

**ENVIRONMENTAL ASSESSMENT**  
**for the**  
**GEOPHYSICAL INSTITUTE SEISMIC STATION UPGRADE AND REPEATER INSTALLATION**  
**AT SEVERAL LOCATIONS IN**  
**DENALI NATIONAL PARK AND PRESERVE, ALASKA**

**Prepared by**  
**UNITED STATES DEPARTMENT OF THE INTERIOR**  
**NATIONAL PARK SERVICE**  
**DENALI NATIONAL PARK AND PRESERVE**

**November 22, 2002**

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## **PURPOSE AND NEED**

The National Park Service (NPS) is considering a proposal by the Geophysical Institute, University of Alaska, to upgrade existing seismic stations at Wickersham Dome and Thorofare Mountain as well the upgrade of the Healy Mountain transceiver and the installation of a new transceiver within the designated wilderness of Denali National Park and Preserve (Figure 1).

By upgrading seismic equipment and transmitters within Denali National Park and Preserve, it may be possible for researchers at the Geophysical Institute to better understand the nature of the Denali Fault and make more accurate assessments of seismic geohazards in the Denali and Interior Alaska regions.

In addition to their local importance, the seismic stations in Denali National Park and Preserve form an integral part of the regional seismic network for the State of Alaska. As part of this network, the Wickersham Dome and Thorofare Mountain seismic stations record earthquakes in Alaska and around the world. Added to the importance of these stations is the fact that they sit on top of the deepest part of the Benioff Zone, a zone of seismicity where the subducting plate is making a sharp turn to the east. The Wickersham Dome and Thorofare Mountain seismic stations would, therefore, contribute to a new National Science Foundation funded project aimed at better understanding global plate tectonics and mountain building processes associated with the Alaska Range.

The existing seismic signals from Wickersham Dome and Thorofare Mountain are currently being transmitted directly from the Thorofare Mountain repeater to the Healy Mountain repeater. This radio link is not in direct line-of-sight, however, causing occasional data loss during times of poor radio signal propagation. Due to the fact that VHF frequencies are being transmitted and readily diffract around terrain features, the existing radio link has worked in the past. The present radio link between Thorofare Mountain and Healy Mountain would not, however, work for the equipment upgrade, with spread spectrum radios that operate above 900 Mhz. Radio waves at this frequency do not easily diffract and therefore require a direct line-of-sight transmission path. To transmit data using spread spectrum radios, a new repeater site would have to be installed at Sable Mountain or Double Mountain.

This document presents the alternatives considered for, and evaluates the consequences of, the equipment upgrades and new repeater installation. This Environmental Assessment (EA) has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and regulations of the Council on Environmental Quality (40 CFR 1508.9).

## **Background**

### Geophysical Institute

Data collected in Denali National Park and Preserve contributes to a state-wide seismic monitoring program. In 1986, the Geophysical Institute, University of Alaska entered into a Memorandum of Understanding (MOU) with the NPS and Denali National Park and Preserve to provide seismic monitoring in the park. Three sites were chosen within the park for the installation: seismographs and radio transmitters were installed at Wickersham Dome, in the Kantishna Hills, and Thorofare Mountain, near the Eielson Visitor Center; a simple repeater without seismic equipment was installed at Mount Healy to transmit seismic data through existing equipment to researchers at the Geophysical Institute in Fairbanks, Alaska.

The MOU requires that the Geophysical Institute provide general assistance to the park's visitor programs and centers. Real time seismic data is used for interpretive displays in the park.

The Geophysical Institute is requesting that more sensitive seismic measuring devices at Wickersham Dome and Thorofare Mountain be added to combine with a direct line-of-sight radio link. This would be facilitated by the installation of Guralp CMG-40 broad band digital seismometers at Thorofare Mountain and Wickersham Dome and the creation of a new repeater site at Sable Mountain or Double Mountain. Such improvements would allow for higher resolution seismic data to be collected, and fewer data losses resulting from a lack of line-of-sight transmission within Denali National Park and Preserve.

Current communication facilities at Wickersham Dome and Thorofare Mountain include NPS and Geophysical Institute instrumentation housed in NPS buildings.

#### Related Legislation, Policies, and Plans

The 1916 Organic Act directed the Secretary of the Interior and the NPS to manage national parks and monuments to:

“...conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” (16 U.S.C. 1.)

The Organic Act also granted the Secretary the authority to implement “rules and regulations as he may deem necessary or proper for the use and management of the parks, monuments and reservations under the jurisdiction of the National Park Service.” (16 U.S.C. 3.)

In 1917, Congress established Mount McKinley National Park:

“...as a public park for the benefit and enjoyment of the people . . . for recreation purposes by the public and for the preservation of animals, birds, and fish and for the preservation of the natural curiosities and scenic beauties thereof . . . said park shall be, and is hereby established as a game refuge”. (39 Statute 938).

1978 amendments to the 1916 NPS Organic Act and 1970 NPS General Authorities Act expressly articulated the role of the national park system in ecosystem protection. The amendments further reinforce the primary mandate of preservation by stating:

“The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided for by Congress.” (16 U.S.C. 1-a1.)

The Alaska National Interest Lands and Conservation Act of 1980 (ANILCA) added approximately 2,426,000 acres of public land to Mt. McKinley National Park and approximately 1,330,000 acres of

public land as Denali National Preserve and re-designated the entirety Denali National Park and Preserve. ANILCA directs the NPS to preserve the natural and cultural resources in the park and preserve for the benefit, use, education, and inspiration of present and future generations.

The NPS Organic Act and the General Authorities Act prohibit impairment of park resources and values. The 2001 NPS Management Policies uses the terms “resources and values” to mean the full spectrum of tangible and intangible attributes for which the park is established and managed, including the Organic Act’s fundamental purpose and any additional purposes as stated in the park’s establishing legislation. The impairment of park resources and values may not be allowed unless directly and specifically provided by statute. The primary responsibility of the NPS is to ensure that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities for enjoyment of them.

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

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

The 2001 NPS Management Policies state in section 6.2 that:

“Even those scientific activities (including inventory, monitoring, and research) that involve 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...The project will not significantly interfere with other wilderness purposes (recreational, scenic, educational, conservation, or historical) over a broad area or for a long period of time.”

The park’s 1986 General Management Plan states that:

The intent of the resource management program is to understand the natural forces that shape Denali’s environment and to avoid or eliminate activities that significantly interfere with natural processes. (General Management Plan, Denali National Park and Preserve, 1986, p.49)

The General Management Plan stated that a park Resource Management Plan would identify actions to be taken in response to specific natural resource concerns. One action recommended in the Geologic Hazards section of the park’s 1998 Resource Management Plan was to: “Initiate efforts to gather, quantify and map seismic events within the park and evaluate risks to structures, and visitors as well as impacts to park resources.”

## **Issues Considered**

### Soils

Small plots of soil would be compacted at a new equipment site and at the existing Wickersham and Thorofare sites.

### Vegetation

Three small plots of alpine vegetation would be removed at the Wickersham and Thorofare sites and at a new equipment site.

### Wildlife Habitat

Some wildlife habitat would be removed at a new equipment site and Dall sheep would also be affected by the helicopter use for maintenance visits.

### Visual Quality

A new equipment site may be seen by some hikers as an intrusion in the backcountry.

### Cultural Resources

Presently unknown cultural resources may be affected by the project.

### Subsistence

Subsistence users may be affected by upgrades at the Wickersham Dome site.

### Wilderness

Wilderness values on Thorofare, Sable, Double, and Healy Mountains could be affected by the sights and sounds of helicopters transporting equipment to the mountain top sites and the installation/upgrade of equipment in these areas.

### Park Management

Increased information from the upgraded equipment would be available for public interpretation and emergency response planning.

## **Issues Considered but Dismissed from Further Analysis**

### Floodplains and Wetlands

The five project areas (Sable Mountain, Double Mountain, Mt. Healy, Wickersham Dome, and Thorofare Mountain) are not located in floodplains or wetlands (see Appendix B).

### Threatened and Endangered Species

There are no threatened and endangered wildlife or plants in the project area (T. Swem, USFWS, Pers. Comm., October 23, 2000).

Environmental Justice: Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, requires all federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs and

policies on minority and low-income populations and communities. This project would not result in significant changes in any changes in the socioeconomic environment of the area, and therefore is not expected to have a direct or indirect impact to minority or low-income populations or communities.

## **Permits and Approvals Needed to Complete the Project**

### Special Use Permit

The Geophysical Institute would need a Special Use Permit from the NPS that would detail the permitted location and limits of construction, use of the park road, and landing of a helicopter in the park. The permit would be issued for 5-10 years and could be renewed. The 1986 MOU with the Geophysical Institute would need to be amended with updated information.

## **DESCRIPTION OF ALTERNATIVES**

### **Alternative 1: No-Action (Environmentally Preferred Alternative)**

Under the no action alternative, equipment upgrades at Wickersham Dome, Mt. Healy and Thorofare Mountain would not occur and a transceiver would not be located at Sable Mountain or Double Mountain. There would be no improvement of seismic data collection and interpretation. Existing use of analog instruments would continue.

### **Alternative 2: Equipment Upgrade at Existing Seismic Stations and Addition of a Transceiver at Double Mountain (NPS Preferred Alternative)**

The Geophysical Institute would upgrade equipment at existing seismic stations at Wickersham Dome and Thorofare Mountain, would upgrade the radio receiver at Healy Mountain, and develop a new repeater site at Double Mountain between the Thorofare and Healy Mountain seismic stations as part of the seismic network upgrade (Figure 1).

The Double Mountain site (Figures 1 and 3) would require a single repeater, directional antenna and batteries, all within a gray, 4 ft. x 4 ft. x 5 ft. fiberglass enclosure. Two solar panels would be mounted on the south facing side of the enclosure roof. No concrete pad would be needed at the transceiver site. (See Appendix B for complete equipment lists for the site).

Proposed replacement equipment at Wickersham Dome and Thorofare Mountain consists of a broad band digital seismometer on a 2 ft. x 2 ft. concrete pad; a free wave spread-spectrum transceiver; non-spillable gell cell batteries as primary batteries, and dry alkaline batteries as backup batteries. The free wave spread-spectrum transceiver and batteries would be located in the NPS sheds currently housing seismic and radio transmitting equipment at Wickersham Dome and Thorofare Mountain. The broad band digital seismometer would be hidden among the rocks near the existing seismometer. Two solar panels would be added to the existing array of panels at Wickersham Dome and 3 solar panels would be added to the Thorofare Mountain solar array. The new antenna would be smaller but the same height as existing antenna, standing 10 ft. high at Wickersham Dome and 20 ft. high at Thorofare Mountain. The frequency range of spread spectrum radios range between 902 and 928 MHz. This frequency range is

well above the range of NPS radios and would not cause interference with Denali National Park and Preserve communication systems.

Solar panels would be adequate for powering the Thorofare and Wickersham sites; however, annual battery replacement and system maintenance would be necessary. This would require helicopter transport to the new repeater site as well as the Thorofare site at least once a year. If Skyline Drive road conditions are good, it is possible to reach the Wickersham Dome site with a high-clearance four-wheel drive vehicle.

The Healy Mountain repeater upgrade would include replacing existing electronic equipment with a Free Wave Spread-Spectrum transceiver and replacing the VHF antenna with a 900 MHz antenna. No batteries or solar panels would be necessary at this site since commercial power is available.

All equipment would be helicopter transported into the project locations. Installation would occur during the summer season of 2003 and should be completed with two days of visits to each site.

An annual visit to seismic sites would be planned to replace back-up batteries and conduct routine maintenance. Geophysical Institute personnel make a point of scheduling such maintenance trips prior to the opening of the Denali Park Road whenever possible. Occasionally, system malfunctions may require a special visit for repairs. When heavy equipment, such as batteries, are required to be transported to sites, helicopter support would be necessary. Thorofare and Healy Mountains can be reached on foot for maintenance purposes provided that it is not necessary to haul heavy equipment to the sites. When Skyline Drive is in good driving condition, high-clearance four-wheel drive vehicles can be used to access Wickersham Dome.

Both the current and the upgraded systems would run in parallel for up to a year so that a comparison between data can be made. After comparisons confirm that the upgraded system is functioning well, the old equipment (batteries, VHF antennae, seismometers, etc.) would be removed from Thorofare and Healy Mountain, and Wickersham Dome.

Activities associated with the seismic equipment upgrade would occur during regularly scheduled maintenance visits. As a result, there would be no additional helicopter use at Thorofare and Healy Mountains or Wickersham Dome for the proposed seismic equipment upgrades.

### **Alternative 3: Equipment Upgrade at Existing Seismic Stations and Addition of a Transceiver at Sable Mountain**

The Geophysical Institute would upgrade equipment at existing seismic stations at Wickersham Dome, Thorofare Mountain, and Healy Mountain and develop a new repeater site at Sable Mountain between the Thorofare and Healy Mountain seismic stations as part of the seismic network upgrade (Figures 1 and 2).

The Sable Mountain site would require a single, directional antenna and batteries, all within a gray, 4 ft. x 4 ft. x 5 ft. fiberglass enclosure. Two solar panels would be mounted on the south facing side of the enclosure roof. No concrete pad would be needed at the transceiver site. (See Appendix B for a complete equipment list).

Seismic station equipment upgrades and maintenance activities at Wickersham Dome, Thorofare Mountain, and Healy Mountain would be the same as identified for Alternative 2.

### **Alternatives Considered and Dismissed from Further Consideration**

**1. Reverse the Direction of the Thorofare and Wickersham Transmissions.** Reversing the direction of the Thorofare and Wickersham transmissions to allow signals to be sent to the Geophysical Institute via the Kantishna satellite phone system was considered to avoid creating a new transceiver site to relay the Thorofare and Wickersham signals to Mount Healy.

The Geophysical Institute currently uses the State Microwave System to relay seismic signals from Denali National Park and Preserve to the Geophysical Institute. The State Microwave System was chosen over commercial phone lines because of reliability. In the event of a natural disaster that could disable communication systems, the State Microwave System receives repair priority over other communication systems due to its reliance by Emergency Response personnel. Geophysical Institute researchers and Denali National Park and Preserve resource managers believe it is necessary to maintain the Geophysical Institutes' capability to keep Emergency Response personnel abreast of seismic activity, should a seismic event of disastrous proportions occur. The Kantishna satellite phone system is not considered to be reliable enough to link the Geophysical Institute to the seismic network in Denali National Park and Preserve. Given these considerations the possibility of downloading and transmitting seismic signals from Kantishna to the Geophysical Institute was dismissed.

**2. Transmitter site on the summit of Double Mountain.** The summit of Double Mountain (Figure 4) provided a good site for helicopter landings and signal reception but was dismissed because it is a noted backcountry destination. A better site was found a few hundred feet below the summit at the East Knob (see Alternative 2).

### **Environmentally Preferred Alternative**

Alternative 1 (No Action) is identified as the Environmentally Preferred Alternative because it affects the least wildlife and vegetation the least and does not affect wilderness resource values. The No Action alternative, however, does not provide support for upgraded scientific investigations into geophysical movements within the earth's crust and its impact on the surface.

## Summary and Comparison of Effects of the Alternatives

Table 1 presents a summary and comparison of potential effects for Alternatives 1, 2, and 3.

**Table 1: Summary and Comparison of Effects of Alternatives 1, 2, and 3**

<b>Impact Topics</b>	<b>Alternative 1: No Action</b>	<b>Alternative 2: Transceiver at Double Mountain</b>	<b>Alternative 3: Transceiver at Sable Mountain</b>
<b>Soils</b>	No impact.	Some soil compaction would occur at the Double Mountain site.	Some soil compaction would occur at the Sable Mountain site.
<b>Vegetation</b>	No impact.	Less than 28 ft <sup>2</sup> of vegetation would be lost.	Less than 28 ft <sup>2</sup> of vegetation would be lost.
<b>Wildlife Habitat</b>	No impact.	A minor amount of Dall sheep habitat would be removed. Maintenance flights would temporarily create an avoidance zone.	A minor amount of Dall sheep habitat would be removed. Maintenance flights would temporarily create an avoidance zone.
<b>Visual quality</b>	No impact.	Instrument enclosure would not be seen from the Park Road. Highly improbable that hikers in the Double Mountain Area would spot the enclosure.	Day hikers would see instrument enclosure from the top of Sable Mountain. Highly improbable that enclosure could be seen from Park Road.
<b>Cultural Resources</b>	No impact.	There would be no known impacts to cultural resources in the project areas. Archeological clearances have been obtained for the Double Mountain site.	There would be no known impacts to cultural resources in the project areas. An archeological clearance would be needed for the Sable Mountain site.
<b>Subsistence</b>	No impact.	There would be no impact on subsistence use. (See Appendix A)	There would be no impact on subsistence use. (See Appendix A)
<b>Wilderness</b>	No impact.	Helicopter use associated with instrument installation & annual maintenance would have negligible impact on wilderness in the Double Mountain Area. The impact from the installation would be negligible.	Helicopter use associated with installation and annual maintenance would have a minor impact on wilderness in the Sable Mountain area. The impact from the installation would be moderate.
<b>Park Management</b>	No improvement in interpretation or emergency response plans.	Seismic data collection and interpretation would improve. Emergency response plans could be adequately assessed.	Seismic data collection and interpretation would improve. Emergency response plans could be adequately assessed.

## **ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES**

### **Alternative 1: No Action**

#### Soils

Soils would not be impacted since no new installations would occur.

#### Vegetation

Vegetation would not be impacted since no new installations would occur.

#### Wildlife Habitat

Wildlife habitat would not be impacted since no new installations would occur.

#### Visual Quality

Visual Quality would not be impacted since no new installations would occur.

#### Cultural Resources

Cultural Resources would not be impacted since no new installations would occur.

#### Subsistence

Cultural Resources would not be impacted since no new installations would occur.

#### Wilderness

Wilderness resource values would not be impacted since no new installations would occur.

#### Park Management

Without upgrading seismic equipment in Denali National Park and Preserve, assessment of geologic hazards in the Denali and Interior Alaska Regions would not be improved. The likelihood of improving interpretative displays would be reduced.

**CUMULATIVE EFFECTS:** The impacts of this alternative to natural resources such as wilderness, vegetation and wildlife habitat would be non-existent and there would not be a contribution to any impacts from other local or regional projects.

**CONCLUSION:** The no-action alternative would result in no impacts to park resources and an impairment of park resources that fulfill specific purposes identified in the establishing legislation or are key to the natural or cultural integrity of the park would not occur.

### **Alternative 2: (Preferred Alternative) Transceiver at Double Mountain**

#### Soils

Twenty square feet of soil compaction would occur at the Double Mountain site, as well as an additional 8 square feet of compaction at the Wickersham Dome and the Thorofare Mountain sites. The impact to the park's soil resources would be negligible.

### Vegetation

Dry alpine vegetation would be removed at Wickersham Dome and Thorofare Mountain locations in a one square foot area at each locale to install concrete pads for the seismometers. Wickersham Dome and Thorofare Mountains are established communication sites. The impacts to vegetation communities would be negligible due to the large areas nearby of similar alpine vegetation. There would be no impact to vegetation at Mt. Healy.

Twenty square feet of scattered vegetation would be covered by the fiberglass enclosure at Double Mountain once in place. This impact would not be significant due to the fact that these vegetation types are common at high altitudes in the Alaska Range. Double Mountain vegetation types consist of the upper end of the dry alpine tundra community. Plants documented within these areas include *Polemonium boreale*, *Douglasia gormanii*, *Saxifraga oppositifolia*, *Potentilla spp.*, *Draba spp.*, and *Synthyris borealis*.

### Wildlife Habitat

Twenty-eight square feet of wildlife habitat would be removed from the Wickersham, Thorofare and Double Mountain sites. Dall sheep habitat would be removed at Thorofare and Double Mountain, and sheep would likely be displaced during maintenance visits.

The amount of wildlife habitat removed due to this project would be negligible given the large acreage of similar habitat surrounding the sites. The impact from the displacement during maintenance visits would be temporary and limited.

### Visual Quality

There would be a negligible impact to visual quality from the equipment upgrades at the Wickersham, Thorofare and Mt. Healy sites due to the on-site battery and equipment sheds and the existing antennas.

Visual quality at Double Mountain would not be impacted because the seismic instrument enclosure at the East Knob location below the summit of Double Mountain would not be seen from the Denali Park Road (see Figure 3 and Appendix C). It is improbable that hikers in the Double Mountain Area would spot the enclosure due to the fact that it is not within ¼ mile of any known hiking routes. The site would be difficult to get to without a helicopter. The instrument enclosure would be discretely placed on the East Knob of Double Mountain and camouflaged with rocks stacked against the enclosure.

Helicopters used to support the installation or maintenance of the sites would cause a temporary and limited impact to the visual landscape. Helicopters are typically only used for this purpose before the main season, when use by visitors is slight.

### Cultural Resources

Archaeological surveys at all the site locations have found no cultural resources. No cultural resources are expected to be encountered or affected.

### Subsistence

There would be no impact on subsistence use because similar facilities already exist at the Wickersham Dome site, and the other sites are in the former Mt. McKinley National Park where subsistence uses are not permitted. (As required by ANILCA § 810 an evaluation is attached in Appendix A)

### Wilderness

A helicopter would be used for the initial placement of the pads and instrument enclosures on Thorofare, Mt. Healy, and Double Mountain and annual maintenance trips by helicopter would occasionally impact wilderness values near these sites. This impact to the wilderness character of the area would be minor, due to the infrequency of the trips and the intention to service these sites before the main visitor season starts.

The new instruments at the Thorofare and Mt. Healy sites would be indistinguishable from the existing instrument clusters at those sites and should not increase any perception of impact on wilderness resource values. The instrument enclosure at Double Mountain is not likely to be noticed by any hikers on the ground and would have a negligible adverse affect on their wilderness experience. The expectation of a wilderness free of permanent facilities might be adversely affected for those who find out about the new site.

### Park Management

By gaining a better understanding of the Denali fault system, park managers would be able to better assess geohazards and plan accordingly. Interpretative displays could be improved for park visitors. The action is consistent with the direction in the General Management Plan to foster research to better understand the natural forces that shape Denali's environment

**CUMULATIVE EFFECTS:** No projects have occurred or are anticipated that would affect resources or values in the Double Mountain area due to its remoteness and protection within the park. Thorofare, Wickersham and the Mt. Healy sites are existing communication sites and no other projects are anticipated to add functions to the areas. The sites are all visited by hikers because they are close to roadside facilities up to 2000 feet lower in elevation.

**CONCLUSION:** Equipment upgrades at existing seismic stations and the addition of a transceiver at Double Mountain would result in minimal impacts to park resources and would meet the goal stated in the park General Management Plan and Resource Management Plan to better understand the natural forces shaping the environment of Denali, including geophysical forces. Double Mountain is a park wilderness destination, but the installation of facilities there would have only a negligible adverse impact on wilderness expectations and wilderness experience because the location is virtually inaccessible and invisible to park users and because the facility would be so small.

The level of resource impacts anticipated from this alternative would not result in an impairment of park resources that fulfill specific purposes identified in the establishing legislation or are key to the natural or cultural integrity of the park. This alternative would be consistent with the park's enabling legislation and general management plan.

### **Alternative 3: Equipment Upgrade at Existing Seismic Stations and Addition of a Transceiver at Sable Mountain**

#### Soils

Twenty square feet of soil compaction from equipment installation would occur at the Sable Mountain site, as well as an additional 8 square feet of compaction from the concrete pads at the Wickersham Dome and Thorofare Mountain sites. The impact to local soil processes would be minimal because of the small size of the installations.

#### Vegetation

Dry alpine vegetation would be removed at Wickersham Dome and Thorofare Mountain locations in one 4-square foot area at each locale to install concrete pads for the seismometers. Wickersham Dome and Thorofare Mountain are established communication sites. The impacts to vegetation communities would be negligible due to the large areas nearby of similar alpine vegetation. There would be no impact to vegetation at Mt. Healy.

Twenty square feet of scattered vegetation would be covered by the fiberglass enclosure on Sable Mountain. This impact would not be significant due to the fact that these vegetation types are common at high altitudes in the Alaska Range. Sable Mountain vegetation types consist of the upper end of the dry alpine tundra community. Plants documented within these areas include *Polemonium boreale*, *Douglasia gormanii*, *Saxifraga oppositifolia*, *Potentilla spp.*, *Draba spp.*, and *Synthyris borealis*.

#### Wildlife Habitat

Twenty-eight square feet of wildlife habitat would be removed from the Wickersham, Thorofare and Sable Mountain sites. Dall sheep habitat would be removed at Thorofare and Sable Mountain, and sheep would likely be displaced during maintenance visits.

The amount of wildlife habitat removed due to this project would be negligible given the large acreage of similar habitat surrounding the sites. The impact from the displacement during maintenance visits would be temporary and limited.

#### Visual Quality

There would be a negligible impact to visual quality from the equipment upgrades at the Wickersham, Thorofare and Mt. Healy sites due to the on-site battery and equipment sheds and the existing antennas.

The instrument enclosure on Sable Mountain would be located within 100 yards of an established hiking route along the ridgeline of Sable Mountain and would be visible to day hikers. The enclosure would not be seen from Denali Park Road (see Figure 2 and Appendix C). The visual impact from a Sable Mountain enclosure would be moderate as this is a small installation but a popular hiking area.

Helicopters used to support the installation or maintenance of the sites would cause a temporary and limited impact to the visual landscape. Helicopters would typically only be used for this purpose before the main season, when use by visitors is slight.

#### Cultural Resources

An archaeological survey and clearance would be needed for the Sable Mountain transceiver site. No cultural resources would be expected from the Sable Mountain site. Archaeological surveys at all the other site locations have found no cultural resources.

#### Subsistence

There would be no impact on subsistence use because these facilities already exist at the Wickersham Dome site, and the other sites are in the former Mt. McKinley National Park where subsistence uses are not permitted. (As required by ANILCA § 810 an evaluation is attached in Appendix A)

#### Wilderness

A helicopter would be used for the initial placement of the pads and instrument enclosures on Thorofare, Mt. Healy, and Sable Mountain and annual maintenance trips per by helicopter would occasionally impact wilderness near these sites. This impact to the wilderness character of the area would be minor, due to the infrequency of the trips and the intention to service these sites before the main visitor season starts.

The new instruments at the Thorofare and Mt. Healy sites would be indistinguishable from the existing instrument clusters at those sites and should not increase any perception of impact on wilderness resource values. Because it would be so close to the ridgeline hiking route, the new instrument enclosure would be noticed by many of the backcountry users on Sable Mountain and would adversely affect their expectation of a wilderness free of permanent installations.

#### Park Management

By gaining a better understanding of the Denali fault system, park managers would be able to better assess geohazards and plan accordingly. Interpretative displays can be improved for park visitors. The action is consistent with the direction in the General Management Plan to foster research to better understand the natural forces that shape Denali's environment

**CUMULATIVE EFFECTS:** No projects have occurred or are anticipated that would affect resources or values in the Sable Mountain area due to its remoteness and protection within the park. Thorofare, Wickersham and the Mt. Healy sites are existing communication sites and no other projects are anticipated to add functions to the areas. The sites are all visited by hikers because they are close to roadside facilities up to 2000 feet lower in elevation.

**CONCLUSION:** Equipment upgrades at existing seismic stations and the addition of a transceiver at Sable Mountain would result in minimal impacts to most park resources and would meet the goal stated in the park General Management Plan and Resource Management Plan to better understand the natural forces shaping the environment of Denali, including geophysical forces. Sable Mountain is an important park wilderness destination, however, and installation of a facility there, while perhaps not a major action, would have a moderate adverse impact to visitor

expectations and to their wilderness experience, and a site with fewer impacts has been identified.

The level of resource impacts anticipated from this alternative would not result in an impairment of park resources that fulfill specific purposes identified in the establishing legislation or are key to the natural or cultural integrity of the park.

## **CONSULTATION AND COORDINATION**

The following persons and agencies were consulted in preparation of this environmental assessment:

Judy Putera, Biologist, LACL, NPS

Joe Van Horn, Wilderness Program Manager, DENA, NPS

Guy Tygyat, Seismologist, Geophysical Institute, University of Alaska, Fairbanks

Roger Hansen, Seismologist, Geophysical Institute, University of Alaska, Fairbanks

Steve Davis, Seismologist, Geophysical Institute, University of Alaska, Fairbanks

The environmental assessment was prepared by:

Guy Adema, Physical Scientist, Resource Management, DENA, NPS

Phil Brease, Park Geologist, DENA, NPS

Steve Carwile, Compliance Officer, DENA, NPS

Patty Craw, former Physical Science Technician, DENA, NPS

Dionne Pete, former Physical Science Technician, DENA, NPS

## APPENDIX A

### SUBSISTENCE - SECTION 810(a) OF ANILCA SUMMARY EVALUATION AND FINDINGS

#### I. INTRODUCTION

This section was prepared to comply with Title VIII, Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA). It summarizes the evaluation of potential restrictions to subsistence activities that could result from seismic upgrade and repeater installation at several locations in Denali National Park and Preserve.

#### II. THE EVALUATION PROCESS

Section 810(a) of ANILCA states:

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

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

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

(3) determines that (A) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands, (B) the proposed activity 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. Denali National Park and Preserve was created by ANILCA Section 202(3)(a):

The park additions and preserve shall be managed for the following purposes, among others: To protect and interpret the entire mountain massif, and additional scenic mountain peaks and formations; and to protect habitat for, and populations of fish and

wildlife, including, but not limited to, brown/grizzly bears, moose, caribou, Dall sheep, wolves, swans and other waterfowl; and to provide continued opportunities, including reasonable access, for mountain climbing, mountaineering, and other wilderness recreational activities."

Title I of ANILCA established national parks for the following purposes:

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

. . . consistent with management of fish and wildlife in accordance with recognized scientific principles and the purposes for which each conservation system unit is established, designated, or expanded by or pursuant to this Act, to provide the opportunity for rural residents engaged in a subsistence way of life to continue to do so.

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

### **III. PROPOSED ACTION ON FEDERAL LANDS**

Alternatives 1, 2, and 3 are described in detail in the environmental assessment. Customary and traditional subsistence use on NPS lands will continue as authorized by federal law under any of the alternatives. Federal regulations implement a subsistence priority for rural residents of Alaska under Title VIII of ANILCA.

The Geophysical Institute, University of Alaska proposal is to upgrade existing repeater sites and a new site location at Sable or Double Mountain. The upgrade equipment would consist of broad band digital seismometers, free wave spread-spectrum transceivers, new antennae with varying mast heights, new solar panels and batteries. The activities are planned for one to two weeks after mid-June, 2003. During the installation, personnel and equipment will be transported to proposed sites with a helicopter.

#### **IV. AFFECTED ENVIRONMENT**

Subsistence uses within Denali National Park and Preserve are permitted in accordance with Titles II and VIII of ANILCA. Section 202(3)(a) of ANILCA authorizes subsistence uses, where traditional, in the park additions and northwestern and southwestern preserves of Denali National Park and Preserve. Lands within former Mount McKinley National Park are closed to subsistence uses.

A regional population of about 300 eligible local rural residents qualifies for subsistence use of park resources. Resident zone communities for Denali National Park and Preserve are Cantwell, Minchumina, Nikolai, and Telida. By virtue of their residence, local rural residents of these communities are eligible to pursue subsistence activities in the new park additions. Local rural residents who do not live in the designated resident zone communities, but who have customarily and traditionally engaged in subsistence activities within the park additions, may continue to do so pursuant to a subsistence permit issued by the park superintendent in accordance with state law and regulations.

The NPS realizes that Denali National Park and Preserve may be especially important to certain communities and households in the area for subsistence purposes. The resident zone communities of Minchumina (population 22) and Telida (population 11) use park and preserve lands for trapping and occasional moose hunting along area rivers. Nikolai (population 122) is a growing community and has used park resources in the past. Cantwell (population 147) is the largest resident zone community for Denali National Park and Preserve, and local residents hunt moose and caribou, trap, and harvest firewood and other subsistence resources in the park additions.

The main subsistence species, by edible weight, are moose, caribou, furbearers and fish. Varieties of subsistence fish include coho, king, pink and sockeye salmon. Burbot, dolly varden, grayling, lake trout, northern pike, rainbow trout and whitefish are also used by local people. Beaver, coyote, land otter, weasel, lynx, marten, mink, muskrat, red fox, wolf and wolverine are important furbearer resources. Rock and willow ptarmigan, grouse, ducks and geese complete the park/preserve subsistence small game list.

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 any given year may vary considerably from previous years because of such factors as weather, migration patterns and natural population cycles. However, the pattern is assumed to be generally applicable to harvests in recent years with variations of reasonable magnitude.

#### **V. SUBSISTENCE USES AND NEEDS EVALUATION**

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

The evaluation criteria are:

- the potential to reduce important subsistence fish and wildlife populations by (a) reductions in numbers; (b) redistribution of subsistence resources; or (c) habitat losses;
- the potential 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:

No change in the availability of subsistence resources is anticipated as a result of the implementation of any of the alternatives discussed in the environmental assessment.

2) Restriction of Access:

All rights of access for subsistence harvests on NPS lands are granted by Section 811 of ANILCA. Denali National Park and Preserve is managed according to legislative mandates, NPS management policies and the park's General Management Plan. No actions under the proposal, which is described in detail in the environmental assessment, should affect the access of subsistence users to natural resources in the park and preserve.

3) Increase in Competition:

None of the alternatives discussed in the environmental assessment would produce any increase in competition for resources to subsistence users.

If and when it is necessary to restrict taking, subsistence uses are the priority consumptive uses on public lands of Alaska and will be given preference on such lands over other consumptive uses (ANILCA, Section 802[2]).

Continued implementation of provisions of ANILCA should mitigate any increased competition, however significant, from resource users other than subsistence users.

Therefore, alternatives presented in the environmental assessment would not adversely affect resource competition.

## **VI. AVAILABILITY OF OTHER LANDS**

With the exception of the Wickersham Dome site, lands under consideration for this proposal are within the former Mount McKinley National Park and are closed to subsistence uses. The Wickersham site currently contains an NPS radio repeater and Geophysical Institute seismic station; therefore, upgrading the seismic equipment would not impact subsistence resources.

## **VII. ALTERNATIVES CONSIDERED**

The alternatives considered for this plan were limited to park land.

## **VIII. FINDINGS**

This analysis concludes that the alternatives considered would not result in a significant restriction of subsistence uses.

## APPENDIX B

### UPGRADE EQUIPMENT LIST FOR EACH SITE LOCATION

Location	Description
Wickersham Dome	Small Concrete pad ( 4-5 sq. ft) Guralp CMG-40 broadband digital seismometer Free Wave Spread-Spectrum transceiver 900 MHz 6-element yagi antenna Install 2 solar panels Install 8 non-spillable gell cell rechargeable batteries Install 9 alkaline dry cell back up batteries
Thorofare Mountain	Small Concrete pad ( 4-5 sq. ft) Guralp CMG-40 broad band digital seismometer 2 Free Wave Spread-Spectrum transceiver 2 900 MHz antenna Install 3 solar panels Install 8 gell cell rechargeable batteries Install 9 alkaline dry cell back up batteries
Proposed Repeater site at Double or Sable Mountain	Enclosed fiberglass unit with all equipment including antennae. ( 4' x 4' x 5') Two solar panels mounted outside on the roof of enclosure Install 8 gell cell rechargeable batteries Install 9 alkaline dry cell back up batteries
Mount Healy	Free Wave Spread-Spectrum Receiver

## APPENDIX C

### DOCUMENTATION OF NPS FIELD VISIT TO DOUBLE AND SABLE MOUNTAINS

On September 9, 1998, Sarah Marshall (NPS), Patty Crow (NPS), and Fritz Wohlwend (Pilot) visited the proposed repeater installation sites at Double Mountain and Sable Mountain. They were attempting to identify locations with both a suitable landing location and adequate radio signals to seismic stations in the network. Detailed photographs of various sites are available from the Division of Resource Management.

Field notes are summarized below:

September 9, 1998

- 1006 Land on north side of Double Mountain (east knob) to check for radio signals and landing locations. Good landing spot in terms of wind and space (63 36.346N, 149 28.224W). Photograph potential transceiver location. Good bedrock substrate, sheep scat and bed, and sparse vegetation to south. At northern portion of east knob, ground squirrel burrows present, sheep scat but no beds. Clayey material, weathered bedrock.
- 1045 Land on Double Mountain summit saddle. Shut down, hiked to west summit. Good signals.
- 1110 Light volcanic material west of west summit. Can't receive Healy signal.
- 1122 Saddle location near helicopter. Good signals.
- 1134 Notch east of helicopter landing. Narrow notch, good signals, sheep bed, steep talus hike from landing. Cornice on lee side of summit, no flat place.
- 1140 Walked along ridge from notch. Good signal, ridge too narrow to place equipment. Return to helicopter.
- 1204 Dropped off on east side of Sable Mountain ridge. Not a good landing spot. Good signal, not visible from road, no animal signs.
- 1223 Walked west on Sable Mountain ridge. Healy signal shadowed on west side of east peak, but elsewhere signal is good.

# Proposed Seismic Upgrade and Installation Sites Denali National Park and Preserve

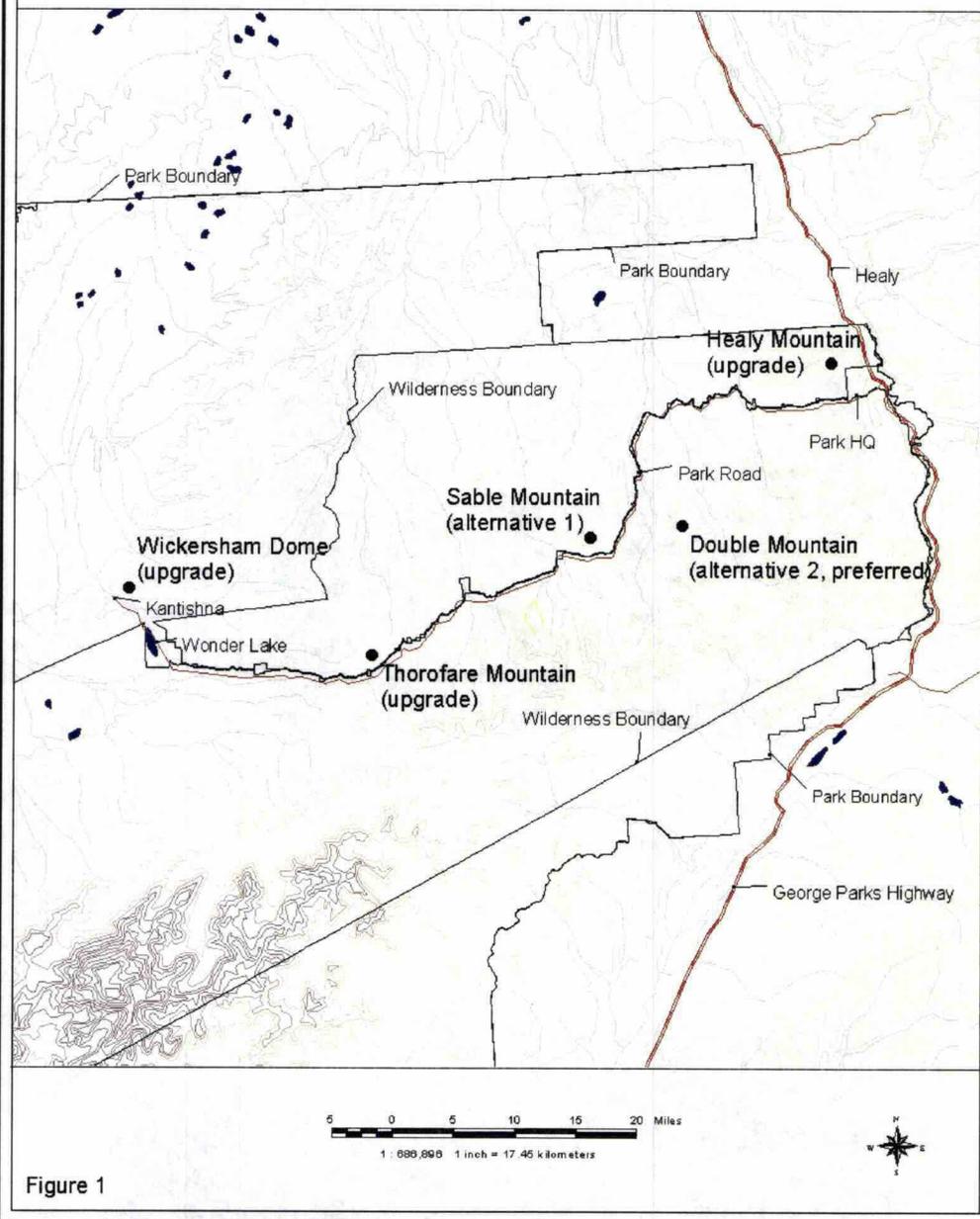


Figure 1

Plot date: March 28, 2001 d:\eq\_seismology\db\mtna.apr



Figure 2. Sable Mountain, looking southwest from west end of ridge. Proposed transceiver location in Alternative 1.



Figure 3. East Knob, Double Mountain. View looking west. Proposed transceiver location in Alternative 2.

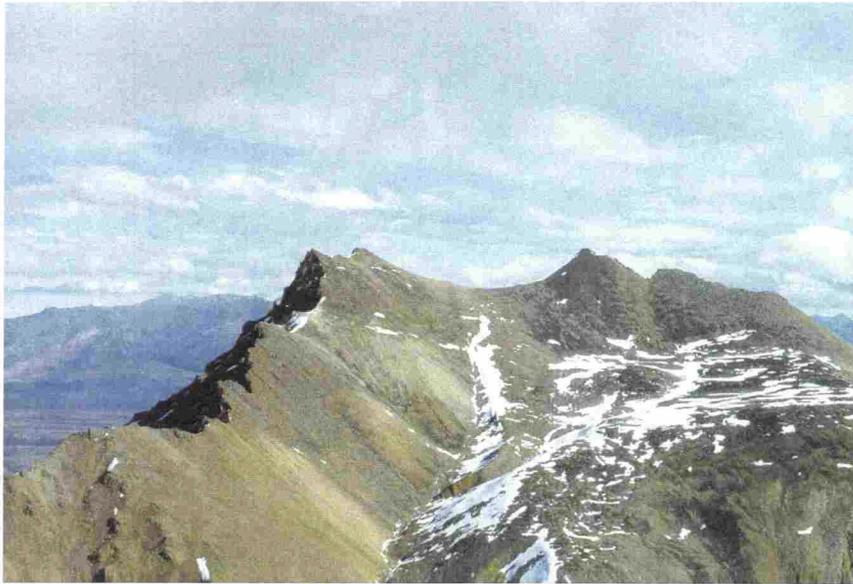


Figure 4. Double Mountain summit, view to east.