as snowcourses. These are all manual sites, measuring only snow depth and snow water content one–two times per month during the months of January to May. Data records for these snowcourses often extend back to the 1920s or 1930s, and the data are generally of high quality. Many of these sites have been replaced by SNOTEL sites, but several hundred snowcourses are still in operation, nationwide.

- Remote Automated Weather Station (RAWS) Network: The RAWS network is administered through many land management agencies, particularly the BLM and the Forest Service. Hourly meteorology elements are measured and include temperature, wind, humidity, solar radiation, barometric pressure, fuel temperature, snow depth, and precipitation (when

temperatures are above freezing). The fire community is the primary client for RAWS data. These sites are remote and data typically are transmitted via GOES (Geostationary Operational Environmental Satellite). Some sites operate all winter. Most data records for RAWS sites began during or after the mid-1980s.

- NWS Surface Airways Observation Network (SAO): These stations are located usually at major airports and military bases. Almost all SAO sites are automated. The hourly data measured at these sites include temperature, precipitation, humidity, wind, barometric pressure, sky cover, ceiling, visibility, and current weather. Most data records begin during or after the 1940s, and these data are generally of high quality.

- NOAA Buoy and C-Man Programs: National Oceanic and Atmospheric Administration (NOAA) National Data Buoy Center (NDBC), a part of the National Weather Service (NWS). NDBC designs, develops, operates, and maintains a network of data collecting buoys and coastal stations. Moored buoys measure and transmit barometric pressure; wind direction, speed, and gust; air and sea temperature; and wave energy data. C-MAN stations have been installed on lighthouses, at capes and beaches, on near shore islands, and on offshore platforms. C-MAN station data typically include barometric pressure, wind direction, speed and gust, and air temperature; however, some C-MAN stations are designed to also measure sea water temperature, water level, waves, relative humidity, precipitation, and visibility.

- USDA/NRCS Snowfall Telemetry (SNOTEL) Network: The USDA/NRCS maintains a network of automated snow-monitoring stations known as SNOTEL. The network was implemented originally to measure daily precipitation and snow water content. Many modern SNOTEL sites now record hourly data, with some sites now recording temperature and snow depth. Most data records began during or after the mid-1970s.

In addition to these major networks, there are a variety of stations run for specific purposes by specific organizations, government agencies, or scientific research projects (e.g., USGS, NSF, university, tribal, community, air quality, etc). Sometimes these are readily accessible, and other times the data are very difficult to obtain, either in near-real-time or in delayed-access mode. Collectively, information from all of these networks may be suitable for obtaining a better picture of the weather at any one time. However, this may have little relationship to their ability to serve as useful climate stations. The main needs for climate stations are consistency in time of station exposure, observational methodology, and instrument type and configuration.

The major weather and climate networks in the SWAN have at most several stations at or inside each park unit (Figure 1-2). Most of these are operated by the NWS, NPS, and the FAA. A station does not have to be within the boundaries of a park to provide useful data and information regarding the park unit in question. Some may be physically *within* the administrative or political boundaries, whereas others may be just outside, or even some distance away, but would be *nearby* in terms of behavior and representativeness.

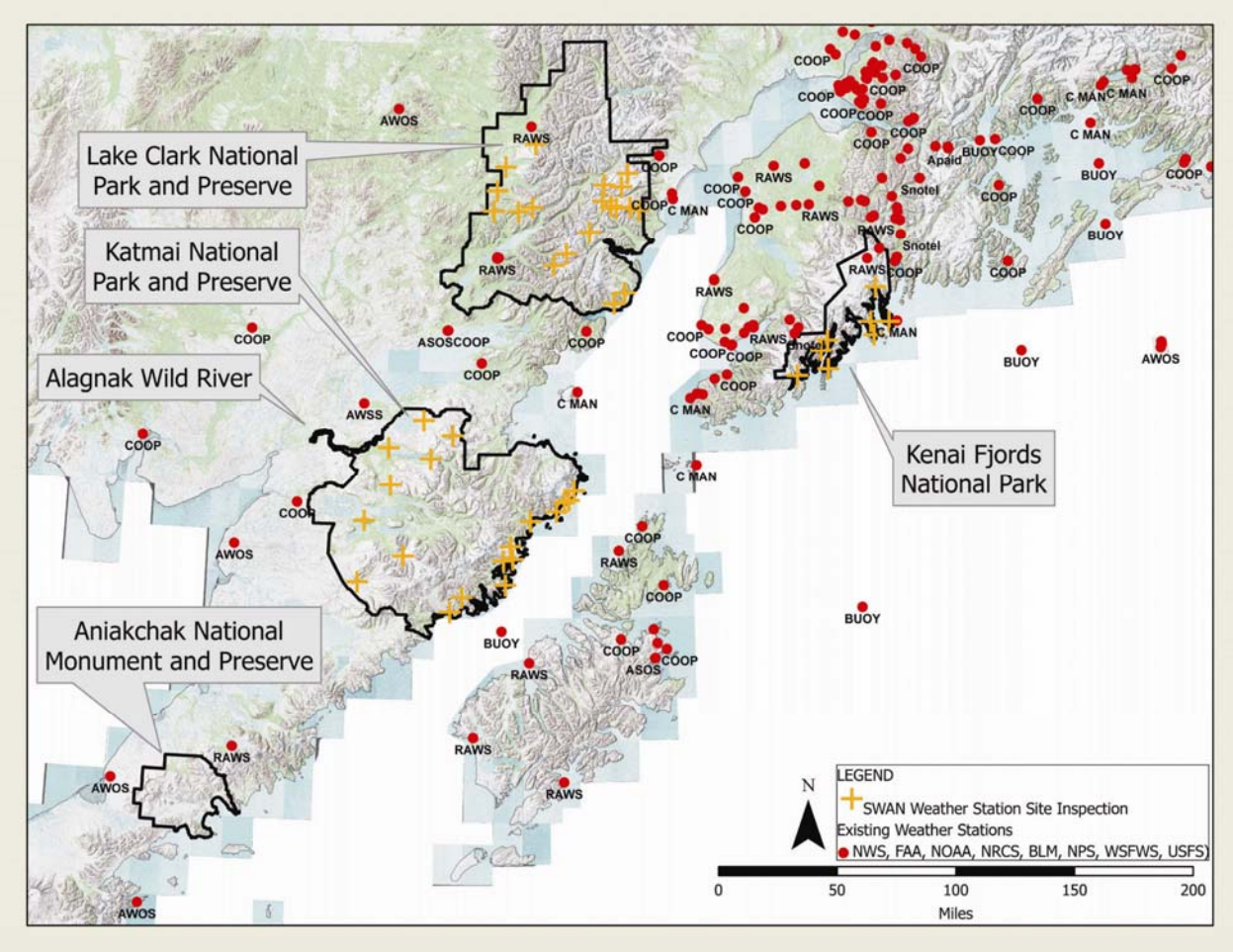

Figure 1-2. Location of existing weather stations in relation to the location of potential climate monitoring sites, Southwest Alaska Inventory and Monitoring Network.

Criteria for Selection of Potential Weather Station Sites in the SWAN Network

Initially, the Western Regional Climate Center (WRCC) was contracted by the SWAN in 2004 in an effort to identify potential weather station deployment areas across the SWAN parks which would help to fill in climate monitoring gaps existing in the current network of operating weather stations across the SWAN region. WRCC prepared a report (Redmond et al., 2005) characterizing climate in the SWAN region, reviewed the existing network of operating weather stations in southwest Alaska and identified potential areas within the SWAN parks which would fill in gaps in the ability of the currently operating network of weather stations to monitor climate and climate change in the SWAN parks (Giffen, 2007).

Potential weather station deployments sites were identified in 2006 across the SWAN parks (Figure 1-2). This effort to identify potential climate monitoring sites was multifaceted utilizing multiple datasets including: landscapes, ecoregions, vegetation patterns, temperature and

precipitation models (PRISM), land management units (wilderness), access, visitor use, and topography were some of the factors considered. Numerous professionals from various organizations in the State participated in the effort to identify potential sites, including: park personnel, National Weather Service, Natural Resource Conservation Service, the WRCC (Redmond et al., 2005 and Davey et al., 2007), and the University of Alaska-State Climatologist.

Several criteria were used in identifying potential sites:1) sites with regional exposure while minimizing local influences, 2) sites dispersed throughout the varied ecoregions of the SWAN, 3) sites at higher elevation sites as compared to the existing weather station network, 4) sites which aren't too challenging to access (critical for the long-term success of climate monitoring) (Giffen, 2007). Ease of access could be the single most important factor in creating a valuable dataset. Fixed-wing aircraft and boats are the preferred means to access weather station sites. Helicopters would be the least desirable form of transportation, due to high cost, and are used only when no other form of transportation is feasible.

On-the-ground site surveys and over-flights were conducted in KATM, KEFJ and LACL in 2006 and 2007 by appropriate NPS staff.

Climate Monitoring Site Review and Priority Ranking Process

The NPS-SWAN invited Alaskan weather and climate professionals to review and prioritize the potential weather station deployment sites in support of the SWAN climate monitoring effort. This review was conducted in a couple of phases. Initially, in preparation for face-to-face meetings, information characterizing each potential site was disseminated to the panel of experts to give these folks the opportunity to become familiar with the sites. A meeting was then held to discuss the pros and cons of each site amongst the group. The potential climate monitoring sites were priority ranked by the experts with the SWAN climate monitoring objectives used for guidance.

It is worth noting that a simple but common point of agreement between panel members was ease of site access. A dataset with longevity is valuable. If a site is difficult and expensive to access, the potential for maintaining such a site for decades into the future is not realistic.

In addition to descriptions, maps and photographs of each site, data used in the site ranking process included ecoregion maps, temperature and precipitation models, topography, land status, and maps showing existing weather stations in the SWAN region. Table 2-1 and Figure 1-3 identify the top ranked sites in KATM, KEFJ and LACL.

Sites that didn't rank high in the ranking process were in areas that did not have good regional exposure as compared to other sites, thus weather observations would likely be influenced by local topographic conditions. Other sites may have proved too challenging to maintain due to available access. A site in KATM was removed from consideration due to high bear activity (Swikshak in KATM). One site, located in KEFJ (Yalik), is located on native-selected lands, so surface ownership/management of this land into the future is unsure.

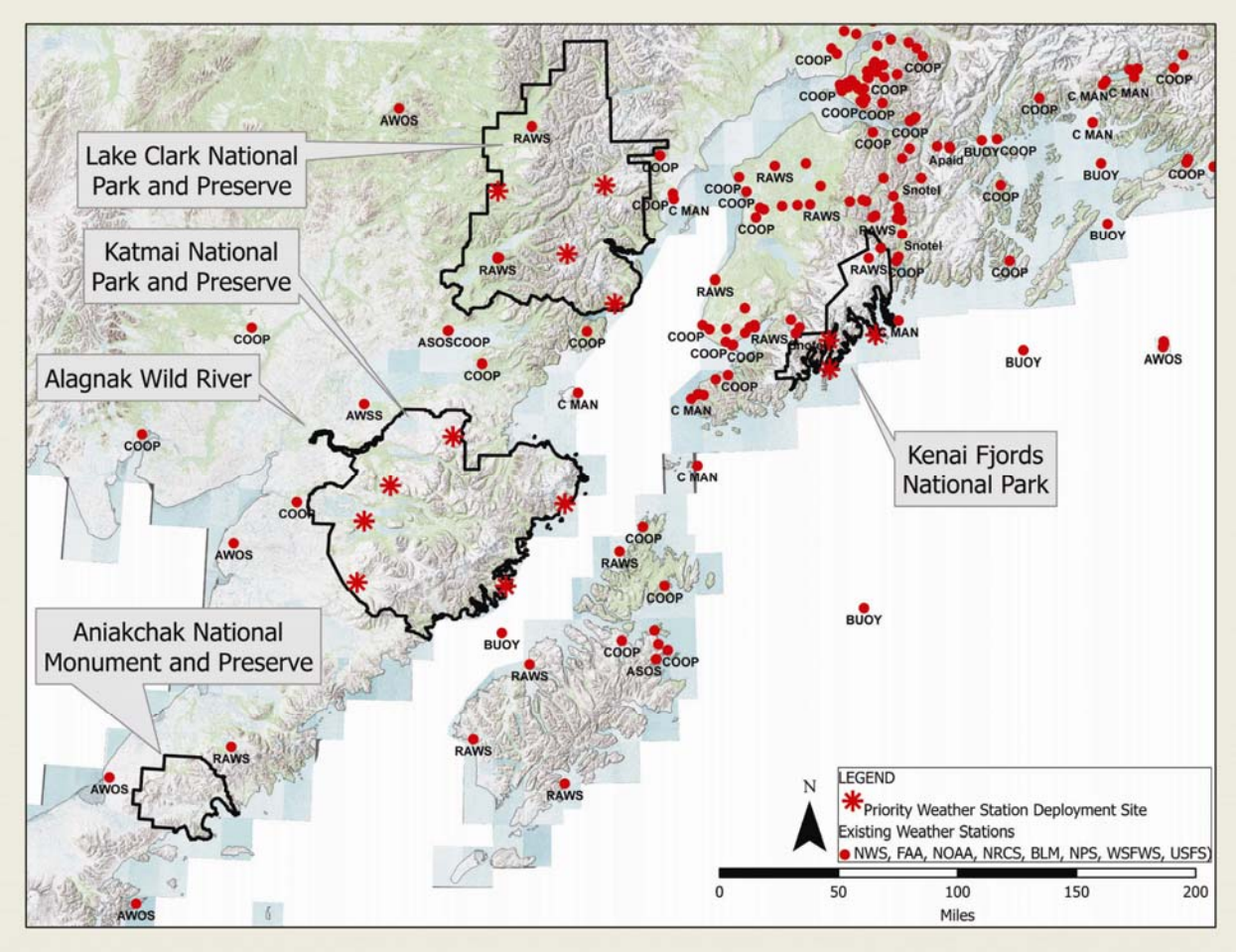

Figure 1-3. Location of priority weather station/climate monitoring sites, Southwest Alaska Inventory and Monitoring Network.

Katmai National Park and Preserve

Initially, 17 potential weather station sites were identified within the park and preserve: 10 coastal sites, two mountain sites and five lower elevation sites (Giffen, 2007). The coast sites would characterize the maritime conditions along the Pacific Coast. Though no high mountain sites were identified due to ease-of access concerns, the lower mountain sites west of the higher mountains would characterize moderate elevation conditions in the continental-maritime climate zone. The low elevation sites in the western portion of the park would characterize low elevation conditions in the continental-maritime climate zone. Six high priority sites were identified in KATM (Coville, Pfaff Mine, Contact Creek, Dumpling Mtn., Cape Gull, and Dark South).

Kenai Fjords National Park

Initially, seven potential weather station sites were identified within the park: six sites were identified along the coast and one in the mountains (Giffen, 2007). The sites would characterize

the maritime conditions along the northern Gulf of Alaska coast, both at low and high elevations. The sites also have the potential to capture down-fjord gradients, which could potentially capture increased precipitation at stations located distal from the outer coast and further into the fjords. Three high priority sites were identified in KEFJ (McArthur Pass, Dinglestadt, Fire Cove).

Lake Clark National Park and Preserve

Initially 19 potential weather station sites were identified within the park and preserve: 2 coastal sites, 11 mountain sites and 6 lower elevation sites (Giffen, 2007). The coastal sites would characterize the maritime conditions along the Pacific Coast (Cook Inlet). High mountain sites would characterize higher elevation conditions of the northern Aleutian Range. No high elevation sites were identified in the southern Alaska Range due to the intense rugged nature of the area and thus lack of accessible terrain. The lower elevation sites in the western portion of the park would fill a data-gap between currently operating weather stations in the western portion of the park and would characterize lower elevation conditions in the continental climate zones. Four high priority sites were identified in LACL (Chigmit Mountains, Chigmit Mountains North, Hickerson Lake, and Snipe Lake).

1.6 ISSUES AND IMPACT TOPICS

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

1.6.1 Issues Selected for Detailed Analysis

Vegetation
Vegetation could be trampled during installation and maintenance of the weather stations. Small areas of vegetation may require clearing beneath and around new weather stations. The footprint could have an impact on vegetation.

The potential exists for invasive species to become transported to weather station sites on equipment, clothing and footwear.

Wildlife
Installation and maintenance of the weather stations could temporarily displace wildlife in the immediate vicinity. Some wildlife habitat could be impacted at the new weather station sites.

Visual Quality
The weather stations may be visible, thus posing an unnatural visual intrusion in pristine environments. Intrusions could include the actual visibility of the tower or glare reflected off the equipment.

Soundscape
Noise intrusions would occur during installation and maintenance of the weather stations due to presence of field crews, boats, and the aircraft used for site access. These noise intrusions could disrupt natural sounds in the parks.

Visitor Experience
Encountering a weather station in the parks could have a detrimental effect on the visitor's recreational experience. Visitors may see the new weather station sites as intrusions on the scenic integrity of the backcountry and designated wilderness areas. None of the proposed RAWS are in locations directly accessible by road vehicles or easily visible from popular frontcountry visitor destinations.

Wilderness
Wilderness values throughout KATM, LACL, and KEFJ could be affected by the long-term installations within designated and eligible wilderness that would remain for decades at a minimum. In addition wilderness character could be affected by sights and sounds of aircraft and boats transporting equipment to the sites for installation and maintenance of weather station equipment in these areas.

Cultural Resources
Unknown cultural resources may be affected by the project. Although three of the new RAWS would be co-located with existing facilities, the majority of the stations would be installed on previously undisturbed sites.

1.6.2 Impact Topics Dismissed from Further Analysis

Executive Order 12898, "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.

Soils
Small holes would be excavated during the installation of each new weather station. Although many weather station sites were selected so that the weather towers could be installed on bedrock, small areas of soil, where it exists, may be compacted by the installation activities. This compaction, if any, would be minimal.

Floodplains and Wetlands
Proposed sites are not located in or adjacent to any floodplains, wetlands or riparian area**.**

Threatened and Endangered Species
In compliance with the Endangered Species Act, the NPS conducted an informal Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS). Steller's eiders (threatened)

infrequently occupy marine waters in the vicinity of KEFJ during winter and occur in relatively high densities in Kamishak Bay (bordering KATM) in fall and winter. Weather station sites are for the most part outside Stellar's eider winter migration routes and would not be affected by station installation and maintenance activities. Kittlitz's murrelets (candidate species) nest in unvegetated scree fields, coastal cliffs, on barren ground, rock ledges, and talas above timberline in coastal mountains. Nests have been confirmed in KEFJ and KATM. However, sites proposed for weather station installation are vegetated and unsuitable for nesting murrelets.

The USFWS concluded that the project is not likely to adversely affect Steller's eiders or Kittlitz's murrelets. USFWS recommended that if weather station installation and maintenance activities occur in areas of suitable nesting habitat for Kittlitz's murrelets, they be conducted after August 20 to avoid disturbance to nesting and chick-rearing murrelets.

Subsistence
Effects on subsistence uses and resources are addressed in detail in the ANILCA Section 810 Evaluation (see Appendix A).

1.7 PERMITS AND APPROVALS NEEDED TO IMPLEMENT PROJECT

Wilderness: a minimum requirement/minimum tool analysis has been conducted for new proposed weather stations located in designated or eligible wilderness at KATM, KEFJ, and LACL. Results for this analysis are included in this EA (Appendix B).

CHAPTER 2: ALTERNATIVES

The Council on Environmental Quality (CEQ) regulations for implementing NEPA requires that Federal agencies explore and objectively evaluate all reasonable alternatives to the Preferred Alternative and briefly discuss the rationale for eliminating any alternatives that were not considered in detail. This chapter describes the No Action Alternative and the Preferred Alternative; there were no alternatives that were considered and eliminated from further analysis.

2.1 ALTERNATIVE A: NO ACTION

Under the No Action alternative, no additional weather stations would be established in Katmai National Park and Preserve, Kenai Fjords National Park, or Lake Clark National Park and Preserve.

2.2 ALTERNATIVE B: EXPAND THE CLIMATE MONITORING PROGRAM IN KATM, KEFJ AND LACL (NPS PREFERRED ALTERNATIVE)

In support of the Southwest Alaska Inventory and Monitoring Program, the National Park Service would establish permanent remote automated weather stations in Katmai National Park and Preserve (six sites, Figure 2-1), Kenai Fjords National Park (three sites, Figure 2-2), and Lake Clark National Park and Preserve (four sites, Figure 2-3). Table 2-1 identifies the individual RAWS sites and provides information as to elevation, location, access, land status, and site preparation. Deployment of these stations is anticipated for 2008 and 2009.

The weather stations would collect basic weather observations including air temperature, precipitation, relative humidity, wind speed and direction, solar radiation and snow depth and transmit these observations hourly via satellite. These observations would be posted to the Western Regional Climate Center's (WRCC) web site in near real-time (http://www.wrcc.dri.edu/NPS.html)

Each weather station would be composed of two towers: the tri-leg tower hosting all the sensors except the precipitation gage, and the precipitation tower.

The tri-leg tower would house the temperature, relative humidity, solar radiation, wind speed and direction, and snow depth sensors, a GPS antenna, and a GOES satellite transmission antenna (Photo 2-1). A steel equipment enclosure located near the base of the structure houses the electronic equipment cabinet such as the datalogger, geostationary satellite transmitter (GOES) and batteries. The batteries are sealed, starved electrolyte-type SUNlyte™ 12-5000x batteries. The wind speed and direction sensors are located on the top of the 20 foot tall mast mounted to the north leg of the tri-leg tower. The footprint of the tri-leg is approximately 12 feet per side. A 48"x13" solar panel would also be attached to the south side of the structure. The tower is typically anchored to the ground with 3-foot long steel pins, though in some cases gabions may

Figure 2-1. Alternative B: Expand Park Climate Monitoring Program – proposed weather stations at Katmai National Park and Preserve. Existing stations and facilities are also shown.

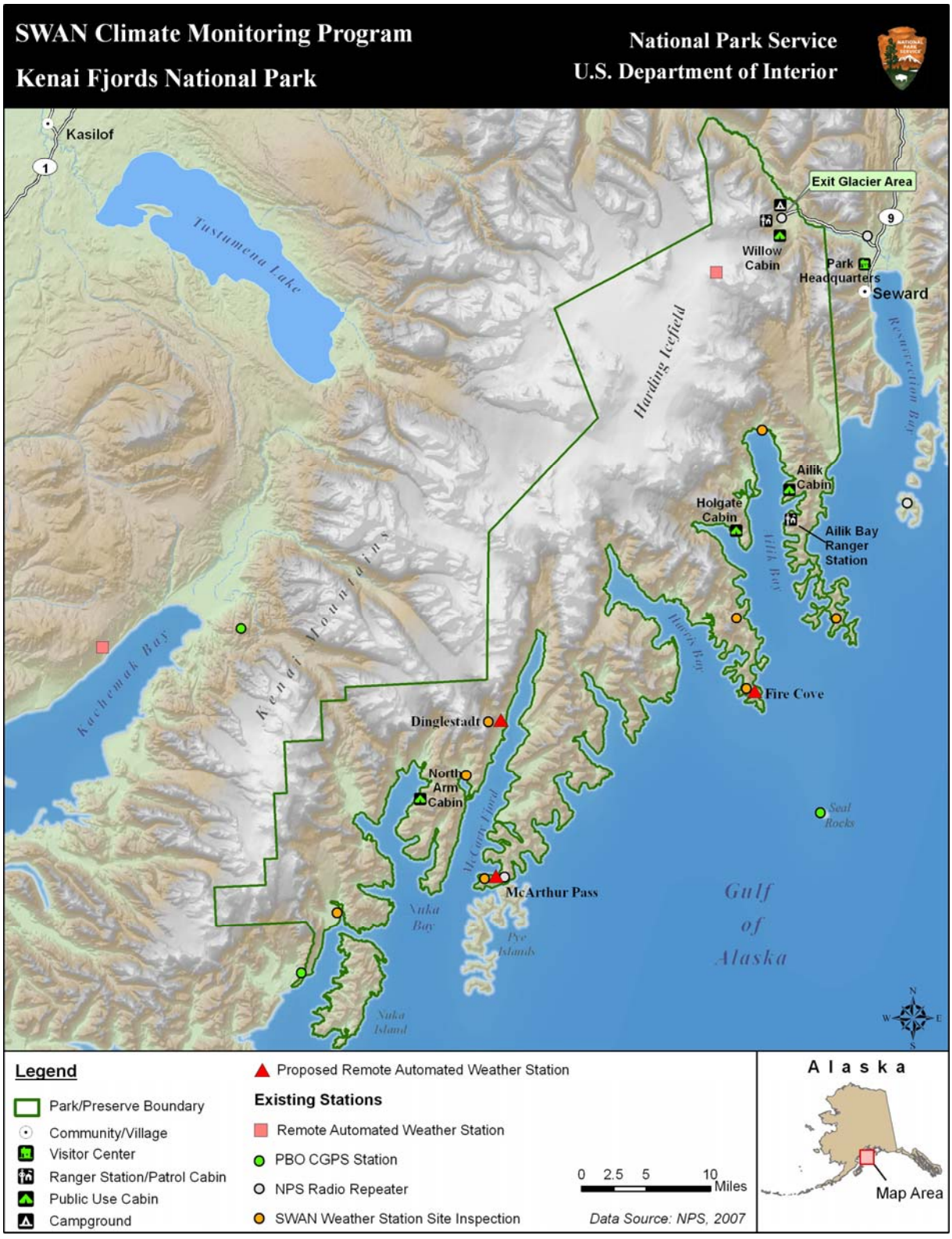

Figure 2-2. Alternative B: Expand Park Climate Monitoring Program – proposed weather stations at Kenai Fjords National Park. Existing stations and facilities are also shown.

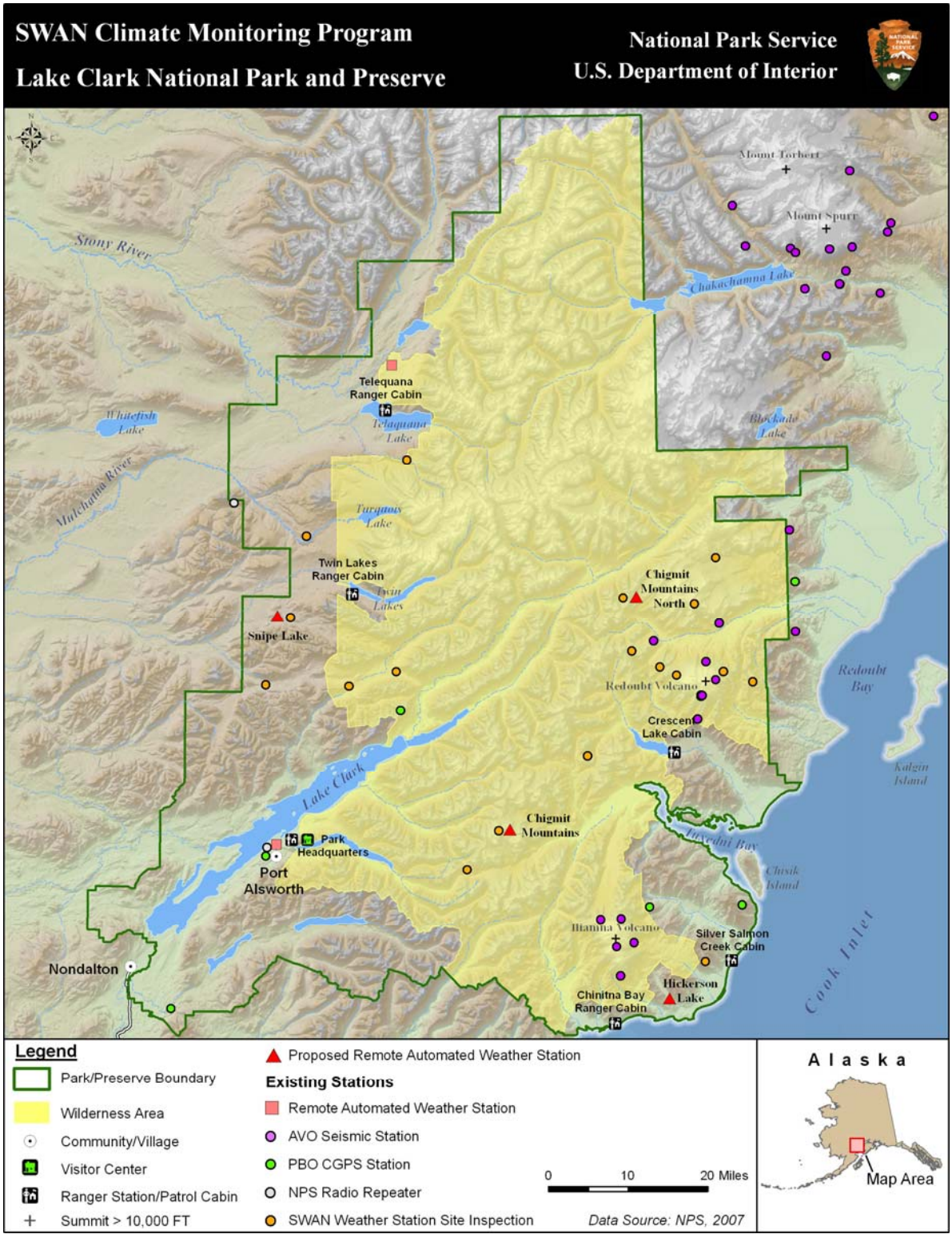

Figure 2-3. Alternative B: Expand Park Climate Monitoring Program – proposed weather stations at Lake Clark National Park and Preserve. Existing stations and facilities are also shown.

Table 2-1. Potential Weather Station Sites at KATM, KEFJ, and LACL.

Park	Site	Elevation (ft)	Latitude	Longitude	Access for Maintenance	Land Status & (Wilderness)	Concurrent Land Uses	Required Site Preparation
KATM	Coville	1,500	58.802572N	155.562799W	Fixed-wing floats on unnamed lake	Park (Designated Wilderness)	None	None
KATM	Pfaff Mine	1,900	59.11027199N	154.83991787W	Fixed-wing wheels on existing strip at mine	Preserve (Eligible Wilderness)	Abandoned mine site	None
KATM	Contact Creek	670	58.20937288N	155.92106419W	Fixed-wing wheels on existing unimproved landing site	Park (Designated Wilderness)	None	None
KATM	Dumpling Mtn	2,400	58.581663N	155.859888W	Helicopter or hike from Brooks Camp. 1 helicopter trip every 3 yrs. for battery replacement.	Park (Designated Wilderness)	NPS Radio Repeater Site	None
KATM	Cape Gull	1,300	58.204392N	154.200093W	Helicopter	Park (Designated Wilderness)	US Coast Guard Communication Site	None
KATM	Dark South	500 – 1,000	58.691444N	153.504050W	Fixed-wing wheels on beach	Park (Designated Wilderness)	None	None
KEFJ	McArthur Pass	1,300	59.472653N	150.333587W	Boat or Helicopter. 1 helicopter trip every 3 yrs. for battery replacement.	Park (Eligible Wilderness)	NPS Radio Repeater Site Subsurface-Native Corp.	None
KEFJ	Dinglestadt	400	59.646352N	150.323406W	Boat or Fixed-wing on floats	Park (Eligible Wilderness)	None	Initial brushing (alder) & annual maintenance
KEFJ	Fire Cove	900	59.661548N	149.756831W	Boat or Helicopter. 1 helicopter trip every 3 yrs. for battery replacement.	Park (Eligible Wilderness)	None	Some initial brushing (willow, alder, spruce) & occasional maintenance
LACL	Chigmit Mts	4,500	60.223321N	153.466436W	Fixed-wing on skis	Park (Designated Wilderness)	None	None
LACL	Chigmit Mtns North	4,400	60.641982N	152.991716W	Fixed-wing on skis Fixed-wing on floats for summer maintenance	Park (Designated Wilderness	None	None
LACL	Hickerson Lake	1,000	59.914785N	152.892598W	Fixed-wing on floats	Park (Eligible Wilderness)	None	Initial brushing (alder) & annual maintenance
LACL	Snipe Lake	2,300	60.61024N	154.319868W	Fixed-wing on floats	Preserve (Eligible Wilderness)	None	None

be necessary. The gabions are wire cages approximately 2-feet wide, 6-feet long and 18-inches high filled with rock from the surrounding area. Where pins can not be driven into the ground and gabians cannot be installed, holes would be drilled into the bedrock and the steel pins secured in the holes with epoxy. The tower components are assembled on site.

The precipitation tower would be approximately 15.5-foot tall, made of steel tubing and securely anchored to the ground with steel pins and/or gabions (Photo 2-2). The gabions are wire cages approximately 2-feet wide, 6-feet long and 18-inches high filled with rock from the surrounding area. The base of the tower would also be weighted with a rock-filled baskets. The tower has three legs on a 5-foot wide base and tapers to 1.5 feet wide at the top. A 4-foot diameter windscreen made up of aluminum flaps is situated on the top. This tower would hold a precipitation gauge and possibly other instruments. An 8-inch diameter PVC pipe antifreeze reservoir would extend through the length of the tower. The pipe would be filled with an antifreeze mixture consisting of 45% propylene glycol, 45% ethyl alcohol and 10% water. The antifreeze mixture melts frozen precipitation (snow, sleet, hail) and is displaced by the accumulating precipitation. The displaced fluid flows through a tube and into a tipping-bucket rain gauge, and then flows through a tube into 5-gallon steel jerry cans or other similar containers located at the base of the tower. The concentration of the antifreeze mixture (which is constantly diluted as precipitation is added) must remain strong enough to prevent freezing during anticipated winter temperatures as low as -40 degrees F. The gage is recharged with fresh antifreeze annually and the diluted mixture is removed from the site for approved disposal. All containers would be highly resistant to damage by animals. The tower structure would be constructed in Anchorage.

Installation

An FTS (Forest Technology Weather System, Inc.) weather station can be installed in a few hours by two people once all the parts and pieces are onsite. Getting the weather station to a deployment site would typically require one or two sling loads using a helicopter. A single helicopter flight would be required to transport personnel to each site. Getting a weather station to a point where helicopter operations can begin may require a combination of fixed-wing aircraft and/or boat operations. Weather station installation would occur in June, July, and August. Power tools would be used for weather station assembly and hand tools would be used for site preparation.

Annual Maintenance

Each station would require one annual maintenance visit. Maintenance activities would be confined to a single day and would primarily occur from June through August. Fixed-wing access on skis would occur during March and April for selected sites in Lake Clark National Park and Preserve. Typically access would be via fixed-wing or boat or rarely helicopter. Six hours would be required to swap sensors and remove and replace the antifreeze solution and perform other routine maintenance including periodic vegetation clearing at each weather station.

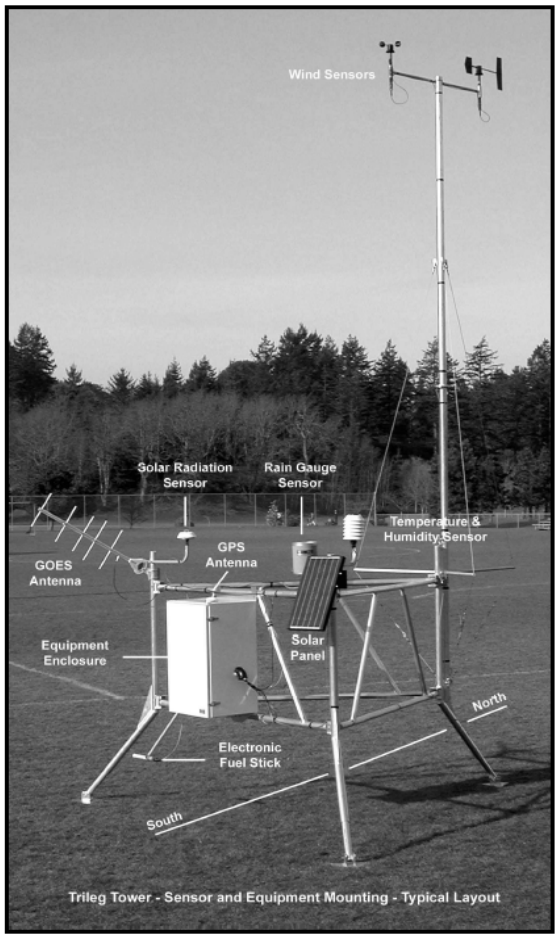

Photo 2-1. Example of a Tri-leg Tower.

Photo 2-2. Example of a Precipitation Tower.

2.3 MITIGATION MEASURES

2.3.1 Vegetation

Where the surfaces of rocks are covered with lichen, disturbance of those rocks will be minimized. If rocks need to be moved or used to fill gabions, the surface rocks with lichen on them would be carefully set aside and rocks from underneath will be used. Rocks with lichens on them would be left lichen-side up and in their original location when possible. Where other plants are present, care would be taken to minimize disturbance (e.g., stepping on rocks where possible rather than on plants and clearing the minimal amount of vegetation necessary).

Mud, dirt, and plant material will be removed from project equipment, footwear, and clothing prior to traveling to the weather station sites, to minimize the possibility of introducing invasive

plants to the parks. Weather station sites would be monitored, during the annual maintenance visit, for the presence of invasive species.

2.3.2 Wildlife

To the extent possible, installation and maintenance activities would be timed to avoid sensitive periods, such as nesting season.

In areas with suitable nesting habitat for Kittlitz's murrelets the installation and maintenance of weather stations would be conducted after August 20 to eliminate possible disturbance to nesting and chick-rearing murrelets.

In addition to meeting all Federal Aviation Administration and NPS helicopter policy and aircraft requirements, mitigation common to all alternatives for both fixed wing and helicopter flight paths would include:

- Maintenance of a 1,500 foot vertical or horizontal clearance from traditional summer and calving or other habitats supporting reproduction as well as adult animals whenever feasible. This includes brown and black bear, moose, caribou, Dall sheep, wolves, mountain goats, wolverines, harbor seals, and Steller's sea lions.
- Pilots would not hover over, circle, harass, or pursue wildlife in any way.
- Where feasible, flight paths would avoid known bald eagle nests and a minimum quarter-mile clearance will be maintained from all active eagle nests. All nests are considered active from March 1 to May 31. Nests used for nesting activity are considered active through August 31.
- To comply with the Migratory Bird Treaty Act, helicopter activity would be scheduled to avoid sensitive bird migration or nesting periods in the project areas. Known seabird colony areas would be avoided.

2.3.3 Visual Quality

Where possible, the antenna/tower would be installed in such a way so as not to protrude beyond the silhouette/horizon of a nunatak or ridge.

2.3.4 Visitor Experience

Signs would be posted on the weather station equipment explaining its purpose and listing a person to contact if visitors who happen upon the site have any questions. Use of helicopters during hunting season in areas of known hunting would be avoided. Flight paths would avoid known wilderness users and high use visitor areas, such as Brooks Camp and Three Forks overlook in Katmai National Park, where users are known to concentrate.

In planning flight paths, all feasible measures would be undertaken to avoid and/or minimize impacts to backcountry users. Planned flight routes would be approved by the park superintendent. Travel routes would be as efficient as possible to minimize flights over conflict

areas. Helicopter and aircraft altitude and horizontal distances would be maintained according to the park policy.

2.3.5 Soundscape

To reduce adverse noise impacts to recreational users and wildlife in the parks, helicopters would maintain a minimum altitude of 2,000 to 2,500 feet above ground surface, other than during landing and takeoff, or when visibility is limited by cloud cover, pursuant to Federal Aviation Administration (FAA) Advisory Circular (AC91-36C), "Visual Flight Rules (VFR) Near Noise Sensitive Areas."

2.3.6 Wilderness

To minimize impacts on wilderness values the stations would be as compact as possible. Mitigation measures as described under Visual Quality, Soundscape, and Visitor Experience would also apply to Wilderness areas.

2.3.7 Cultural Resources

Archeological site clearance would be conducted concurrent with installation of equipment, as necessary. Ground disturbance would be minimized. If archaeological features are encountered during equipment installation, work would cease immediately and the Superintendent and park Cultural Resource Specialist would be notified. Procedures would be followed, as per Director's Order 28 and found in the guiding regulations in 36 CFR 800.13. No further action would take place until the NPS provides clearance.

2.4 THE ENVIRONMENTALLY PREFERRED ALTERNATIVE

As stated in Section 2.7 (D) of the NPS DO-12 Handbook, "The environmentally preferred alternative is the alternative that will best promote the national environmental policy expressed in NEPA (Section 101(b))." In sum, the environmentally preferred alternative is the alternative that not only results in the least damage to the biological and physical environment, but that also best protects, preserves, and enhances historic, cultural, and natural resources. Alternative A (No Action Alternative) is the environmentally preferred alternative because no new adverse impacts to the environment would occur from installation of new weather stations. New weather stations, however, would provide valuable climate data, which would not occur under the No Action alternative.

2.5 ALTERNATIVES CONSIDERED BUT REJECTED

There are no alternatives that were considered and rejected.

2.6 COMPARISON OF ALTERNATIVES

Table 2-2 compares the potential environmental impacts associated with the No Action and Preferred alternatives. Potential impacts are provided for each environmental resource topic. Chapter 4, *Environmental Consequences*, of this EA contains a detailed discussion of the potential impacts by resource topic.

Table 2-2. Comparison of Alternatives.

Impact Topic	Alternative A: No Action	Alterative B: Expand Climate Monitoring Program
Vegetation	No impacts on vegetation would occur at any of the three parks. *Minor adverse cumulative impacts*	Minor, long-term, adverse impacts to vegetation at all three parks from loss of plants due to anchoring of equipment & vegetation trampling during installation and maintenance of weather stations. *Minor adverse cumulative impacts*
Wildlife	No impacts on wildlife would occur at any of the three parks. *Minor adverse cumulative impacts*	Minor, temporary, adverse impacts to wildlife and minor, long-term, adverse impacts to wildlife habitat from displacement of wildlife & disturbance of wildlife habitat during installation & maintenance of weather stations. *Minor adverse cumulative impacts*
Visual Quality	No impacts to visual quality would occur at any of the three parks. *Minor adverse cumulative impacts*	Minor adverse impacts to visual quality from the installation & presence of weather stations. *Minor adverse cumulative impacts*
Soundscape	No impacts to the natural soundscape would occur in any of the three parks. *Minor adverse cumulative impacts*	Minor adverse impacts on soundscape from noise intrusions during installation & maintenance of weather stations. *Minor adverse cumulative impacts*
Visitor Experience	No impact to visitor experience would occur at any of the three parks *Minor adverse cumulative impacts.*	Negligible adverse impacts to visitor experience from encounters with the stations & noise from overhead aircraft during installation & maintenance of weather stations. *Minor adverse cumulative impacts*

Impact Topic	Alternative A: No Action	Alterative B: Expand Climate Monitoring Program
Wilderness	No impacts to designated or eligible wilderness would occur at any of the three parks. *Minor adverse cumulative impacts*	Minor adverse impacts to wilderness from the installation & maintenance of 13 new weather stations in designated or eligible wilderness at the three parks. *Minor adverse cumulative impacts*
Cultural Resources	No impacts to cultural resources would occur at any of the three parks. *Minor adverse cumulative impacts*	Negligible adverse impacts to cultural resources from the installation of new weather stations. *Minor adverse cumulative impacts*

CHAPTER 3: AFFECTED ENVIRONMENT

This chapter describes the existing environment and current conditions of important resources and values at KATM, KEFJ, and LACL. Topics characterized are vegetation, wildlife, visual quality, soundscape, visitor experience, wilderness, and cultural resources. These resources have the potential to be affected by an expanded climate monitoring program.

3.1 VEGETATION

KATM is located in the Aleutian Meadows Division – Alaska Peninsula Ecoregion; KEFJ is located in the Coastal Rainforests Division – Gulf of Alaska Coast Ecoregion; and LACL is located in the Alaska Range Transition Division – Alaska Range Ecoregion (Nowacki et al., 2002). Ecoregions are large ecosystems primarily defined by climate and topography, with refinements from vegetation patterns, disturbance regimes, bedrock geology, and surficial deposits remaining from recent geomorphic activities such as glaciers, floods, and volcanic eruptions.

3.1.1 Katmai National Park and Preserve

The Aleutian Meadow Division stretches nearly 2,000 miles, reaching from Iliamna Lake west to the Komandorskiye Islands near the Kamchatka Peninsula in Russia. The fog-shrouded Aleutian Islands and storm-pounded coasts of the Alaska Peninsula make up this exposed division, set between the cold Bering Sea and the stormy North Pacific Ocean (Spencer et al., 2002). Parts of the region support lush meadow and heath vegetation communities, with willows along streams. The flora is a blend of species from two continents, grading from Asian to North American affinities from west to east.

The Pfaff Mine site is inland at a moderate elevation (1,900 feet) in a mountainous location being surrounded by mountains exceeding 3,200 feet elevation within two miles of the site. The site is on bench with low tundra ground cover consisting of crowberry, lichen, grass, and occasional willow and alder (1 meter height) along the sides of an airstrip associated with disturbed ground.

Photo 3-1. Pfaff Mine Site.

Photo 3-2. Coville Site.

The Coville site is inland, at a moderate elevation (1,500 feet), 3 miles northeast of Coville Lake in rolling foothills on a flat tundra covered hilltop. The low tundra ground cover consists of crowberry, blueberry, bearberry, willow, dwarf birch, lichen, and grass. Alder occurs off on the sides of the hills and there is occasional stunted spruce.

The Dumpling Mountain site is inland, at a moderate elevation (2,500 feet), on top of Dumpling Mountain where there is an NPS radio repeater. The ground cover is blocky broken bedrock with low tundra made up of crowberry, blueberry, lichen, grass, and occasional willow.

Photo 3-3. Dumpling Mtn. Site.

Photo 3-4. Contact Creek Site.

The Contact Creek site is inland, at a low elevation (670 feet), on a broad plain. Crowberry, blueberry, willow, dwarf birch, lichen, and grass comprise the low tundra ground cover.

The Dark South site is coastal, at a low elevation (500-1,000 feet), on the coast on a prominent grassy cape gently sloping to the ocean and co-located with a U.S. Coast Guard navigation site. The site is close to the ocean both laterally (1/2 mile) and vertically (1,000 feet). The cape is vegetated with grass and low brush (alder). The station would be placed in an unvegetated (fractured bedrock) area along the nose of the cape.

Photo 3-5. Dark South site.

Photo 3-6. Cape Gull site.

The Cape Gull site is coastal, at a moderate elevation (1,300 feet), on the coast on a prominent grassy cape gently sloping to the ocean. The site is close to the ocean both laterally (1 mile) and vertically (1,300 feet). The cape is vegetated with grass and alder.

3.1.2 Kenai Fjords National Park

The Coastal Rainforest Division includes the great arc of mountains and the forested fringe that swings around the north and east shores of the Gulf of Alaska (Spencer et al., 2002). The warm maritime environment encourages lush moss-draped conifer forests along the coast. Old-growth forests of Sitka spruce and hemlock reach to the end of the Kenai Peninsula. Pockets of wetlands form on shallow, poorly drained soils on bedrock. Hidden coves and rocky islands are fringed with intertidal communities of kelp, eelgrass, and barnacles. Upper forests give way to a narrow subalpine zone of alder and herbaceous meadows and then alpine tundra and bedrock or ice.

The Dinglestadt site is coastal, at a low elevation (400 feet), on a bedrock bench just south of the Dingstadt Glacier on the western side of McCarty Fjord. Vegetation cover consists of alder, willow, moss, and grass. A population of dandelion, an invasive species, was found at the site in 2006.

Photo 3-7 Dinglestadt site.

Photo 3-8. McArthur Pass site.

The McArthur Pass site is coastal, at a moderate elevation (1,300 feet), on top of a ridge at the southern extent of a peninsula located just east of McCarty Fjord. The site is near the tree-line extent of spruce/hemlock. Bedrock is exposed in the area. Low brush and stunted spruce and mountain hemlock trees occur on the ridgeline. The station would be located on low tundra consisting of ericaceous plants such as blueberry and lupine, plus grass, lichen, and occasional spruce.

The Fire Cove site is coastal, at a low elevation (1,000 feet), on the crest of the Harris Peninsula near its southern most extent. The terrain is forested at the site though this general area is lightly forested. The terrain at the site is rolling; however, access from the coastline is a very steep climb. Deer Cabbage, grass, lichen, blueberry, dwarf hemlock, and moss comprise the vegetative cover. Large hemlocks occur on side slopes in the area.

Photo 3-9. Fire Cove site.

3.1.3 Lake Clark National Park and Preserve

The Alaska Range Transition Division rises between the continental boreal interior of Alaska and the marine rainforest coastlands along the Gulf of Alaska (Spencer et al., 2002). The lower slopes of the Alaska Range are covered with dense thickets of alder that transition to low shrubs in the subalpine and blueberry-rich alpine tundra. Vegetation of all types succumbs to the harsh conditions at about 4,000 feet, leaving the higher arena to bare rock, talus (broken loose bedrock), and ice.

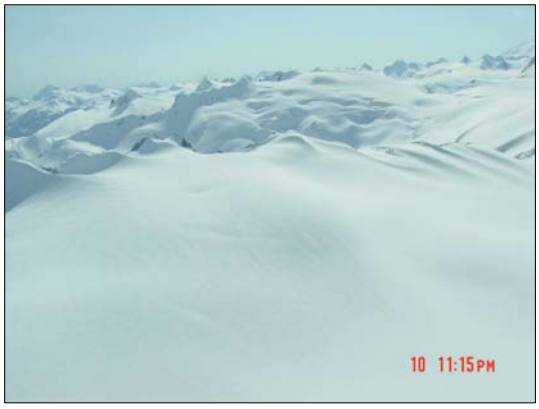

Photo 3-10. Chigmit Mountains site.

The Chigmit Mountains site is mountainous, at a high elevation (4,500 feet), on a nunutak in the heart of the Chigmit Mountains. The site is exposed bedrock with lichens, likely fractured at the surface.

The Chigmit Mountains North site is mountainous, at a high elevation (4,400 feet), on an exposed hilltop in the north Chigmit Mountains near the head of the Drift River. The site is exposed bedrock with lichens, likely fractured at the surface.

Photo 3-11. Chigmit Mtns. North site.

Photo 3-12. Hickerson Lake site.

The Hickerson Lake site is coastal, at a moderate elevation (1,000 feet), on a hilltop approximately ½ mile from the southeast end of Hickerson Lake and approximately 2.5 miles from the coast. Currents, high-bush blueberry, alder, ferns, grass, lichen, and moss comprise the vegetative cover and is covered with boulders ranging up to the size of a small car.

The Snipe Lake site is inland, at a moderate elevation (2,300 feet), on a hilltop approximately ½ mile to the southwest of Snipe Lake. The hilltop is rounded tundra covered with occasional low brush. Vegetation is made up of dryas, blueberry, wind flower, and lichen. Dwarf birch, scrubby spruce, and willow occur on the sides of the hill. Alder occurs on the lower slopes of the hill.

Photo 3-13. Snipe Lake site.

3.2 WILDLIFE

3.2.1 Katmai National Park and Preserve

Brown bears and moose live throughout the coastal and lake regions of KATM. Katmai is inhabited by the largest protected population of brown bears in North America. The bears are most commonly encountered along fishing streams and the coast, and often den on mountain slopes. Other common mammals include the caribou, red fox, wolf, lynx, wolverine, river otter,

mink, marten, weasel, porcupine, marmot, snowshoe hare, red squirrel, and beaver (NPS, 2007b). Two caribou herds live in Katmai, the Mulchatna herd which ranges north of the Naknek River to Lake Iliamna and beyond, and the Northern Alaska Peninsula herd which has drifted north from its historic range between Port Moller and the Naknek River to mingle with the Mulchatna herd. Along the coast are sea lions, sea otters, hair seals, and porpoise, with beluga, killer, and gray whales sometimes using the Shelikof Strait.

Katmai's lake edges and marshes serve as nesting sites for tundra swans, ducks, loons, grebes, and the arctic tern. Seabirds and waterfowl are present close to coastal areas. Grouse and ptarmigan inhabit the uplands, and some 40 songbird species summer here. Seacoast rock pinnacles and treetops along lakeshores provide nesting sites for bald eagles, hawks, falcons, and owls (NPS, 2007b).

3.2.2 Kenai Fjords National Park

Terrestrial mammals at KEFJ include moose, black bear, brown bear, mountain goat, wolf, wolverine, marmot, and porcupine (NPS, 1984a). Black bears are abundant in the park, particularly along the coastline. Brown bear and moose do not occur at the proposed RAWS sites. The marine waters off the KEFJ coast support whales, porpoises, dolphins, Steller's sea lions, harbor seals, and sea otters. Steller's sea lions use the granite shelves of the Chiswell Islands as haulouts. Harbor seals tend to congregate near the tidewater glaciers. Sea otters in the park are most abundant in Northwestern Lagoon and McCarty Fjord. Whales common throughout the Gulf of Alaska include the killer, humpback, minke, and gray.

Thousands of seabirds, including horned and tufted puffins, black-legged kittiwakes, common and thick-billed murres, marbled and Kittlitz's murrelets, cormorants, gulls, oystercatchers, terns, and pigeon guillemots seasonally inhabit and breed along the shoreline. There are prolific colonies of black-legged kittiwakes, glaucous winged gulls, and pelagic and red-faced cormorants along the coastline (Pfeiffenberger, 1995). Bald eagles nest in trees along the shoreline. Peregrine falcons are found along the KEFJ coast as well as on the Chiswell Islands. The white-tailed ptarmigan, willow ptarmigan, and spruce grouse are also in the park.

3.2.3 Lake Clark National Park and Preserve

Both black and brown bears are present in the Lake Clark region (NPS, 2006). Black bears use all areas of the park and preserve, except the higher elevations. Brown/grizzly bears, common in all habitats, are most numerous along the coast. Moose are found below treeline in transition areas between forest and tundra, between aquatic and terrestrial environments, and in areas that have been burned or disturbed. The Mulchatna Caribou Herd numbers more than 100,000 animals. These caribou range through the foothill lakes and tundra plains of the western preserve. Dall sheep range along the western slopes of the Chigmit Mountains along the boundary of the park. Wolves in Lake Clark National Park and Preserve are found mainly in the park's mountainous areas, generally below 5,000 feet in coniferous forests, and in open tundra. Lynx, coyotes, and wolverines range widely throughout the forests and low alpine areas of the park and preserve, which they share with porcupines and snowshoe hares. The tiniest mammals also make their homes in the area - twelve species of vole, lemming and shrew probably occur, of which the

redback vole is most abundant. Minks, beavers and river otters inhabit ponds, lakes and rivers. River otters, also called land otters, are particularly common along the coast. Red squirrels, arctic ground squirrels, American marten, short-tail weasels and least weasels are also found throughout the Lake Clark area. Along Lake Clark's coast, marine mammals use haulout sites and feeding areas. Observed most frequently are harbor seals, beluga whales, Steller's sea lions, and harbor porpoises.

Raptors, including bald and golden eagles, northern goshawks, sharp-shinned hawks, northern harriers, and merlins, breed in the Lake Clark area. Two pairs of Osprey also nest in the preserve. Waterfowl nest and molt in wetlands throughout the area. Large migratory flocks of ducks, swans, and geese rest and feed in the park. Sea ducks, primarily white-winged and surf scoters, are the most abundant waterfowl on the coast. The coast also provides important breeding habitat for mallards, American widgeon, Barrow's golden-eye, and red-throated loons. About 30 pairs of trumpeter swans nest in the park and preserve; most breed in wetlands on the coast. Seabird breeding colonies occur along Cook Inlet and include black-legged kittiwakes, horned puffins, double-crested cormorants, pelagic cormorants, glaucous-winged gulls, tufted puffins, common murres, and pigeon guillemots (NPS, 2006).

3.3 VISUAL QUALITY

Views at the potential weather station sites include expansive vistas of mountains, glaciers, undulating hills, grassy knolls, plateaus, river valleys, and ocean.

3.3.1 Katmai National Park and Preserve

The Pfaff Mine site is located in a mountainous location surrounded by mountains exceeding 3,200 feet elevation within two miles of the site. It is possible that hikers could see the site, but hikers in the area are rare. Overflights are less common in comparison to known travel corridors, such as over large lakes, rivers, and mountain passes, but pilots and passengers would see it as they fly past the site or land at the nearby air strip. The nearby airstrip is used on rare occasions.

The Coville site is located three miles northeast of Coville Lake in rolling foot hills. Mountains rise gently to the east. Broad gently rolling terrain lies to the west. There may be sporadic floatplane landings on the small lake adjacent to the station site. Hiking within the area is rare as visitors to Lake Coville and nearby American Creek focus their activities on fishing and bear viewing away from the higher elevation site where the station would be located. The site would be visible to the pilots and passengers using this air corridor as overflights are common during summer months. It is unlikely that boaters on Coville Lake would see the towers.

The Dumpling Mountain site (co-located with an NPS radio repeater) is on top of Dumpling Mountain very close to Brooks Camp. The site would be readily visible to the many pilots and passengers flying to and from Brooks Camp, and possibly (but not likely) to boaters on the lakes surrounding Brooks Camp. If hikers are able to reach the summit of Dumpling Mountain, the site would be visible.

The Contact Creek site is on a broad plain with an unobscured horizon from the NE through to the S and through to the NW. A small mountain occurs directly to the north. Mountains rising to 2,600 feet occur one to two miles north of the site. The site could be seen by the sporadic bear viewers and anglers who land at the adjacent unimproved landing strip as hiking is common from the landing strip to Contact Creek during the summer months. Overflights are also common in the area and the station would be visible to pilots and passengers.

The Dark South site is located on the coast on a prominent grassy cape gently sloping to the ocean. From this cape, the horizon is unobscured to the ocean from the northeast through to the southwest. Mountains approaching 4,000 feet are within 3 miles of the site to the northwest. The site is close to the ocean both laterally (½ mile) and vertically (1,000 feet). This site would be seldom encountered by hikers, but would be visible to the many pilots and passengers flying the Katmai coast in summer and early fall. Offshore boat traffic is also common and it is possible that the site would be visible to boaters.

The Cape Gull site would be co-located with the Cape Gull US Coast Guard communications site. This site is close to the ocean both laterally (1 mile) and vertically (1,300 feet) and there is unobscured horizon open to the ocean from the northeast through to the south. This site would be seldom encountered by hikers, but would be visible to the many pilots and passengers flying the Katmai coast in summer and early fall. It is unlikely that it would be visible to boaters as the view to boats close enough to shore would be obstructed by tall cliffs.

3.3.2 Kenai Fjords National Park

The site McArthur Pass site is located at the southern extent of a peninsula located just east of McCarty Fjord. The site is on the top of a ridge within several hundred feet of an NPS radio repeater. Pilots and passengers flying over the area and boaters would see the weather station, along with other man-made installations such as the existing radio repeater equipment and navigational aids on the rocks near the water. Though unlikely, the site can also be seen from boats to the east of McArthur Pass.

The Dinglestadt site is located on a bedrock bench just south of the Dingstadt Glacier on the western side of McCarty Fjord. The site is well exposed in all directions except the west and north where there is extreme mountainous topography. This site would be seen by the occasional aircraft and a small number of backcountry kayakers who recreate in upper McCarty Fjord.

The Fire Cove site is located on the crest of the Harris Peninsula near its southern most extent. The terrain at the site is rolling; however, access from the coastline is a very steep climb. The site is well exposed in all directions except for a hill ½ mile away rising about 300 feet above the site to an elevation of 1,200 feet. There would not be any hikers in the area; however, the site would be visible to the many pilots and passengers from flights on route to Northwestern Fjord. The weather towers would not be visible to people on tour boats and fishing boats that frequent the area in the summer.

3.3.3 Lake Clark National Park and Preserve

The Chigmit Mountains site is on a nunutak in the heart of the Chigmit Mountains with unobstructed views in all directions. There is low likelihood that this site would be seen, other than by the occasional aircraft, as it is in a very remote area of the park and at a high elevation.

The Chigmit Mountains North site is on an exposed hilltop in the north Chigmit Mountains near the head of the Drift River. The site is located in an area of more subdued topography approximately 1,500 feet above the Drift River valley floor. Surrounding topography rises to 5,000 feet within 1.5 miles to the west, north and east of the site. The topography drops to the south into the Drift River valley from the site. There is low likelihood that this site would be seen, other than by the occasional aircraft, as it is in a very remote area of the park and at a high elevation.

The Hickerson Lake site is on a hilltop approximately ½ mile from the southeast end of Hickerson Lake. This site overlooks Cook Inlet to the northeast, east and south and is approximately 2.5 miles from the coast. Two peaks, North Twin (7,703 feet) and South Twin (7,444 feet), lay approximately 8-miles northwest of the site. North Twin and South Twin are two peaks on the south flank of Iliamna Volcano (10,016 feet). Iliamna Volcano is approximately 10 miles northwest of the site. This site is between the ranger stations at Chinitna Bay and Silver Salmon Creek on the coast. Although there is little likelihood that hikers would encounter the site. This area receives numerous aircraft overflights (Putera, 2007a). Additionally, the site would be seen if visitors travel to Hickerson Lake.

The Snipe Lake site is on a hilltop approximately ½ mile to the southwest of Snipe Lake and eight miles west of the foothills of the Neacola Mountains. It is possible that the site could be seen by hunters and other visitors to Snipe Lake. The site would also be visible to pilots and passengers flying over the area.

3.4 SOUNDSCAPE

The ambient sounds at the proposed weather station sites consist predominantly of natural sounds, including wind and rain. On this natural background can occasionally be heard the manmade sounds of transiting high altitude commercial airlines, authorized helicopters for research and routine park management operations, low level local fixed-wing aircraft utilized for transport of park visitors into the backcountry or for sight seeing, and motor boats. Human voices may occasionally be heard at sites where limited visitor access is possible. Table 3-1 compares decibel levels of sounds that may be heard near weather stations.

3.4.1 Katmai National Park and Preserve

The natural soundscape of the proposed station sites within Katmai National Park and Preserve is predominantly natural. For the Cape Gull and Dumpling Mountain sites, which would be co-located with as US Coast Guard communications site and an NPS radio repeater, the existing installations make little, if any, noise. For all sites, overhead and landing aircraft are heard either nearby or from a distance of up to several miles. Human voices and occasional shouts are heard

in areas receiving higher visitation levels (particularly where recreation visitors occur such as Contact Creek and Dumpling Mountain). Other common human sounds heard at the Dumpling Mountain site from Brooks Camp are from many float plane landings and take-offs per day, small motor vehicles for NPS or concession use, few infrequently used larger vehicles (the daily bus to the Valley of Ten Thousand Smokes, road grader, front-end loader), and infrequent motor boat noise. Motor boat noise also occurs at the Cape Gull and Dark South sites on the coast.

Table 3-1. Decibel Levels of Ambient and Human-induced Sounds.

Source	Decibels (dBA)
Rainfall	50
Normal Conversation	60
Wind	35-85
Shouting	90
Airplanes (overhead)	65-70
Helicopter (at site)	105
Helicopter (5 seconds away)	95
Helicopter (10 seconds away)	85
Helicopter (15 seconds away)	80

(Data derived from the following sources: Hamilton, 2003; LHH, no date; Miller, 2002; UCSC, no date).

3.4.2 Kenai Fjords National Park

Natural sounds predominate at the McArthur Pass and Dinglestadt sites, although aircraft and motor boat noise is occasionally heard. Float planes landing in upper McCarty Fjord are heard in summer months. The Fire Cove site has frequent noise from motor boat traffic in summer months, including tour boats, fishing boats, and other private boats.

3.4.3 Lake Clark National Park and Preserve

Natural sounds predominate at the Chigmit Mountains and Chigmit Mountains North sites. Although there would be many aircraft nearby using Lake Clark Pass, these sites are well protected by topography, so it is unlikely that there would be much noise at the actual sites. The Snipe Lake site receives occasional aircraft noise, especially during hunting season. The Hickerson Lake site receives almost no aircraft noise near the site, although there is a moderate amount of aircraft along the nearby coast to the east.

3.5 VISITOR EXPERIENCE

Use of the backcountry at KATM, KEFJ, and LACL for those seeking a remote experience includes activities such as hiking, mountaineering, hunting, fishing, boating and kayaking. Opportunities for solitude abound and a primitive and unconfined type of recreation can be expected in the KATM and LACL Wilderness as well as most other backcountry locations at all three parks. Recreationists in designated and eligible wilderness do not expect to encounter any

modern man-made structures. Most of the potential weather station sites are remote and inaccessible other than by aircraft and boat.

3.5.1 Katmai National Park and Preserve

Annual park visitation at Katmai was approximately 68,900 people in 2006 (NPS, no date).

The Pfaff Mine site does not offer opportunities for fishing or bear viewing opportunities, thus aircraft landings are rare at the nearby unimproved landing strip (Noon, 2007). Although numbers are unknown, hiking in the area is infrequent.

The Coville site would most likely receive little visitation from the public since most visitors use American Creek and Lake Coville for transportation (floatplane, boat) and fishing purposes (Noon, 2007). American Creek had 1,628 Commercial Use Authorization (CUA) user days in 2006 (NPS, 2007c). There may be sporadic floatplane landings on the small lake adjacent to the station site. Hiking in the area is infrequent.

Hiking is common at the Dumpling Mountain site, which is located near Brooks Camp. Brooks Camp is the most heavily visited site in Katmai; it received approximately 9,000 visitors in 2006 (Noon, 2007). The CUA user days in 2006 at Brooks Camp was 8,342 (NPS, 2007c). Visitors may participate in one or more of the following activities: fishing in Brooks River, observing or photographing brown bears, taking a bus tour to the Valley of Ten Thousand Smokes, sightseeing, and hiking. Dumpling Mountain trail use was approximately 200 hikers in 2006. Those visitors that actually reached the summit was greatly reduced (approximately 50 hikers).

The Contact Creek site is adjacent to an unimproved landing strip used to transport park staff and bear viewers and anglers. Use is sporadic during the summer months but hiking is common from the landing strip to Contact Creek (Noon, 2007). The CUA user days in 2006 at Contact Creek was 147 (NPS, 2007c).

The exact numbers of visitors are not known for the Dark South and Cape Gull sites. Due to the locations of these sites near the coast, overflights would be common during the summer and early fall months. Offshore boat traffic is also common. Hiking opportunities to the weather station sites are infrequent due to the steep topography above the coastline (Noon, 2007).

3.5.2 Kenai Fjords National Park

In 2006, KEFJ ranked fifth in total visitation out of the fifteen park units in Alaska, reporting a total of approximately 251,600 recreational visits (NPS, no date-a). Visitation to the Exit Glacier area represents about one half of the park's total annual visitation, 115,000 visitors in 2006 (NPS, no date-b). Most other park visitors access the fjords on tour boats to Aialik and Northwestern fjords. Other visitors access the park by plane and land at remote camp sites or stay at Public Use Cabins. Of the number of visitors calculated for the park each year, a very small percentage of them ever come within the vicinity of these three sites. In 2006, there were 310 backcountry overnight visits (NPS, no date-b). One tour boat a day in summer travels from Seward to Northwestern Fjord passing by Fire Cove en route, but it is unlikely that the Fire Cove

site would ever be seen from anyone in a boat (Hahr, 2007). Infrequently, kayakers paddle from Aialik Fjord to Northwestern Fjord (mainly Outward Bound groups). The upper end of McCarty Fjord, where the Dinglestadt site is located, receives a very small amount of campers and kayakers arriving by float plane. The Dinglestadt site is the only one of the three sites that visitors could easily access (once they get to McCarty Fjord). Flight paths through the park also transport visitors past the McArthur Pass and Fire Cove sites. Additionally, many fishing boats frequent the waters of the park near all three sites.

3.5.3 Lake Clark National Park and Preserve

Annual visitation at LACL was approximately 5,300 in 2006 (NPS, no date). Silver Salmon, Lake Clark, Chinitna Bay and Twin Lakes are the most popular visitor destinations in the park. Silver Salmon (1542 user days in 2006) gets three times as much use as the other two locations (455 and 430 user days respectively in 2006), most likely due to visitation from the Kenai Peninsula via easy aircraft access across Cook Inlet. Although private floatplanes may land at Hickerson Lake, it likely rarely occurs, and anecdotal information indicates that visitor do not go to Hickerson Lake from Silver Salmon (Putera, 2007a). Likewise, private floatplanes could land at Snipe Lake. In the past, hunters used Snipe Lake as a base camp; however, the area is not used as much for hunting currently due to lower populations of caribou and moose.

3.6 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 icefields, 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."

These three national parks comprise approximately 8.8 million acres of land, approximately 6 million of which were designated wilderness with the passage of the Alaska National Interest Lands Conservation Act (ANILCA). These lands are managed as wilderness under the Wilderness Act of 1964 and under the provisions of ANILCA. An additional 2.6 million acres are considered eligible for wilderness designation by the Congress based on the wilderness suitability reviews conducted in compliance with ANILCA section 1317(a) and included in the park General Management Plans published in the mid 1980's. The full wilderness review process required under ANILCA section 1317(b) has not yet been completed on those eligible lands. Although EISs were completed there was no final action taken in the Secretary of the Interior's office and no record of decision was published in the Federal Register. This leaves the eligible wilderness acreage managed under NPS policies that protect wilderness character until Congress can act.

3.6.1 Katmai National Park and Preserve

Section 701 of ANILCA designated 3,384,358 acres of Katmai National Park & Preserve 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 will be managed under the terms of ANILCA to maintain the wilderness character and values of the lands until designation recommendations have been proposed.

The Pfaff Mine site is not located in designated wilderness, but occurs in an area eligible for wilderness designation (Noon, 2007). The other five sites (Coville, Contact Creek, Dumpling Mountain, Cape Gull and Dark South) are within the designated wilderness of Katmai National Park and Preserve.

3.6.2 Kenai Fjords National Park

No lands were designated as wilderness in Kenai Fjords National Park under the enabling legislation (ANILCA, sec. 701). However, most of the federal lands in the park are eligible for designation as wilderness (NPS, 1984a). These lands meet the criteria for designation found in the Wilderness Act of 1964. Lands in the park that are not eligible for wilderness designation are developed lands in the Exit Glacier area and lands associated with mining in the Nuka Bay area. KEFJ is managing lands as eligible wilderness to maintain the wilderness character and values of the lands until a final decision has been made. The McArthur Pass, Dinglestadt, and Fire Cove sites are all located in areas considered eligible for wilderness designation (Hahr, 2007).

3.6.3 Lake Clark National Park and Preserve

Section 701 of ANILCA designated approximately 2,619,550 acres of Lake Clark National Park & Preserve 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, 1984b). The approximately 1,240,280 acres determined eligible for wilderness designation will be managed under the terms of ANILCA to maintain the wilderness character and values of the lands until designation recommendations have been proposed.

The Chigmit Mountains and Chigmit Mountains North sites are located within the designated wilderness of Lake Clark National Park and Preserve. The Hickerson Lake and Snipe Lake sites are located in areas determined eligible for wilderness designation.

3.7 CULTURAL RESOURCES

3.7.1 Katmai National Park and Preserve

Knowledge of cultural resources at the proposed weather station sites can be summarized as follows (Noon, 2007):

The Pfaff Mine itself constitutes a historic site near the Pfaff Mine proposed site.

There are no known archeological sites at or near the Coville site; however, the area has not been investigated. The location has fairly high potential for the occurrence of cultural resources.

The Dumpling Mountain site has the possibility of artifacts eroding from snow fields in late season. However, the station would be co-located with the NPS radio repeater station in an already disturbed area.

Archeological sites have been found on the surface of terraces above Contact, Takayofo, and Angle Creeks near the Contact Creek site.

There are no known archeological sites at Dark South; however, the area has not been investigated.

There are no cultural resources within the Cape Gull area, which was previously investigated before installation of Coast Guard communications station.

3.7.2 Kenai Fjords National Park

There are no known cultural resources at any of the three sites, but the sites themselves have not been surveyed specifically for cultural resources (Hahr, 2007). Several archeological sites occur in the MacArthur Pass area.

3.7.3 Lake Clark National Park and Preserve

The Chigmit Mountains and Chigmit Mountains North sites are high elevation nunatak sites where it is not expected that cultural resources would be found. It is also unlikely that cultural resources occur at the Hickerson Lake site which is composed of boulders from an ancient landslide and thus unattractive to human habitation (Spencer, 2007). However, rock art, graves, and caches may be present.

The Snipe Lake site is the only proposed location at LACL which is known to have cultural resources. The site would have been used in the past as an overlook to search for caribou and other wildlife. There is a prehistoric site on the western shore of Snipe Lake.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

This EA evaluates the effects of the proposed weather stations on Katmai National Park and Preserve, Kenai Fjords National Park, and Lake Clark National Park and Preserve. The chapter is organized by alternative and, where applicable, the environmental effects of the alternatives are discussed by national park. This information is based on readily available environmental information, information from NPS resource specialists, and field reconnaissance.

4.1 METHODOLOGY

For each issue selected for detailed analysis (see section 1.6) 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 the duration, extent, and intensity of the impacts. Summary impact levels (characterized as negligible, minor, moderate, or major) are given for each issue topic in the analyses. Definitions of impact terms are provided below. Table 4-1 presents a summary of impact level thresholds.

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

Duration of Impact:
Temporary – Impacts would last only a single visitor season or for the duration of the discreet activity, such as weather station installation or maintenance.
Long-term – Impacts would extend for several years up to the life of the facility.
Permanent – Impacts are a permanent change to the resource that would last beyond the life of the facility even if the actions causing the impacts were to cease.

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

Table 4-1. Summary Impact Levels

Negligible	Minor	Moderate	Major	Impairment
Effects would generally be low intensity, temporary, and would not affect unique resources.	Effects would tend to be low intensity and short duration, but common resources may sustain medium intensity and long-term effects.	Common resources would be affected by higher intensity and longer term impacts while important and unique resources are affected by medium to low intensity and shorter-term to temporary impacts, respectively.	Effects are generally medium to high intensity, long-term to permanent and affect important to unique resources.	Impairment occurs when a resource no longer fulfills the specific purposes in the enabling legislation or its role in maintaining the park's natural integrity.

4.2 CUMULATIVE IMPACTS

Cumulative impacts were assessed by combining the potential environmental impacts of the alternatives with the impacts of projects that have occurred in the past, are currently occurring, or are proposed in the future within each of the three SWAN parks. Known past, present, and reasonably foreseeable future projects and actions in the authorized boundaries of the three parks include areas of nonfederal land, human habitation, roads, trails, buildings, campgrounds, air strips, and land applications.

4.2.1 Katmai National Park and Preserve

There are a variety of human installations located in both the wilderness and non-wilderness of KATM (Figure 2-1), including 26 Alaska Volcano Observatory (AVO) seismic stations, two Plate Boundary Observation (PBO) continuous global positioning system CGPS stations (Cape Gull and Cape Douglas), a United Stated Coast Guard (USCG) communications site at Cape Gull, four NPS radio repeater sites (Dumpling Mountain, Pedmar, Raspberry, and Sugarloaf), the Fures public use cabin, seven backcountry lodges (Battle River Wilderness Retreat, Kulik Lodge, Enchanted Lake Lodge, Royal Wolf Lodge, Grosvenor Lodge, Hallo Bay Wilderness Camp, and Katmai Wilderness Lodge – although most of these are located on private inholdings), Brooks Lodge and Brooks Camp facilities, Brooks Lake housing and maintenance facilities, installations adjacent to the Valley of Ten Thousand Smokes Road (Robert F. Griggs Visitor Center (Three Forks Overlook Shelter), Margot Falls restroom facility, Moraine (gravel) Pit, Squirrel Camp (temporary housing facility), and sewage pit), three backcountry patrol cabins (Amalik Bay, Swikshak Lagoon, and Nonvianuk), one boat ramp at Lake Camp, one airstrip, 27 miles of road, and 7 miles of trails.

Future installations include new maintenance and housing facilities located adjacent to the Valley of Ten Thousand Smokes Road approximately 1 mile southwest of Brooks Camp.

4.2.2 Kenai Fjords National Park

There are a variety of human installations located in both the eligible wilderness and non-eligible wilderness areas of KEFJ (Figure 2-2) including one existing RAWS station on the Harding Icefield, two NPS radio repeater sites (Exit Glacier and McArthur Pass), two backcountry public use cabins (Holgate and North Arm), one backcountry ranger station in Aialik Bay, the visitor facilities at Exit Glacier, two remotely controlled video monitoring equipment sites for harbor seal research (Pedersen Lake and Aialik Glacier), six mine sites in the Nuka Bay district, one abandoned and unmaintained airstrip in Beauty Bay, 1.5 miles of road, and 5.8 miles of trails. Other human installations in the backcountry (e.g., public use cabins) are located on private land. A proposed lodge development on Port Graham Village Corporation land in Pederson Lagoon is reasonably foreseeable.

4.2.3 Lake Clark National Park and Preserve

There are a variety of human installations located in both the wilderness and non-wilderness of LACL (Figure 2-3), including two existing RAWS stations (Port Alsworth and Stony), 13 AVO seismic stations, two PBO CGPS stations (Slope Mountain and Lake Clark NPS Radio Hut), three FAA weather cameras (at east Lake Clark Pass, Hatchet Point on north side of Lake Clark itself, and Merrill Pass), two NPS radio repeater sites (only one is in the park at the west end of Lake Clark Pass), five backcountry ranger stations (Telaquana Lake, Twin Lakes, Silver Salmon Creek, Chinitna Bay, and Crescent Lake), the visitor facilities in Port Alsworth, several old mines (none operational for many years), and several miles of trails concentrated at Port Alsworth and Silver Salmon Creek. The Snipe Lake Cabin is anticipated to be rehabilitated in 2008.

4.3 ALTERNATIVE A: NO ACTION

4.3.1 Vegetation

Under the No Action Alternative, no new weather stations would be installed in KATM, KEFJ, or LACL. No impacts to vegetation would occur as a result of this alternative.

Cumulative Impacts
Vegetation in parts of the parks has been cleared for construction of buildings, roads, trails, and other 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 parks, including seismic stations, CGPS stations, radio communications sites, and RAWS impact very small areas of vegetation. The area of vegetation

trampling from foot traffic and helicopter landings during maintenance would both be minimal and limited to the area immediately surrounding the stations. Maintenance activities at these existing stations would continue to impact vegetation. The cumulative impact on vegetation from human installations, plus the more extensive impacts from past mining development, human habitation, roads, and buildings would be minor. This alternative would not contribute any adverse cumulative impacts on vegetation in each of the three parks.

Conclusion: The No Action Alternative would not have any effects on vegetation in KATM, KEFJ, or LACL. The level of impact to vegetation from the No Action Alternative would not result in impairment of park resources that fulfill specific purposes identified in the enabling legislations or that are essential to the natural and cultural integrity of the parks.

4.3.2 Wildlife

Under the No Action Alternative, no new weather stations would be installed. No impacts to wildlife would occur as a result of this alternative.

Cumulative Impacts
Wildlife habitat in parts of the parks has been cleared for construction of buildings, roads, trails, and other facilities. 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, CGPS stations, radio communications, and RAWS 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 would be minimal and limited to the area immediately surrounding the stations. Public use cabins, radio repeaters, and ranger stations 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 human installations, plus the more extensive impacts from past mining development, human habitation, roads, and buildings would be minor. The No Action alternative would not contribute any adverse cumulative impacts on wildlife and habitat in each of the three parks.

Conclusion: The No Action Alternative would not have any effects on wildlife and habitat. The level of impact to wildlife from the No Action Alternative would not result in impairment of park resources that fulfill specific purposes identified in the enabling legislations or that are essential to the natural and cultural integrity of the parks.

4.3.3 Visual Quality

Under the No Action Alternative, no new weather stations would be installed, and there would be no impacts on visual quality.

Cumulative Impacts
Visual quality is affected by the presence and operation of human installations in the backcountry as described in the Cumulative Impacts sections for each park (Section 4.2.1 KATM; Section 4.2.2 KEFJ; and Section 4.2.3 LACL). Few hikers and climbers view existing seismic, climate, and communications stations, which continue to have a minor impact on the pristine visual quality of the areas. During the summer months, however, many pilots and passengers see the existing monitoring stations and other structures located in all three parks. The cumulative impact on visual quality from human installations, plus the more extensive impacts from past mining development, human habitation, roads, and buildings would be minor. The No Action Alternative would not contribute any cumulative impacts on visual quality in any of the three parks.

Conclusion: The No Action Alternative would not have any adverse effects on visual quality at any of the three parks. The level of impact to visual quality from the No Action Alternative would not result in impairment of park resources that fulfill specific purposes identified in the enabling legislations or that are essential to the natural and cultural integrity of the parks.

4.3.4 Soundscape

Under the No Action Alternative, no new weather stations would be installed, thus there would be no impact on the natural soundscapes of the parks.

Cumulative Impacts
Cumulative effects to the natural soundscapes of the parks include the occasional military aircraft, and the more common passenger jets, small aircraft overflights, helicopters operating in the parks, and motor boats. Aircraft and boat noise disturbances are much more frequent during the summer months than other times of year. Helicopter use would be required to access existing RAWS (some every year, some every three years, for routine maintenance), seismic stations, NPS repeaters, and other installations or research projects in the backcountry. These helicopter flights would be direct from the heli-base to the sites and of limited duration, thus noise intrusions would be temporary and of short duration, although spread throughout the parks. Human voices may occasionally be heard at sites where limited visitor access is possible.

Existing and potential noise disturbance in the parks would have minor adverse cumulative impacts on soundscape. The No Action Alternative would not contribute any cumulative impacts on soundscape in any of the three parks.

Conclusion: The No Action Alternative would not result in any impacts to the natural soundscape in any of the three parks. The level of impact to soundscape from the No Action Alternative would not result in impairment of park resources that fulfill specific purposes identified in the enabling legislations or that are essential to the natural and cultural integrity of the parks.

4.3.5 Visitor Experience

Under the No Action Alternative, no new weather stations would be installed and there would be no impacts on visitor experience.

Cumulative Impacts
Park visitors encountering existing RAWS, seismic equipment, radio repeaters, GPS sites, 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. Combined with known past, current and future projects and actions, there would be minor adverse cumulative impacts on visitor experience. The No Action Alternative would not contribute any cumulative impacts on visitor experience at any of the three parks.

Conclusion: The No Action Alternative would not have any adverse impacts on visitor experience.

4.3.6 Wilderness

Under the no-action alternative, no new weather stations would be installed and there would be no impacts on designated wilderness or areas eligible for wilderness designation.

Cumulative Impacts
Twenty-three seismic stations, three NPS radio repeater sites, two PBO CGPS sites, a USCG navigation site, one PUC, and two patrol cabins are among the backcountry installations in KATM that are located in designated wilderness. Almost all the backcountry installations, including the existing RAWS station, one NPS radio repeater site, the two public use cabins, and the ranger station, at KEFJ are located in eligible wilderness. The backcountry installations at LACL that are located in designated wilderness include one RAWS, twelve seismic stations, one radio repeater site, and one PBO CGPS station

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 each park are considered to be minor. This alternative would not contribute any cumulative impacts on wilderness since no new stations would be installed.

Conclusion: The No Action Alternative would not result in any impacts to designated or eligible wilderness areas. The level of impact to wilderness from this alternative would not result in impairment of park resources that fulfill specific purposes identified in the enabling legislations or that are essential to the natural and cultural integrity of the parks.

4.3.7 Cultural Resources

Under the No Action Alternative, no new weather stations would be installed and there would be no impacts on cultural resources
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Cumulative Impacts
All three parks contain historic and archeological sites which evidence rich cultural histories of prehistoric habitation, early native Alaskan camps and villages, and European and Russian exploration and settlement. Prehistoric sites at the three parks are evident by surface lithic scatters generally situated near creek confluences. Impacts to historic and prehistoric resources associated with human activities in the parks 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 of the Katmai National Park have occurred from underground storage tank fuel leaks (NPS, 2004d). Some looting and vandalism of archeological sites have occurred along the outer coast of Katmai and other locations.

Known past, current and future projects and actions would have minor adverse cumulative impacts on cultural resources. This alternative would not contribute any cumulative impacts on cultural resources since no new weather stations would be installed.

Conclusion: The No Action Alternative would not result in any impacts to cultural resources in any of the three parks. The level of impact to cultural resources from the No Action Alternative would not result in impairment of park resources that fulfill specific purposes identified in the enabling legislations or that are essential to the natural and cultural integrity of the parks.

4.4 ALTERNATIVE B: EXPAND CLIMATE MONITORING PROGRAM

4.4.1 Vegetation

Under Alternative B, six new weather stations would be installed at KATM, three at KEFJ, and four at LACL. RAWS have a combined footprint of about 100 square feet (about 0.002 acre), depending on whether gabions are used for anchoring the towers. Although many sites consist of bare rock, rock rubble, and/or small pockets of soil supporting low growing herbaceous vegetation, direct impacts on vegetation would result from anchoring of equipment and foot traffic. In addition to vegetation being trampled or destroyed by anchoring techniques, small areas of vegetation may require clearing beneath and around the towers depending on the site. There would also be localized vegetation trampling from foot traffic during installation and maintenance; however, the area trampled would likely be minimal and limited to the area immediately surrounding the weather stations. Additionally, localized trampling of any existing vegetation from helicopter landings would occur; however, helicopters would land on bare rock or snow wherever possible. Foot traffic and landing zones at each new site would comprise an area of about 360 square feet (about 0.008 acre).

The maximum direct impacts to vegetation from the installation of six stations at KATM, including the equipment footprint (0.012 acres) and foot traffic and landing zones (0.048 acres), would be about 0.06 acres. The Dumpling Mountain site, which would be co-located with an NPS radio repeater, and the Cape Gull site, which would be co-located with a US Coast Guard communications site, would already have some ground disturbance, thus any new vegetation disturbance should be minimal.

The maximum direct impacts to vegetation from the installation of three stations at KEFJ, including the equipment footprint (0.006 acres) and foot traffic and landing zones (0.024 acres), would be about 0.03 acres. The Dinglestadt and Fire Cove sites would need initial brushing to make room for the weather stations, and annual or occasional maintenance to keep the vegetation low. The McArthur Pass site, which would be co-located with an NPS radio repeater, would already have some ground disturbance, thus any new vegetation disturbance should be minimal.

The maximum direct impacts to vegetation from the installation of 4 stations at LACL, including the equipment footprint (0.008 acres) and foot traffic and landing zones (0.032 acres), would be about 0.04 acres. The Hickerson Lake site would need initial brushing to make room for the weather stations, and annual maintenance to keep the vegetation low.

Exotic plants or seeds could be transported to the sites on equipment, clothing and footwear. New introductions could allow for exotic plants to become established and spread, especially in areas where the ground is disturbed by installation activities. However, mitigation to ensure that equipment, clothing and footwear do not contain exotic plant material would be implemented.

Impacts on vegetation, although long-term, would be minor since very little trampling and destruction of plants would occur, especially when compared to thousands of acres of undisturbed vegetation at each park.

Cumulative Impacts
Vegetation in parts of each park has been cleared for construction of buildings, roads, trails, and other 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 parks, including seismic stations, CGPS stations, radio communications sites, and RAWS impact very small areas of vegetation. Maintenance activities at these existing stations would continue to impact vegetation. The cumulative impact on vegetation from human installations, plus the more extensive impacts from past mining development, human habitation, roads, and buildings would be minor. This alternative would also contribute minor adverse cumulative impacts on vegetation in each of the three parks.

Conclusion: Alternative B would result in minor, long-term, adverse impacts to vegetation at all three parks from loss of plants due to anchoring of equipment and vegetation trampling during installation and maintenance of weather stations. The level of impact to vegetation from Alternative B would not result in impairment of park resources that fulfill specific purposes identified in the enabling legislations or that are essential to the natural and cultural integrity of the parks.

4.4.2 Wildlife

Under Alternative B, installation of new weather stations would temporarily displace wildlife in the immediate vicinity during installation of six new stations at KATM, three at KEFJ, and four

at LACL. Disturbance would be temporary as installation would require only one day at each site. Wildlife would be disturbed temporarily by helicopters accessing the sites and by the presence of people. Although there have not been any reports of wildlife disturbance or habituation at existing seismic, RAWS, and other monitoring sites, it is documented that wildlife startle responses to helicopters include fleeing, cessation of foraging, and disruption of bedding (Cote, 1996; Larkin, 1996; Frid, 1999a and 1999b). Frid (1999c) found that activity disruptions occurred when the helicopter was a median distance of 1 km away. Helicopter disturbance during installation would be minor as there would be two to three round-trip flights at each site. Disturbance from maintenance activities on wildlife would be minor as each site would be visited only once every year. Most sites would be accessed by boat or plane for yearly maintenance, which would lessen the impacts on wildlife as compared to those incurred by helicopters.

RAWS have a combined footprint of about 100 square feet, or about 0.002 acre, depending on whether gabions are used for anchoring the towers. Although many sites consist of bare rock, rock rubble, and/or small pockets of soil supporting low growing herbaceous vegetation, direct impacts to wildlife habitat would result from anchoring of equipment and from foot traffic. In addition to wildlife habitat impacts from anchoring techniques, small areas of habitat may require clearing beneath and around the towers depending on the site. There would also be localized habitat disturbance from foot traffic during installation and maintenance; however, this area would likely be minimal and limited to the area immediately surrounding the weather stations. Additionally, localized habitat disturbance from helicopter landings would occur; however, helicopters would land on bare rock or snow wherever possible. Foot traffic and landing zones at each new site would comprise an area of about 360 square feet or about 0.008 acre.

The maximum direct impacts to wildlife habitat from the installation of six stations at KATM, including the equipment footprint (0.012 acres) and foot traffic and landing zones (0.048 acres), would be about 0.06 acres. The Dumpling Mountain site, which would be co-located with an NPS radio repeater, and the Cape Gull site, which would be co-located with a US Coast Guard communications site, would already have some ground disturbance, thus any new disturbance to wildlife habitat should be minimal. Brown bear, caribou, coyote, gray wolf, red fox, and wolverine occur at all proposed sites, but do not tend to stay for long periods of time for feeding or resting. The Arctic ground squirrel and various hares, voles, and shrews are likely to inhabit underground burrows at all of the proposed sites. Moose and ermine occur at the interior sites in the vicinity of small water bodies, wetlands, and riverine areas (Contact Creek and Coville). However, it is unlikely that wildlife species would be susceptible to disturbance from the installation and maintenance of the six weather stations within Katmai as these sites are not located within sensitive nesting, breeding, or foraging habitats.

The maximum direct impacts to wildlife habitat from the installation of three stations at KEFJ, including the equipment footprint (0.006 acres) and foot traffic and landing zones (0.024 acres), would be about 0.03 acres. The McArthur Pass site, which would be co-located with an NPS radio repeater, would already have some ground disturbance, thus any new disturbance to wildlife habitat should be minimal. Species that occur at the sites that could be disturbed during installation and maintenance activities include gulls, other seabirds and black bear at McArthur

Pass, and marine mammals in the vicinity of boat landing; black bears, mountain goats, river otters, and black oystercatchers at Dinglestadt; and black bears at Fire Cove. Disturbing Steller's sea lions that use the nearby Chiswell Islands as haulouts would be avoided when using helicopters to access the Fire Cove site for installation and to change batteries every three years. Bald eagle nests occur in the vicinity of all three sites (approximately 10 near McArthur Pass, one near Dinglestadt, and six near Fire Cove) and could be disturbed by aircraft overflights during nesting season if active.

The maximum direct impacts to wildlife habitat from the installation of 4 stations at LACL, including the equipment footprint (0.008 acres) and foot traffic and landing zones (0.032 acres), would be about 0.04 acres. Species occurring at the sites that could be disturbed during installation and maintenance activities include brown and black bear at all of the proposed sites, Dall's sheep at the two Chigmit Mountain sites, and moose in the Snipe Lake area and possibly at Hickerson Lake (Putera, 2007b). Large numbers (on the order of thousands) of post calving caribou migrate through the Snipe Lake area on their way to forming post calving aggregations west of the park/preserve boundary in June and may spend several days around the lake. Two bald eagle nests occur in the vicinity of Snipe Lake and could be disturbed by aircraft overflights during nesting season if active.

Antifreeze, used in the precipitation tower, is a known attractant for bears, mountain goats, and marmots. Bears have disturbed weather stations at numerous locations throughout Alaska, because of curiosity and apparent interest in the antifreeze solution. However, all containers used to store antifreeze would be highly resistant to damage by animals.

Impacts on wildlife and habitat would be minor since human activity during installation and maintenance would be temporary and of short duration, and very little habitat would be disturbed when considering thousands of acres of untouched habitat in each park.

Cumulative Impacts
Wildlife habitat in parts of each park has been cleared for construction of buildings, roads, trails, and other facilities. 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, CGPS stations, radio communications, and RAWS 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. Subsistence and sport hunting are not permitted on KEFJ lands, but are permitted in the KATM and LACL preserves. Public use cabins, radio repeaters, and ranger stations also add to existing impacts on wildlife and wildlife habitat. The above human installations and public use, plus the more extensive impacts from past mining development, human habitation, roads, buildings and land applications have resulted in long and short-term habitat loss, displacement of wildlife, and increased human-wildlife conflicts. Combined with known past, current and future projects and actions, there would be minor adverse cumulative impacts on wildlife. This alternative would contribute minor adverse cumulative impacts on wildlife and habitat in each of the three parks

Conclusion: Alternative B would result in minor, temporary, adverse impacts to wildlife and minor, long-term, adverse impacts to wildlife habitat from displacement of wildlife and

disturbance of wildlife habitat during installation and maintenance of weather stations. The level of impact to wildlife from Alternative B would not result in impairment of park resources that fulfill specific purposes identified in the enabling legislations or that are essential to the natural and cultural integrity of the parks.

4.4.3 Visual Quality

Under Alternative B, six new weather stations would be installed at KATM, three at KEFJ, and four at LACL. The visual quality and aesthetics at each site would be affected by the two weather towers at each station which would be visible to visitors who may encounter the sites. As discussed in the Affected Environment chapter (Section 3.3.1 KATM; Section 3.3.2 KEFJ; and Section 3.3.3 LACL), there is also the possibility that the stations could be visible to a few hikers and climbers from a distance of one to two miles where located on exposed ridges, but varies greatly with the viewing angle and whether the towers are silhouetted against the sky or against terrestrial background. During the summer months, however, many pilots and passengers would see the weather stations from low-flying aircraft.

At Katmai, two of the proposed sites would be most readily visible to visitors; the other sites would rarely be seen except by pilots and passengers in overhead aircraft. At the Dumpling Mountain site, hikers who reach the summit would be able to readily see the station site (along with the co-located NPS radio repeater). The Contact Creek site could be seen by the occasional bear viewers and anglers who land at the adjacent unimproved landing strip and hike to Contact Creek during the summer months.

At Kenai Fjords, the sites would be seen mainly by occasional aircraft. Additionally, the Dinglestadt site could be seen by a small number of backcountry kayakers who recreate in upper McCarty Fjord.

At Lake Clark, few visitors would see any of the sites. The Hickerson Lake area receives numerous aircraft overflights, likely more than the other sites. The Snipe Lake site could be seen by hunters and other visitors to Snipe Lake.

The overall impact on the pristine visual quality of the areas would be minor because installations would be small and visible only from short distances by a few visitors.

Cumulative Impacts
Visual quality is affected by the presence and operation of human installations in the backcountry as described in the Cumulative Impacts sections for each park (Section 4.2.1 KATM; Section 4.2.2 KEFJ; and Section 4.2.3 LACL). Few hikers and climbers view existing seismic, weather, and communications stations, which continue to have a minor impact on the pristine visual quality of the areas. During the summer months, however, many pilots and passengers see the existing monitoring stations and other structures located in all three parks. Combined with known past, current and future projects and actions, there would be minor adverse cumulative impacts on visual quality. This alternative would contribute minor cumulative impacts on visual quality in each of the three parks.

Conclusion: Alternative B would result in minor adverse impacts to visual quality from the permanent installation and presence of weather stations. The level of impact to visual quality from Alternative B would not result in impairment of park resources that fulfill specific purposes identified in the enabling legislations or that are essential to the natural and cultural integrity of the parks.

4.4.4 Soundscape

Under Alternative B, six new weather stations would be installed at KATM, three at KEFJ, and four at LACL. Helicopters, which would be required for initial installation of the stations, would intrude upon the natural soundscape for one day at each site, with two to three round-trip flights that day.

Subsequent to initial weather station installation, site visits would be conducted annually for routine maintenance at all sites. Maintenance of most stations would not require helicopter access; rather sites could be reached by boat or fixed wing aircraft on wheels, floats, or skis (Table 2-1), all of which produce less noise than helicopters. Use of boats and fixed wing aircraft would reduce the amount of helicopter flight time and associated noise intrusions. Helicopters would be required for access to McArthur Pass, Fire Cove, and Dumpling Mountain every three years when batteries need to be replaced. All access for maintenance would require one helicopter or fixed wing round-trip flight (or one boat trip) per site once a year.

The six new stations at KATM would require 12 to 18 helicopter flights over the course of six days for station installation. Helicopter would be used for all maintenance at the Cape Gull site since it is the only means available for access. Annual maintenance at the Dumpling Mountain site could be coordinated to occur at the same time as maintenance of the co-located NPS radio repeater. If so, it is likely that access for maintenance at Dumpling Mountain would also be via helicopter each year. There would also be one round-trip flight helicopter flight every three years at Dumpling Mountain for battery replacement. Thus every year, there would be a minimum of one helicopter flight day, and possibly two, for maintenance.

The three new stations at KEFJ would require six to nine helicopter flights for station installation. Boat and foot access for maintenance would be used whenever possible. Annual maintenance at the McArthur Pass site could be coordinated to occur at the same time as maintenance of the co-located NPS radio repeater. If so, it is likely that access for maintenance at McArthur Pass would be via helicopter each year. There would also be two helicopter flight days every three years for battery replacement at McArthur Pass and Fire Cove, with one round-trip flight per day. The Dinglestadt site would only be accessed by boat and foot for yearly maintenance. Thus every year, there could be a minimum of one helicopter flight day for maintenance.

The four new stations at LACL would require eight to twelve helicopter flights for station installation. There would be no helicopter flight days for maintenance of RAWS.

Since helicopter-produced sound can be heard at long distances (see Table 3-1 for sound levels of helicopters at various distances), the natural soundscape would be diminished. However, these

intrusions of the natural soundscape would be minor as they would be temporary and of short duration, and would occur very few days each year at each park.

Cumulative Impacts
Cumulative effects to the natural soundscapes of the parks include the occasional military aircraft, and the more common passenger jets, small aircraft overflights, helicopters operating in the parks, and motor boats. Aircraft and boat noise disturbances are much more frequent during the summer months than other times of year. Helicopter use would be required to access existing RAWS (some every year, some every three years, for routine maintenance), seismic stations, NPS repeaters, and other installations or research projects in the backcountry. These helicopter flights would be direct from the heli-base to the sites and of limited duration, thus noise intrusions would be temporary and of short duration, although spread throughout the parks. Human voices may occasionally be heard at sites where limited visitor access is possible.

Combined with known past, current and future projects and actions, there would be minor adverse cumulative impacts on soundscape. Alternative B would contribute minor cumulative impacts on soundscape in each of the three parks.

Conclusion: Alternative B would result in minor adverse impacts on soundscape from noise intrusions during installation and maintenance of weather stations. The level of impact to soundscape from Alternative B would not result in impairment of park resources that fulfill specific purposes identified in the enabling legislations or that are essential to the natural and cultural integrity of the parks.

4.4.5 Visitor Experience

Under Alternative B, six new weather stations would be installed at KATM, three at KEFJ, and four at LACL. Park visitors encountering RAWS equipment at close range, or subjected to overhead aircraft noise during installation and maintenance, could have a diminished visitor experience. Due to the remote location and inaccessibility of many of the sites, as well as the limited time during which sites would be installed or maintained, it is estimated that a very small percentage of annual visitors at each of the three parks would be impacted.

At KATM, the Dumpling Mountain site would have the highest probability of visitors encountering the station at close range due to its accessibility via hiking and close proximity to Brooks Camp which receives approximately one quarter of all visitation at the park. In addition, Brooks Camp visitors are likely to be disturbed by helicopter access to the site for installation and maintenance. This disturbance, however, would be temporary and of short duration. The Contact Creek site is adjacent to an unimproved landing strip used to transport park staff and bear viewers and anglers. Use is sporadic during the summer months but hiking is common from the landing strip to Contact Creek, thus there could be a fair number of visitors who may encounter the weather station. The other proposed sites at KATM would have very little likelihood of encounters by visitors.

At KEFJ, Dinglestadt is the only site where visitors may have close contact with the weather station Kayakers or other boaters can land on the beach and hike to the site. However, very few

people visit McCarty Fjord, where the Dinglestadt site is located. Additionally, it is unlikely that aircraft overflights to access any of the three sites for installation and maintenance would disturb many if any visitors on the ground.

At LACL, it is unlikely that visitors would encounter any of the sites, with the possible exception of hunters at Snipe Lake. However, the level of hunting in that area has diminished in recent years. Likewise, it is unlikely that aircraft overflights to access any of the four sites for installation and maintenance would disturb many if any visitors on the ground.

The impact on visitor experience at all three parks would be negligible as the likelihood of visitors encountering the sites would be very low and few visitors would be disturbed by aircraft accessing the sites for installation and maintenance.

Cumulative Impacts
Park visitors encountering RAWS, seismic equipment, radio repeaters, GPS sites, 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.

Combined with known past, current and future projects and actions, there would be minor adverse cumulative impacts on visitor experience. Alternative B would contribute negligible cumulative impacts on visitor experience at the three parks as very few visitors are likely to encounter them compared to other existing facilities.

Conclusion: Alternative B would likely result in negligible adverse impacts to visitor experience from encounters with the stations and noise from overhead aircraft during installation and maintenance of weather stations.

4.4.6 Wilderness

Under Alternative B, six new weather stations would be installed at KATM (five in designated wilderness, one in eligible wilderness), three at KEFJ (all in eligible wilderness), and four at LACL (two in designated wilderness, two in eligible wilderness). Wilderness resource values, including undeveloped, untrammeled, naturalness, and opportunity for solitude or unconfined recreation, would experience impacts from helicopter, fixed wing airplane, and boat visits to install and maintain the weather stations, and from these facilities which would remain in the wilderness indefinitely. A Minimum Requirements/ Minimum Tool Analysis for this project is included in Appendix B.

The undeveloped and untrammeled qualities of wilderness would be diminished by the addition of 13 new long term installations. The footprints of the impacts would be small and inconspicuous (0.002 acre at each site), but the stations would affect the intrinsic value of large, untrammeled and undeveloped wilderness landscapes. Of the 13 stations proposed in wilderness or eligible wilderness, three would be co-located or near existing radio repeater sites or communication installations which would already have some ground disturbance and visual impacts (Table 2-1); the remaining ten proposed RAWS in wilderness or eligible wilderness, would be located on previously undisturbed sites. Natural ecosystem processes would continue

and the naturalness of the wilderness would not be affected. The value of wilderness includes the opportunity for solitude or unconfined recreation. A wilderness experience is partly dependent on a wilderness setting without facilities or where "the imprint of mans work (is) substantially unnoticeable" (Wilderness Act Sec. 2(c) (1). The presence of the stations and the yearly maintenance visits via helicopter, fixed wing airplane, or boat would have would have a minor temporary and site specific effect on the opportunity for solitude.

Cumulative Impacts
Twenty-three seismic stations, three NPS radio repeater sites, two PBO CGPS sites, a USGS navigation site, one PUC, and two patrol cabins are among the backcountry installations in KATM that are located in designated wilderness. Almost all the backcountry installations, including the existing RAWS station, the two NPS radio repeater sites, the two public use cabins, and the ranger station, at KEFJ are located in eligible wilderness. The backcountry installations at LACL that are located in designated wilderness include one RAWS, twelve seismic stations, one radio repeater site, and one PBO CGPS station.

These human developments are small and the cumulative effects on the resources and values of the vast area of wilderness and eligible wilderness are considered to be minor. This alternative would contribute minor adverse cumulative impacts from the installation of five new stations in designated wilderness at KATM and one in eligible wilderness, three in eligible wilderness at KEFJ, and two in designated wilderness, two in eligible wilderness at LACL. Combined with known past, current and future projects and actions, there would be minor adverse cumulative impacts on wilderness.

Conclusion: Alternative B would result in minor adverse impacts to wilderness from the installation and maintenance of 13 new weather stations in designated or eligible wilderness at the three parks. The level of impact to wilderness from Alternative B would not result in impairment of park resources that fulfill specific purposes identified in the enabling legislations or that are essential to the natural and cultural integrity of the parks.

4.4.7 Cultural Resources

At KATM, the Pfaff Mine, Coville, Contact Creek, and Dark South stations would be on previously undisturbed sites. The potential for the occurrence of cultural resources at the Dark South site is low. The Pfaff Mine site is located near the historic Pfaff Mine, so it is possible that cultural resources could be found at this location. Although not surveyed, there is high potential for occurrence of cultural resources at Coville. At Contact Creek, surface archeological sites have been previously found near the site, so there is potential for cultural resources at the site as well. Archeological sites would not be approached during installation or maintenance of the station. At the sites where there is potential for occurrence, installation of new weather stations could impact cultural resources; however, mitigation measures would reduce these impacts greatly. The Dumpling Mountain and Cape Gull sites would be co-located with an existing NPS radio repeater and USCG communications site respectively, thus it is unlikely that any new impacts would occur as the sites are already disturbed.

None of the proposed sites at KEFJ have been surveyed for cultural resources. However, two archeological sites have been identified in the McArthur Pass area (although not in the vicinity of the proposed RAWS station). These sites would be avoided when accessing the McArthur Pass site. The McArthur Pass site is on land that was conveyed to the English Bay Corporation and subsequently purchased back by the NPS. Under the purchase deed agreement, English Bay retained ownership rights to all historic and prehistoric archeological and cultural artifacts on those lands, and Chugach Alaska Corporation retains sub-surface rights at the site.

The Chigmit Mountains, Chigmit Mountains North, and Hickerson Lake sites at LACL are remote or inhospitable to human activity, thus no cultural resources would be expected to occur at any of them. The Snipe Lake site is located on a landform where multiple prehistoric archeological sites have been previously identified. It is possible that additional artifacts could be found when installing the station at Snipe Lake. However, mitigation measures including on site monitoring by archeologists would greatly reduce any potential impacts to cultural resources.

If any archeological or historical resources would be discovered during installation at any of the new stations, the installation would be halted and the NPS Superintendent and park cultural resource managers would be notified as soon as possible. No further action would take place until the NPS provides clearance, which would occur sometime after consultation with the State Historic Preservation Office and affected Native communities. Additionally, none of the proposed weather stations at any of the parks would be located in historic districts or cultural landscapes. Impacts on cultural resources would be negligible as many of the proposed sites likely do not contain cultural resources and great care would be taken to avoid adverse effects at sites where they could occur.

Cumulative Impacts
All three parks contain historic and archeological sites which evidence rich cultural histories of prehistoric habitation, early native Alaskan camps and villages, and European and Russian exploration and settlement. Prehistoric sites at the three parks normally occur as lithic scatters on ridges or hill tops, or as settlements near stream mouths, confluences and the heads of bays. Impacts to historic and prehistoric resources associated with human activities in the parks 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 of the KATM have occurred from underground storage tank fuel leaks (NPS, 2004d). Some looting and vandalism of archeological sites have occurred along the outer coast of Katmai and other locations.

Combined with known past, current and future projects and actions, there would be minor adverse cumulative impacts on cultural resources. This alternative would contribute negligible adverse cumulative impacts on cultural resources.

Conclusion: Alternative B would result in negligible adverse impacts to cultural resources from the installation of new weather stations. The level of impact to cultural resources from Alternative B would not result in impairment of park resources that fulfill specific purposes

identified in the enabling legislations or that are essential to the natural and cultural integrity of the parks.

CHAPTER 5: 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
ANILCA SECTION 810(A)
SUMMARY EVALUATION AND FINDINGS

I. INTRODUCTION

This evaluation and finding was prepared to comply with Title VIII, Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA). It evaluates the potential restrictions to subsistence uses, which could result from National Park Service (NPS) installation and maintenance of remote automated weather stations (RAWS) at sites in Katmai National Park and Preserve (KATM), Kenai Fjords National park (KEFJ), and Lake Clark National Park and Preserve (LACL). The Environmental Assessment (EA) describes a no-action alternative and a proposed action alternative for consideration.

Subsistence uses, as defined by ANILCA, section 803, means "the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools or transportation; for the making and selling of handicraft articles out of non-edible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade." Subsistence activities include hunting, fishing, trapping, and collection of berries, edible plants, and wood or other materials.

II. EVALUATION PROCESS

Section 810(a) of ANILCA states:

“In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the Federal agency having primary jurisdiction over such lands or his designee shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for the purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit, or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be affected 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 to accomplish the purposes of such use, occupancy, or other disposition, 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.

KATM
A proclamation by President Woodrow Wilson in 1918 created Katmai National Monument from a reservation of approximately 1,700 square miles. Three major purposes of the monument designation were 1) to preserve an area important to the study of volcanism, 2) to preserve the Valley of Ten Thousand Smokes and 3) to conserve an area potentially popular with persons seeking unique scenery and for those with scientific interest. Increased in 1931 to include Brooks Lake, Grosvenor Lake, Lake Colville and part of Naknek Lake; again in 1942 to include offshore islands within five miles of the monument coastline; and again in 1969 to include the remainder of Naknek Lake, the monument grew to contain 4,361 square miles.

With the passage of the ANILCA in 1980 the designation of 3.7 million acres of the monument was changed to a national park, and an additional 308,000 acres was included as a national preserve. Furthermore, 3.4 million acres of the park and preserve were designated as wilderness. Katmai National Preserve was created by the 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 taking of fish and wildlife for subsistence uses is allowed by the ANILCA within Katmai National Preserve pursuant to Section 203, however, subsistence activities are not authorized within Katmai National Park.

KEFJ
The national park contains approximately five hundred and sixty-seven thousand acres of public lands, and was created by ANILCA, Section 201(5) for the following purposes:

"The park shall be managed for the following purposes, among others: To maintain unimpaired the scenic and environmental integrity of the Harding Icefield, its outflowing glaciers, and coastal fjords and islands in their natural state; and to protect seals, sea lions, other marine mammals, and marine and other birds and to maintain their hauling and breeding areas in their natural state, free of human activity which is disruptive to their natural processes.”

Section 201 (5) of ANILCA did not authorize subsistence uses within KEFJ.

LACL
Lake Clark National Park containing approximately 2,439,000 acres of public lands, and Lake Clark National Preserve, containing approximately 1,214,000 acres of public lands, was established by ANILCA Section 201(7) (a) for the following purposes, among others:

“To protect the watershed necessary for the perpetuation of the red salmon fishery in Bristol Bay; to maintain unimpaired the scenic beauty and quality of the portions of the Alaska Range and the Aleutian Range, including active volcanoes, glaciers, wild rivers, lakes, waterfalls, and alpine meadows in their natural state; and to protect habitat for the populations of fish and

wildlife including but not limited to caribou, Dall sheep, brown/grizzly bears, bald eagles, and peregrine falcons."

ANILCA Section 201(7)(b) and NPS regulations authorize subsistence uses within LACL where such uses are traditional in accordance with the provisions of ANILCA Title VIII.

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

III. PROPOSED ACTION ON FEDERAL PUBLIC LANDS

The Alternative section of the EA describes in detail the alternatives for consideration. Following is a brief summary of each.

Alternative A - No Action: No additional climate monitoring stations would be established. Climate data would continue to be collected using existing methods.

Alternative B - (NPS preferred alternative)
The NPS proposed to establish and expand the RAWS network in KATM, KEFJ, and LACL. The proposed action would establish additional stations to collect basic climatological data including air temperature, precipitation, relative humidity, wind speed and direction, solar radiation, and snow depth. Because climate is a basic driver of ecological systems, weather measurements are important for understanding the relationship between climate and components of biotic and abiotic systems. Without climate data, it is difficult to understand and appreciate the causes of a variety of ecosystem changes. New permanent RAWS would be established as follows in:

KATM - the installation and maintenance of the six weather stations within KATM would each affect a small area of land (25 ft by 25 ft). Five of the six stations (Cape Gull, Contact Creek, Coville, Dark South, and Dumpling Mountain) would be located entirely within Katmai National Park while one station (Pfaff Mine) would be located within Katmai National Preserve in close proximity to the Katmai National Park boundary.

KEFJ - the installation and maintenance of two stations in KEFJ.

LACL - the installation and maintenance of four stations in LACL.

Comprehensive descriptions and locations of each proposed weather station is located in the Environmental Assessment (EA). These unmanned stations, consisting of a battery-powered weather instrumentation unit and separate snowfall measuring unit, would become part of the Southwest Alaska Network (SWAN) climate monitoring system and provide baseline weather information and supporting climate trend analysis.

IV. AFFECTED ENVIRONMENT

KATM
ANILCA and Federal regulations do not authorize subsistence uses in Katmai National Park. However, subsistence uses are allowed within Katmai National Preserve. Katmai National Preserve is located on the northern end of the Alaska Peninsula. ANILCA also authorized subsistence uses on adjacent federal public lands managed by the Bureau of Land Management (BLM) and the US Fish and Wildlife Service (USFWS).

The installation and maintenance of the six weather stations within KATM would each affect a small area of land (25 ft by 25 ft). Five of the six stations (Cape Gull, Contact Creek, Coville, Dark South, and Dumpling Mountain) would be located entirely within Katmai National Park while one station (Pfaff Mine) would be located within Katmai National Preserve in close proximity to the Katmai National Park boundary.

The Pfaff Mine site is situated within a mountainous tundra-covered bench (elevation 1,900 feet) which separates the Moraine Creek drainage to the north from the Battle Lake drainage to the south. This specific area provides suitable habitat for caribou, moose, snowshoe hare, beaver, lynx, fox, coyote, wolf, and wolverine; grouse and ptarmigan; and rainbow trout, salmon, and other freshwater fish species. The area consists of low tundra ground cover (crowberry, lichen, and grasses) with occasional small patches of low willow and alder shrubs.

Subsistence activities in Katmai National Preserve include hunting, trapping, fishing, gathering firewood, picking berries and wild plants, and gathering bird eggs. The area is used for subsistence by residents of Kokhanok, Igiugig, Levelock, Naknek and King Salmon to harvest caribou, brown bear, moose, beaver, snowshoe hare, fox, lynx, mink, wolf, wolverine, ptarmigan, waterfowl, salmon, trout, berries, wild edible plants and other wood resources.

Regional subsistence activities include seasonal gathering of wild edible plants and berries, hunting, trapping, and fishing. The main subsistence species are moose, caribou, furbearers, and fish. Subsistence fish include Coho salmon, king salmon, sockeye salmon, northern pike, burbot, Dolly Varden, arctic grayling, lake trout, rainbow trout, and whitefish. Beaver, coyote, red fox, gray wolf, wolverine, river otter, weasel, lynx, marten, mink, and muskrat are important furbearer resources. Subsistence birds include rock and willow ptarmigan, grouse, ducks, and geese.

The NPS recognizes that patterns of subsistence use vary from time to time and from place to place depending on the availability of wildlife and other renewable natural resources. A subsistence harvest in a given year may vary considerably from previous years because of weather, migration patterns, and natural population cycles.

KEFJ was established by ANILCA in 1980. Located on the Kenai Peninsula in Game Management Unit 7, KEFJ contains impressive geologic features, scenery, wildlife and human history.

ANILCA and National Park Service regulations authorize subsistence use of resources in all Alaska national parks, monuments and preserves with the exception of Kenai Fjords National Park, Glacier Bay National Park, Katmai National Park, Klondike Gold Rush National Historical Park, “old” Mount McKinley National Park, and Sitka National Historical Park (Codified in 36

CFR part 13, Subparts A, B, and C). Consequently there are no Federal subsistence open seasons for wildlife harvest within Kenai Fjords National Park.

In accordance with Title VIII of ANILCA, subsistence uses are allowed on adjacent federal public lands within Kenai National Wildlife Refuge and Chugach National Forest. Federal regulations allow qualified rural residents to use fish and wildlife population for subsistence purposes on National Forest and USFWS lands.

Regional subsistence activities that occur outside the park include hunting, fishing, trapping, berry picking and plant gathering. Black bear, moose, fish, furbearers, small mammals, waterfowl, berries, edible plants, and wood constitute the major subsistence resources used by qualified rural residents.

LACL

Subsistence uses are allowed within LACL in accordance with Titles II and VIII of ANILCA. The national preserve is open to federal subsistence uses and state authorized general (sport) hunting, trapping and fishing activities. Qualified local rural residents who live in one of the park's designated resident zone communities or have a special subsistence use permit issued by the park superintendent may engage in subsistence activities within the national park. State-regulated sport fishing is also allowed in the national park. The proposed action would potentially affect both park and preserve lands.

Historical resource utilization patterns, such as fish camps or communal hunts, are linked to traditional social and subsistence use patterns. Sharing of resource occurs between park resident zone communities, as well as other communities throughout the region.

The landscape included within LACL ranges from forests and tundra to the rock and ice of high mountains. Some of the major resources used for subsistence are black bear, brown bear, moose, dall sheep, beaver, snowshoe hare, fox, lynx, mink, wolf, wolverine, ptarmigan, waterfowl, salmon, trout, clams, berries, wild edible plants, and other wood resources. Lowlands with LACL support nesting habitat for ducks, geese, swans, grouse and ptarmigan.

Comprehensive descriptions of the affected subsistence environment can be found in the following documents and web sites:

- Code of Federal Regulations, Title 36 Part 13, National Park System Units in Alaska, NPS, 2007.
- Alaska Department of Fish and Game General and Subsistence Harvest Information and Publications online at: http://www.state.ak.us/adfg
- Federal Subsistence Management Regulations, Office of Subsistence Management, FWS, 2007. Information and Publications online at: http://alaska.fws.gov/asm/home.html
- National Park Service Management Policies, NPS, 2006. Information and Publications online at: http:// ww.nps.gov/policy
- Who's Counting, National Parks Conservation Association, 2006.
- NPS Subsistence Strategic Plan, NPS, 2004.
- Alaska Subsistence, NPS Management History, NPS 2002

- KATM Final Environmental Impact Statement, Wilderness Recommendation, NPS, 1988.
- KEFJ Final Environmental Impact Statement, Wilderness Recommendation, NPS, 1988.
- LACL, Final Environmental Impact Statement, Wilderness Recommendation, NPS, 1988.
- KATM Final General Management Plan, Land Protection Plan, NPS, 1986.
- KEFJ Final General Management Plan, Land Protection Plan, NPS, 1986.
- LACL, Final General Management Plan, Land Protection Plan, NPS, 1986.

The NPS recognizes that patterns of subsistence use vary from time to time and from place to place depending on the availability of wildlife and other renewable natural resources. A subsistence harvest in a given year may vary considerable from previous years due to weather conditions, migration patterns, and natural population cycles.

V. SUBSISTENCE USES AND NEEDS EVALUATION

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

The evaluation impact criteria are:

The potential to reduce important subsistence fish and wildlife populations by (a) reductions in number, (b) redistribution of subsistence resources, or (c) habitat losses;

what affect the action might have on subsistence fisherman or hunter access;

the potential for the action to increase fisherman or hunter competition for subsistence resources.

1. The potential to reduce populations:

(a) Reduction in Numbers:

The proposed installation and maintenance of each station is not expected to significantly restrict subsistence resources, their distribution or habitat. Installation and maintenance activities may temporary displace wildlife in the immediate vicinity of the stations. The footprint of the sites is small, 25 feet by 25 feet. Any wildlife habitat loss would be extremely minor. The proposed actions are not expected to significantly reduce populations of important subsistence resources.
.

(b) Redistribution of Resources:

The alternatives are not expected to cause a disturbance to habitat thereby reducing certain subsistence resources. The superintendent may enact closures and/or restrictions if necessary to protect subsistence uses or park resources.

(c) Habitat Loss:

The proposed alternatives are not expected to manipulate subsistence habitats or result in any measurable reduction in or redistribution of wildlife or other subsistence resources. Provisions of ANILCA, Federal regulations provide the tools for adequate protection of fish and wildlife populations within region while ensuring a subsistence priority for local rural residents. In addition, the Federal managers may enact closures and/or restrictions if necessary to assure the continued viability of a particular fish or wildlife population.

2. Restriction of Access*:*
The proposed alternatives are not expected to significantly change regional subsistence use patterns on federal public lands. Access for traditional subsistence uses is granted pursuant to ANILCA, sections 811(a)(b) and 1110(a) and NPS regulations.

3. Increase in Competition:
The alternatives are not expected to result in an increase in competition for subsistence resource on federal public lands, which are open to eligible subsistence users. Federal regulations and provisions of ANILCA mandate that if and when it is necessary to restrict taking of fish or wildlife subsistence users are given a priority over other user groups. Continued implementation of the ANILCA provisions should mitigate any increased competition from resource users other than subsistence users. Federal managers may enact restrictions if necessary to protect the continued viability of a particular fish or wildlife population.

VI. AVAILABILITY OF OTHER LANDS

The proposed actions are consistent with NPS mandates and the General Management Plans for each of the areas. No other alternatives that would reduce or eliminate the use of public lands needed for subsistence purposes were identified.

VII. ALTERNATIVES CONSIDERED

No other alternatives were considered.

VII. FINDINGS

This analysis concludes that the proposed actions would not result in restriction of subsistence uses.

APPENDIX B
WILDERNESS MIMIMUM REQUIREMENT/
MINIMUM TOOL ANALYSIS

ARTHUR CARHART NATIONAL WILDERNESS TRAINING CENTER

MINIMUM REQUIREMENTS DECISION GUIDE

WORKSHEETS FOR SWAN CLIMATE MONITORING STATIONS PROJECT

". . . 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.

Step 1: Determine if any administrative action is necessary.

Description: Briefly describe the situation that may prompt action.

Three parks comprise the Southwest Alaska Network (SWAN) of parks within the Inventory and Monitoring (I&M) program. These parks wish to place climate monitoring stations at 13 locations in eligible and designated wilderness as a part of the I&M program.

Katmai National Park and Preserve (KATM), Lake Clark National Park and Preserve (LACL), and Kenai Fjords National Park (KEFJ) exhibit extreme topographic and geographic gradients and climate variability due to their extent and locations on the Seward Peninsula and Alaska Peninsula. In large wilderness parks such as these, understanding how climate variability and change relates to complex ecological systems is important to the National Park Service (NPS). The SWAN network is lacking the data necessary to establish baseline climate information and monitor long-term climate trends as directed by the National Parks Omnibus Management Act (1998). Existing weather stations in the area are focused primarily on the safety and needs of the aviation community, the primary form of transportation in the area, and are thus usually co-located with the region's sparse human development. These weather stations are commonly located at lower elevations near large lakes or coastal areas and outside of national parks, monuments, and preserves. Several of these stations are located in the communities of King

Salmon, Naknek, and Iliamna and on Kodiak Island. Although two weather stations are located within LACL at Port Alsworth and north of Lake Telaquana, the majority of these weather stations near LACL are commonly located within or near the small communities of Drift River, Iliamna, Iniskin, and Kokhanok. Weather stations or climate information are collected in KEFJ in the town of Seward and from the existing RAWS on the Harding Icefield and the snow course at Exit Glacier.

Better understanding of the ecological processes and changes that are resulting from climate change directly relates to the protection of wilderness ecosystems and the natural, untrammeled nature of the wilderness character in the SWAN parks.

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

A. Describe Options Outside of Wilderness

Is action necessary within wilderness?

Yes: X☐ **No:** ☐

Explain:

Yes. Nearly all of the lands within the SWAN parks are either designated wilderness or are managed as eligible wilderness under NPS management policies based on the wilderness suitability assessments completed concurrently with the GMPs for the parks. Existing weather stations in southwest Alaska are already primarily co-located with the region's sparse human development. These stations are commonly located at lower elevations (< 500 feet) near large lakes or coastal areas and outside of national parks, monuments, preserves, and wilderness areas. Existing weather stations were placed within or near small communities to provide up-to-date and reliable weather information to federal, state, and local agencies. An additional assortment of locations for climate monitoring stations is required to represent the widest range of topographic and geographic gradients within SWAN.

Several of these gradients, particularly mid-elevation slopes (≥ 500 feet) within the KATM interior lakes region and facing the KATM coast are located entirely within the Katmai Wilderness. Placing the weather stations outside of the Katmai Wilderness would limit the usefulness of the data and would not meet the goals and objectives of the SWAN Vital Signs Monitoring Plan.

A number of weather stations would be strategically placed to represent the widest range of topographic and geographic gradients within LACL. The weather stations placed within the coastal and interior portions of LACL would be located outside of Wilderness. However, to successfully monitor weather and climate throughout the topographic and geographic gradients within LACL, two weather stations would need to be placed within the higher elevation (≥ 3,000 feet) portions of the park which comprise the Alaska and Aleutian Ranges. These higher elevation mountain ranges are located entirely within the Lake Clark Wilderness. Placing the weather stations outside of the LACL Wilderness would limit the usefulness of the data and would not meet the goals and objectives of the SWAN Vital Signs Monitoring Plan.

Three weather stations would be placed in KEFJ to characterize maritime conditions along the northern Gulf Coast of Alaska, both at high and low elevations. These weather stations would

be located in areas eligible for wilderness. Placing the weather stations outside of the KEFJ eligible Wilderness would limit the usefulness of the data and would not meet the goals and objectives of the SWAN Vital Signs Monitoring 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: ☐ **No:** X☐ **Not Applicable:** ☐

Explain: There is no provision in ANILCA which requires the NPS to place these facilities for its own purposes. However, Sec. 1310(b) does allow other agencies to apply to the NPS for placement of weather stations which "shall be permitted…in accordance with such terms and conditions as may be mutually agreed in order to minimize the adverse effects of such activities within such unit." ANILCA foresaw the potential need for additional weather stations in the vast conservation system units established by that law.

C. Describe Requirements of Other Legislation

Is action necessary to meet the requirements of other laws?

Yes: ☐ **No:** X☐ **Not Applicable:** ☐

Explain: No other laws specifically require action for the installation and maintenance of weather monitoring stations within SWAN wilderness.

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: X☐ **No:** ☐ **Not Applicable:** ☐

Explain:

National Park Service 2006 Management Policies

Weather station installation and maintenance activities within the SWAN Wilderness would conform to specific NPS Management Policies (2006):

> Section 4.2.1—NPS-conducted or –sponsored Inventory, Monitoring, and Research Studies
>
> *The Service will:*
> *Identify, acquire, and interpret needed inventory, monitoring and research…..to obtain information and data that will help park management accomplish park management objectives…*

Define, assemble, and synthesize comprehensive baseline inventory data describing he natural resources under NPS stewardship, and identify the processes that influence those resources;

Section 6.3.6.1 – General Policy (Scientific Activities in Wilderness)

Research and monitoring devices (e.g., video cameras, data loggers, meteorological stations) may be installed and operated in wilderness if (1) the desired information is essential for the administration and preservation of wilderness and cannot be obtained from a location outside of wilderness without significant loss of precision and applicability; and (2) the proposed device is the minimum requirement necessary to accomplish the research objective safely…

…Devices located in wilderness would be removed when determined to be no longer essential. Permanent equipment caches are prohibited within wilderness. Temporary caches must be evaluated using the minimum requirement concept.

All scientific activities, including the installation, servicing, removal, and monitoring of research devices, would apply minimum requirement concepts and be accomplished in compliance with Management Policies, director's orders, and procedures specified in the park's wilderness management plan.

Katmai National Park and Preserve General Management Plan

The KATM General Management Plan (1986) provides additional guidance for the proposed project:

Natural Resource Management – Inventories and Monitoring (page 50): *Natural processes that are fundamental to the ecosystems of Katmai would be identified, and a monitoring program would be established to obtain baseline information and identify human-induced disturbances.*

Lake Clark National Park and Preserve General Management Plan

The LACL General Management Plan (1984) provides additional guidance for the proposed project:

Resource Management – Geologic Resources (page 10): *Climate and fire-weather data would be gathered by observation and recording instruments at selected locations. In addition to the normal records of temperature, precipitation, snowfall, relative humidity, and wind strength and direction, records of snow depth and water content would be kept for specific areas determined by park wildlife specialists to gain information about wildlife wintering conditions.*

Kenai Fjords National Park General Management Plan

The KEFJ General Management Plan (1984) provides additional guidance for the proposed project:

Natural Resources (page 71)- *Elicit the corporation of knowledgeable individuals, groups, institutions, and agencies in collecting the most current and complete information and data about the natural resources, including climate, weather, glaciers*

and glacier activity; and the effects of motorized equipment and vehicles on the natural resources.

The KEFJ Resource Management Plan (1999) (page N-120-4) indicates that additional automated weather stations should be established in the park.

> Monitoring: Objective N-120.033: *To improve geological coverage of the park, additional automated meteorological stations would be established in areas that are representative of the park's different climatic regimes.*

Southwest Alaska Network (SWAN) Vital Signs Monitoring Plan

The proposed project would also conform to the goals of the NPS Vital Signs Monitoring Program (SWAN Vital Signs Monitoring Plan Section 1.7 – Monitoring Goals, Objectives, and Questions). These goals are to:

- *Determine the status and trends in selected indicators of the condition of park ecosystems to allow managers to make better-informed decisions and to work more effectively with other agencies and individuals for the benefit of park resources.*
- *Provide early warning of abnormal conditions of selected resources to help develop effective mitigation measures and reduce costs of management.*
- *Provide data to better understand the dynamic nature and condition of park ecosystems and to provide reference points for comparisons with other, altered environments.*
- *Provide data to meet certain legal and Congressional mandates related to natural resource protection and visitor enjoyment.*
- *Provide a means of measuring progress towards performance goals.*

To meet these goals, two objectives were developed to answer questions related to the weather and climate of SWAN parks. Objective 1 is to understand the natural range of variation in weather patterns across the SWAN parks. Objective 2 is to understand general climate trends in network parks, including changes due to Pleistocene ice retreat and global climate change.

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?

Explain: With the rapid change in global climate, the discussion among ecologists and wilderness managers has turned to attempting to understand the place and role of protected areas and lands in the future given the already obvious changes to natural systems, especially in northern latitudes. The untrammeled character and naturalness of wilderness is one of those values that will be at the center of these discussions. Additional climate change data would add depth and breadth to these discussions.

Undeveloped: **Yes:** ☐ **No:** x☐ **Not Applicable:** ☐

Explain:

Natural: **Possibly Yes:** x☐ **No:** ☐ **Not Applicable:** ☐

Explain: See untrammeled above

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

Yes: ☐ **No:** x☐ **Not Applicable:** ☐

Explain:

Other unique components that reflect the character of this wilderness:

Yes: ☐ **No:** ☐ **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:** ☐ **No:** x☐ **Not Applicable:** ☐

Explain: Although the proposed project would not directly support the recreational purpose of the SWAN parks wilderness, the data obtained from the weather stations would provide near real-time weather conditions to the public through a specific website maintained by the Western Regional Climate Center (WRCC) at http://www.wrcc.dri.edu/NPS.html. This real-time information would enable pilots, boaters, and other recreational users to avoid and/or prepare for inclement weather conditions within the Wilderness. The proposed project would not interfere with recreational use of the Lake Clark Wilderness.

Scenic: **Yes:** ☐ **No:** X☐ **Not Applicable:** ☐

Explain: These stations may be seen or encountered by visitors who are hiking, boating or flying over the park units. Most of these facilities would be in extremely remote parts of the parks and the encounter rate is expected to be very low.

Scientific: **Yes:** X☐ **No:** ☐ **Not Applicable:** ☐

Explain: The proposed weather stations installation and maintenance project would support the scientific purpose of the Lake Clark Wilderness. Wilderness is an important resource for long-term monitoring and research of ecological processes and the impacts humans have on its ecosystems (*2006 NPS Management Policies*, Section 6.3.6.1). Monitoring weather and climate is critical to the long-term preservation of the Lake Clark Wilderness. Placing the weather stations outside of the Wilderness would cause a significant loss of data precision and value.

Education: **Yes:** ☐ **No:** ☐ **Not Applicable:** ☐

Explain: One of the primary educational/interpretive themes of wilderness within the National Park System is to promote and perpetuate public awareness and appreciation for wilderness character, resources, and ethics, while providing for acceptable use limits (*2006 NPS Management Policies*, Section 6.4.2). The proposed project would support the educational purpose of wilderness through the SWAN education and interpretation program. The goal of the

program is to strengthen the understanding and appreciation of science in the National Parks, including Wilderness areas within National Parks. The goal capitalizes on the ability of SWAN to link education, research, stewardship, and resource management into meaningful messages about the status and trends of park resources. Weather and climate information obtained and analyzed would be disseminated to the public (*SWAN Vital Signs Monitoring Plan*, Section 7.3).

Conservation: **Yes:** ☐ **No:** ☐ **Not Applicable:** X☐

Explain:

Historical use: **Yes:** ☐ **No:** ☐ **Not Applicable:** X☐

Explain:

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

Yes: X☐ **No:** ☐ **More information needed:** ☐

Explain:

The proposed weather station installation and maintenance project would meet the National Park Service polices related to scientific activities within wilderness. Climate is a fundamental driver to ecological condition and the patterns of plant and animal communities found in NPS park units. Changes in climate will impact these ecosystems. Although the proposed project would not contribute directly to the preservation of the untrammeled, undeveloped, naturalness and outstanding opportunities for solitude or a primitive and unconfined type of recreation within the wilderness, the project would indirectly contribute weather and climate information which could be used to monitor how the character, especially the naturalness and untrammeled qualities, of wilderness is affected by global climate change and increasing development in the world. The project would also benefit the scientific and educational purposes of wilderness. These long term installations will impact the undeveloped character of wilderness.

The climate monitoring stations located in SWAN parks will transmit hourly weather observations via satellite including air temperature, relative humidity, wind speed and direction, solar radiation, precipitation and snow depth. These observations will be posted to the Western Regional Climate Center's (WRCC) web site in near real-time (http://www.wrcc.dri.edu/NPS.html) and will thus be available for day-to-day park operations, the public, private operators and other government agencies, enhancing safe travel (aviation and marine operations) in the parks and surrounding areas. A permanent data archive will be maintained by WRCC and will be available to park staff, scientists and the public. This permanent archive will contribute resource data for park management decisions and will also contribute to future efforts in broader-scale climate monitoring and modeling efforts.

Weather monitoring is important to understanding how climate variability and change relates to complex ecological systems within the SWAN network. Placing all of the weather stations outside of the wilderness would limit the precision and applicability of the data and would not meet the goals and objectives of the SWAN Vital Signs Monitoring Plan. To accomplish these goals and objectives safely, the weather stations would be designed and installed using the minimum requirement and tools necessary.

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 methods and techniques will be used, when the activity will take place, where the activity will take place, what mitigation measures are necessary, and the general effects to the wilderness resource and character.

ALTERNATIVE 1: NO ACTION

Description: No Remote Automated Weather Stations (RAWS) would be established in SWAN parks. The NPS would continue to collect basic climatological data using the existing network of RAWS and other weather stations located in southcentral and southwest Alaska.

Effects:

Wilderness Character

- **Untrammeled –** the ecological systems within the wilderness would not be controlled or manipulated.
- **Undeveloped** – The Coville and Dark South areas of the Katmai wilderness would remain undeveloped. The level of development within the Cape Gull (Coast Guard communication site), Contact Creek (unimproved fixed-winged aircraft landing strip) and Dumpling Mountain (radio repeater station) areas of the Katmai wilderness would slightly increase. The Chigmit Mountains and Chigmit Mountains North locations of the Lake Clark Wilderness would remain undeveloped. No Remote Area Weather Stations (RAWS) will be installed at Dinglestadt Glacier, Fire Cove or McArthur Pass in Kenai Fjords National Park.
- **Natural –** the natural conditions and biological diversity within the wilderness would continue to be protected.
- **Outstanding opportunities for solitude or a primitive and unconfined type of recreation –** visitors to the Coville and Dark South areas of the Katmai wilderness would continue to experience opportunities for solitude and/or a primitive and unconfined type of recreation. Visitors would continue to notice the Coast Guard communication site at Cape Gull, the unimproved landing strip at Contact Creek, and the radio repeater station at Dumpling Mountain. Visitors to the Chigmit Mountains and Chigmit Mountains North areas of the Lake Clark wilderness would continue to experience opportunities for solitude and/or a primitive and unconfined type of recreation. Harding Icefield visitors and coastal users would not encounter new climate monitoring installations.

Heritage and Cultural Resources

Heritage and cultural resources within the wilderness would not be affected. Historic and pre-historic artifacts, sites, structures, and landscapes would continue to be protected and managed.

Maintaining Contrast and Skills

The contrast between Wilderness and areas adjacent to the Wilderness would not be altered. The use of primitive and traditional skills, tools, and travel methods would remain unchanged.

Special Provisions

The weather stations would not be installed and maintained.

Safety of Visitors, Personnel, and Contractors

There would be no safety concerns or risks to visitors, personnel, and others within the SWAN wilderness directly associated from the implementation of the no-action alternative.

Economic and Time Constraints

No economic and time constraints would exist from the implementation of the no-action alternative.

Additional Wilderness specific Comparison Criteria

ALTERNATIVE 2: INSTALLATION OF 13 CLIMATE MONITORING STATIONS IN THE SWAN PARKS

Description: In support of the SWAN Inventory and Monitoring Program, the NPS would establish 13 permanent remote automated weather stations within the SWAN parks (EA Figures 2-1, 2-2 & 2-3). EA Table 2-1 identifies the individual RAWS sites and provides information as to elevation, location, access, land status, and site preparation. Deployment of these stations is planned for 2008 and 2009. There would be 6 stations within KATM, 3 stations within KEFJ, and 4 stations within LACL. Of these stations, 7 would be located in designated wilderness and 6 would be located in eligible wilderness.

The stations would collect basic weather observations including air temperature, precipitation, relative humidity, wind speed and direction, solar radiation, and snow depth, and transmit these observations hourly via satellite. These observations would be posted to the WRCC web site in near real-time (http://www.wrcc.dri.edu/NPS.html).

Station Description: Each weather station would be composed of two towers. The tri-leg tower would house the temperature, relative humidity, solar radiation, wind speed and direction, and snow depth sensors (EA Photo 2-1. An aluminum equipment enclosure located near the base of the structure would house the electronic equipment such as the data logger, geostationary satellite server (GOES), and batteries. The wind speed and direction sensors would be located on top of the 20-foot tall mast mounted to the north leg of the tri-leg tower. The footprint of the tri-leg is approximately 12 feet per side. A 48”x13” solar panel would be attached to the structure. The tower is typically anchored to the ground with steel pins, although in some cases gabions may be necessary. The gabions are wire cages approximately 2 feet wide, 6 feet long and 18 inches high filled with rock from the surrounding area. The tri-leg towers would be constructed at each station site.

The precipitation tower would be approximately 15.5 feet tall, made of steel tubing, and securely anchored to the ground with steel pins and/or gabions (EA Photo 2-2). The base of the tower would be weighted with a rock-filled gabion. The tower has 3 legs on a 5-foot wide base and tapers to 1.5 feet wide at the top. A 4-foot diameter windscreen made up of aluminum flaps is situated on the top. An 8-inch diameter PVC pipe antifreeze reservoir would extend through the length of the tower. The pipe would be filled with an antifreeze mixture consisting of 45% propylene glycol, 45% ethyl alcohol and 10% water. The antifreeze mixture melts frozen precipitation (snow, sleet, hail) and is displaced by the accumulating precipitation. The displaced fluid flows through a tube and into a tipping-bucket rain gauge, and then flows through a tube into 5-gallon jerry cans or other similar containers located at the base of the tower. The concentration of the antifreeze mixture (which is constantly diluted as precipitation is added) must remain strong enough to prevent freezing during anticipated winter temperatures of up to –40 degrees F. All containers would be highly resistant to damage by animals. The precipitation towers would be constructed in Anchorage and transported to each station site.

Station Installation: Transporting and installing the towers at each of the locations would be accomplished by two to three individuals during a one- to two-day period using a combination of helicopters and fixed-winged aircraft. Up to two helicopter sling loads may be required to transport the towers and materials to each site. Work on site would consist of erecting and anchoring the tower using power tools and hand tools. See Table 2-1 in the EA for a description of access to each site.

Annual Maintenance: Each station would require one annual maintenance visit. Access would most likely occur via fixed-wing aircraft on skis or floats. In a few cases, a boat may be used for access and on a rare occasion a helicopter may be required to access one or more stations. If helicopter use is needed, the activity would be coordinated with other activities. Approximately four hours would be needed to replace sensors and the antifreeze solution (precipitation tower) and perform other routine maintenance at each of the weather stations.

Effects:

Wilderness Character

- **Untrammeled –** These weather monitoring stations would provide current weather conditions within the mountainous, coastal and glaciate areas of the parks. The stations would not control or manipulate the ecological systems within the wilderness.

- **Undeveloped –** The weather monitoring stations would be placed primarily within undisturbed locations and would require a footprint of approximately 25’ by 25’ (625 sq ft). The weather station sites would be placed in such a manner as to minimize the developed appearance within each of these areas. The level of development within the Cape Gull, Contact Creek, and Dumpling Mountain station sites (previously developed locations within the Katmai Wilderness) would increase by approximately 625 sq ft. Under this alternative, the undeveloped character of each of these locations would be decreased, as human development would be apparent. Some site preparation would be necessary to facilitate erecting the previously-described structures. Brush (primarily alder) removal would be necessary at the Dinglestadt and Fire Cove sites in KEFJ, but would likely regrow quickly, minimizing visual impacts. Visual impact of the structures in areas otherwise devoid of human presence would be long-term and would detract from the undeveloped wilderness character. However, it is unlikely that the weather stations would be seen by visitors, as the

stations would be inaccessible by trails (except for Dumpling Mountain in KATM) and located on steep, rocky ridge tops, on glaciers or in other seldom visited areas.

- **Natural –** The natural conditions and biological diversity within the wilderness would continue to be protected. The number and duration of aircraft flights over and into the two station locations and surrounding access areas would be minimized. Aircraft flights and ground activities would not disturb breeding, nesting, feeding, and other important wildlife habitats. Ground disturbance activities would be limited to the weather station tower placement footprints. Rock collections (gabions) would be limited to the minimum amount needed to secure the towers. Additional information for scientific and management decisions about the role of wilderness in a time of rapid climate change would enhance discussion and planning.

- **Outstanding opportunities for solitude or a primitive and unconfined type of recreation –** With the exception of a few days during the year and within and adjacent to the proposed weather station locations, visitors to the wilderness would continue to experience opportunities for solitude and/or a primitive and unconfined type of recreation. During the one-time installation and subsequent annual maintenance of each of the weather stations, visitors may observe fixed-winged aircraft and/or helicopter activities within and surrounding these areas. Personnel may also be seen and heard. The number and duration of aircraft flights would be minimized to mitigate any possible adverse effects the proposed project may have on visitors to the wilderness areas. Noise from air or watercraft could diminish naturalness and solitude in the vicinity, as motor noise, especially helicopter noise, can be heard over long distances. These intrusions on naturalness and solitude could extend beyond the immediate climate monitoring station site, but would be temporary and of short duration.

Heritage and Cultural Resources

Historic and pre-historic artifacts, sites, structures, and landscapes would continue to be protected and managed. If any archeological or historic resources are discovered during the installation and maintenance of the weather monitoring stations, the installation would be halted and the Superintendent or Chief of Cultural Resources would be notified as soon as possible. No further action would take place until the NPS has had the opportunity to consult with the State Historic Preservation Office (SHPO) and affected Native communities.

Maintaining Contrast and Skills

The use of aircraft to assist with the transportation of weather station equipment and personnel would provide little contrast between wilderness and non-wilderness areas. The use of primitive and traditional skills and tools would not be utilized.

Special Provisions

Field personnel responsible for the installation and maintenance of the weather monitoring stations would follow specific mitigation measures described in the EA and conditions and restrictions stipulated in the NPS Scientific Research and Collecting Permit which would be issued to the project's principal investigator.

Safety of Visitors, Personnel, and Contractors

Installing and maintaining the weather monitoring stations would involve field personnel flying in fixed-winged aircraft and helicopters and remote on remote snow-covered mountainous terrain while carrying equipment. All aircraft activity would be safely implemented. Field personnel would be in radio and/or satellite phone contact with park dispatch, aircraft pilots, and/or other key personnel while conducting field activities. Field crew personnel would be properly equipped to survive one or more nights within remote areas. Trained field crew personnel would carry an approved firearm and/or pepper spray canister for personal protection and, if necessary, would be used on aggressive wildlife posing an immediate threat to an individual or group of individuals. No potential public safety hazards would result from installing and maintaining the weather stations.

Economic and Time Constraints

The cost for installing each weather monitoring station is approximately $10,000. Annual monitoring and maintenance costs for each station are approximately $2,000. Each station would be installed within a one- to two-day period while annual monitoring and maintenance activities would be completed in one day. These costs and timing requirements would be the minimum required to successfully accomplish the goals and objectives of the SWAN Vital Signs Monitoring Plan.

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: This alternative reflects a selection of 13 station locations which was pared down from an original 43 desirable locations. This alternative reflects a number of stations that will minimally provide the monitoring information required by the SWAN network based on distribution among a variety of ecological and physiographical locations.

The selected alternative conforms to NPS 2006 Management Policies, and the park GMPs. The information obtained from the weather stations (RAWS) is important for the administration and preservation of wilderness ecosystems and cannot be obtained from a location outside of the wilderness without significant loss of precision and applicability and without successfully meeting the goals and objectives of the SWAN Vital Signs Monitoring Plan safely.

The selected alternative would mitigate adverse impacts to the wilderness resource by minimizing the number and duration of field activities, minimizing ground disturbance to the smallest practicable footprint, and installing each weather station in such a manner as to ensure its appearance would not adversely affect wilderness character. Construction activities would be attempted during times when visitor use is minimal. Flight paths will be used that minimize or avoid impacts to sensitive wildlife or higher public use areas.

Monitoring and reporting requirements: The Principal Investigator would be issued an annual scientific research and collecting permit through the NPS Research Permitting and Reporting System (RPRS). The permit would stipulate specific conditions, restrictions, and mitigations the

Principal Investigator and field crew would be required to follow while installing and maintaining each weather station. At the end of each field season, the Principal Investigator would be required to submit an Investigator's Annual Report (IAR) through RPRS. The IAR would provide park staff updates on field accomplishments and weather station operation success and enable the park RPRS coordinator to provide feedback to the Principal Investigator for future monitoring and mitigation requirements.

Check any Wilderness Act Section 4(c) uses approved in this alternative:

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

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

Approvals	Signature	Name	Position	Date
Prepared by:		Daniel Moon Judy Alderson Meg Hahr	KATM, Biologist Regional Wilderness Coordinator KEFJ, Ecologist	
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Recommended		Page Spencer	LACL, Chief of Resources	
Approved:		Jeff Mow	KEFJ Superintendent	
Approved:		Ralph Moore	KATM Superintendent	
Approved:		Joel Hard	LACL Superintendent	