

# Olympic National Park

## ENVIRONMENTAL ASSESSMENT PROPOSED RELOCATION AND IMPROVEMENTS TO THE HURRICANE RIDGE WEATHER STATION

JANUARY 2009



Existing Weather Station – Hurricane Ridge, Olympic National Park

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**National Park Service and the Northwest Avalanche Center**



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## **Chapter 1: Purpose and Need for Action**

The Northwest Weather and Avalanche Center (NWAC), in conjunction with the National Park Service (NPS), is considering the installation of a new weather station at Hurricane Ridge, in Olympic National Park. The existing Hurricane Ridge Weather Station is located immediately west of the generator building near the Cirque Rim Trail. The purpose of the weather station is to provide specialized mountain weather and avalanche forecasts to allow for safe park operations, winter travel, and recreation at the Hurricane Ridge area of Olympic National Park. Through the site at Hurricane Ridge, NWAC monitors weather, snow cover, and forecasts avalanche conditions to prevent avalanche fatalities and to minimize transportation disruptions to the greatest extent possible.

As currently configured, the Hurricane Ridge Weather Station is composed of a variety of sensors located on a 25-foot tower attached to the generator building (measuring heated precipitation, air temperature, relative humidity) and on the 80-foot tall radio tower immediately adjacent to and just west of the generator building (measuring wind speed, direction, and snow depth). Although in its current configuration the system provides reliable and relatively representative data on wind speed and direction, precipitation and snow depth data obtained from the system is unreliable, unrealistic and not representative of local snow or rain received at this location. Also, owing to wind effects, the temperature/humidity sensor and radiation shield located on the main radio tower may fill with snow during winter storms. This may result in both incorrect temperature and relative humidity data as well as time lagged temperature values (air temperature changes must infiltrate the blocked temperature shield to be correctly measured). For this reason, the NPS and NWAC have worked together to identify other potential suitable sites for the relocation of the weather station.

The primary objectives of this project are as follows:

1. Eliminate or reduce inaccuracies in precipitation and snow depth data from automated NWAC weather station at Hurricane Ridge so as to provide accurate snow and precipitation measurements.
2. Provide emergency managers, meteorologists and avalanche forecasters with real-time climate data to better predict timing and extent of flood, winter storm and avalanche events.
3. Promote visitor and staff safety, and help create better river, weather and avalanche forecasts for Olympic National Park.

NWAC is administered by the U.S. Forest Service, but it is cooperatively funded by a variety of federal, state, and private agencies, including the Washington State Department of Transportation, Washington State Parks and Recreation Commission, National Weather Service, Pacific Northwest Ski Areas Association, Friends of the Avalanche Center, the NPS, and others.

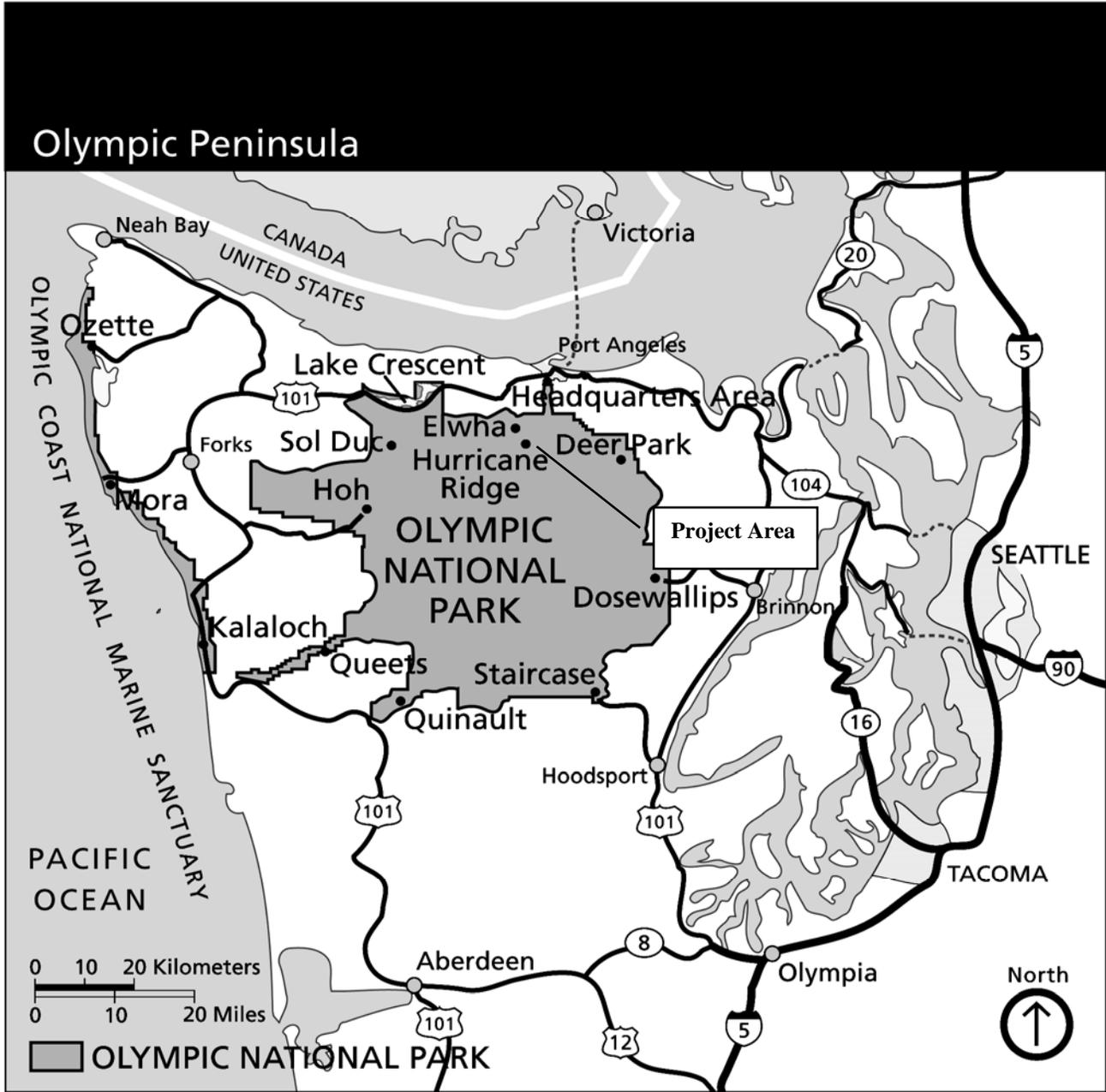


Figure 1. Project Area

NWAC promotes safety by helping reduce the impacts of avalanches and adverse mountain weather on recreation, industry and transportation in Washington and northern Oregon through data collection, mountain weather and avalanche forecasting and education. The program provides detailed weather and avalanche forecasts for all the Washington Cascades and Olympics, and northern Oregon Cascades and manages the most comprehensive real-time mountain weather data network in the U.S.

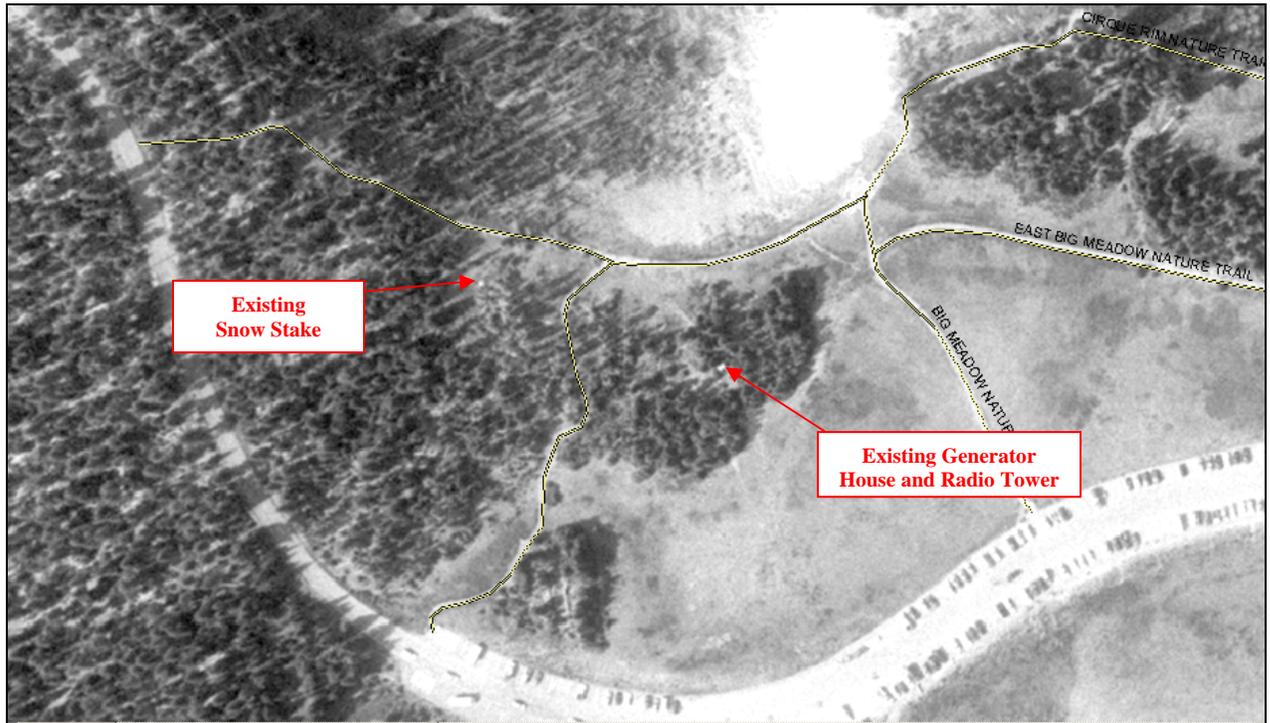


Figure 2. Existing Facilities near Project Area

## Park Purpose and Significance

An essential part of the planning process is to understand the purpose and significance of the park for which this environmental assessment is being prepared.

Olympic National Park protects 922,651 acres of three distinctly different ecosystems — rugged glacier-capped mountains, more than 70 miles of wild Pacific coast, and magnificent stands of old-growth and temperate rain forest. Olympic National Park encompasses and protects one of the largest wilderness areas in the contiguous United States — 95% of the park (876,669 acres) is designated wilderness, offering visitors a chance to experience the park’s amazing diversity in its natural and pristine state.

Park purpose statements are based on national park legislation, legislative history and NPS policies. The statements reaffirm the reasons for which the national park was set aside, and provide the foundation for national park management and use.

The purpose of Olympic National Park is described in the *Final General Management Plan* (2008) is as follows.

The purpose of Olympic National Park is to preserve for the benefit, use and enjoyment of the people, the finest sample of primeval forests of Sitka spruce, western hemlock, Douglas fir and western red cedar in the entire United States; to provide suitable winter range and permanent protection for the herds of native Roosevelt elk and other wildlife indigenous to the area; to conserve and render available to the people, for recreational use, this outstanding mountainous country, containing numerous glaciers and perpetual snow fields, and a portion of the surrounding verdant forests together with a narrow strip along the beautiful Washington coast.

Olympic National Park is significant because it protects several distinct and relatively pristine ecosystems, including more than 70 miles of wild Pacific coast and islands, densely forested lowlands and the glacier-crowned Olympic Mountains. The ecosystems protected within Olympic National Park contain a unique array of habitats and life forms, resulting from thousands of years of geographic isolation, and extreme gradients of elevation, temperature and precipitation. At least 16 kinds of animals and 8 kinds of plants on the Olympic Peninsula exist nowhere else in the world.

Olympic National Park protects more than 3,000 miles of rivers and streams within 11 watersheds and provides one of the largest remaining tracts of pristine fish spawning and rearing habitat in the lower 48 states. Nine species of salmon, trout, char and many other native fish inhabit these waters.

Olympic National Park protects the largest population of Roosevelt elk in its natural environment in the world. Decades of protection from human harvest and habitat manipulation have sustained not only high densities of elk, but have also preserved the natural composition, social structure and dynamics of this unique coastal form of elk as found nowhere else.

## Related Legislation and Policy

***The NPS Organic Act of 1916 (16 USC 1, 2-4) and the General Authorities Act (16 USC 1a-8)***: These acts direct the NPS to “conserve the scenery, the natural and historic objects, and wildlife, and to provide for the enjoyment of those resources in such a manner as to leave them unimpaired for future generations.”

**The Redwood Act (March 27, 1978, 16 USC 1a-1)**: This act reaffirms the mandates of the *NPS Organic Act* and provides additional guidance on national park system management as follows:

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.

**The National Parks Omnibus Management Act of 1998**: This act provides national parks with clear guidance to use sound scientific methods to better achieve the park service mission.

**Acts Related to Cultural Resources Management**: The National Historic Preservation Act of 1966 (1992, as amended) (NHPA), and other applicable laws and regulations including the *NPS Organic Act* (1916), the Antiquities Act of 1906, NEPA, the National Parks and Recreation Act of 1978, the Archeological Resources Protection Act of 1979, the Native American Graves Protection and Repatriation Act of 1990, and the Curation of Federally Owned and Administered Archeological Collections (1991), along with applicable agency policies provide direction for the protection, preservation and management of cultural resources on public lands. Further, these laws and policies establish what must be considered in general management planning and how cultural resources must be managed in future undertakings resulting from the approved plan, regardless of the final alternative chosen.

**NPS Management Policies 2006** are based on these and other legislation, and provide guidance for management of all national park units. Section 1.10 of *Management Policies* focuses on partnerships. The NPS has had many successful partnerships with individuals; organizations; tribal, state, and local governments; and other federal agencies that have helped fulfill the NPS mission. Through these partnerships, the NPS has received valuable assistance in the form of educational programs and visitor services, and a host of other activities. These partnerships, both formal and informal, have produced countless benefits for the NPS. Benefits often extend into the future, because many people who participate as partners connect more strongly with the parks and commit themselves to long-term stewardship. The NPS will continue to welcome and actively seek partnership activities with individuals, organizations, and others who share the NPS commitment to protecting park resources and values and providing for their enjoyment.

The safety and health of employees, contractors, volunteers, and the public are core values. In making decisions on matters concerning employee safety and health, NPS managers must exercise good judgment and discretion and, above all, keep in mind that the safeguarding of human life must not be compromised. The NPS must ensure that all employees are trained and informed on how to do their jobs safely, and that they have the necessary clothing, materials, and equipment to perform their duties with minimal personal risk (*Management Policies* 1.9.1.4).

*Management Policies* Section 8.2.5.1, Visitor Safety, states that the saving of human life will take precedence over all other management actions as the NPS strives to protect human life and provide for injury-free visits. The NPS will do this within the constraints of the 1916 Organic Act. The primary constraint imposed by the Organic Act is that discretionary management activities may be undertaken only to the extent that they will not impair park resources and values. While there are limitations on the ability to totally eliminate all hazards, the NPS and its concessioners, contractors, and cooperators will seek to provide a safe and healthful environment for visitors and employees. The NPS will work cooperatively with other federal, tribal, state, and local agencies; organizations; and individuals to carry out this responsibility. The NPS will strive to identify and prevent injuries from recognizable threats to the safety and health of persons and to the protection of property by applying nationally accepted codes, standards, engineering principles, and guidance. When practicable and consistent with congressionally designated purposes and mandates, the NPS will reduce or remove known hazards and apply other appropriate measures, including closures, guarding, signing, or other forms of education.

Section 8.11.2 of *Management Policies* focuses on NPS-supported studies and research. The NPS is responsible for the identification and acquisition of needed inventory, monitoring, and research, as well as for the interpretation of the management and operational implications of such studies. The NPS will use the best available science to assist park managers in addressing management needs and objectives that have been identified in legislation and planning documents. The NPS will support studies to reach a level of understanding that, among other goals, accomplish the following: ensure a systematic and fully adequate park information base; provide a sound basis for policy, planning, and decision-making; develop effective strategies, methods, and technologies to predict, avoid, or minimize unacceptable impacts on resources, visitors, and related activities; determine causes of resource management problems; and, to further understand park ecosystems and related human social systems, and document their components, condition, and significance.

**Director's Order #28 and Cultural Resources Guideline #28, NPS 1998:** This guideline elaborates on cultural resource management policies and standards and offers guidance in applying them to establish, maintain and refine park cultural resource programs. It is intended to aid managers, planners, staff, and cultural resource specialists, and places greater emphasis on the needs of park managers and staff and non-specialists. It outlines the basic principles and ingredients of a good park program.

**Natural Resources Management Guideline, NPS-77, 1991:** This document provides guidance to park managers for all planned and ongoing natural resource management activities. Managers must follow all federal laws, regulations and policies. This document provides the guidance for park management to design, implement and evaluate a comprehensive natural resource management program.

## **Park Planning Documents**

**Olympic National Park Final General Management Plan (GMP) and Environmental Impact Statement (2008):** The GMP provides overall planning guidance for desired conditions and parkwide policies for resource protection, sets park access goals, including winter access goals for Hurricane Ridge, and provides the direction for park management for the next 15 to 20 years.

## **Scoping, Issues and Impact Topics**

### **Scoping**

Scoping is an effort to involve agencies and the general public in determining issues to be addressed in this environmental assessment. Internal scoping for this project began when the NWAC submitted a proposal to the NPS to improve or relocate the existing weather station at Hurricane Ridge. The proposal was presented to the park's interdisciplinary planning team. As part of this original proposal, park staff met on site numerous times with NWAC staff to determine options and issues related to the relocation and improvement of the weather station.

A press release initiating public scoping and describing the project was issued on July 28, 2008 (Appendix A). The press release was sent to approximately 50 media outlets, interested groups, public officials, agencies, and individuals in the Puget Sound and Olympic Peninsula area. Comments were solicited during a public scoping period that originally ended August 25, but was extended until September 10 because the original news release was not published in the local newspaper in a timely manner. Five responses were received. Comments received were generally in support of the project. Commenters expressed concern about the impacts the weather station would have on park visitors, visual resources including night sky, vegetation, wildlife and wildlife habitat, and nearby wilderness areas. There was interest in the park carefully choosing an appropriate site which would minimize the footprint on the land and would be hidden from public view and wilderness users. Individuals also desired direct benefits from the weather station such as improved safety and access due to more accurate avalanche forecasting.

### **Issues and Impact Topics**

Specific impact topics were developed for discussion and to allow comparison of the environmental consequences of each alternative. These impact topics were identified based on internal and external scoping; federal laws, regulations and executive orders; NPS *Management Policies 2006*; results of a site visit; and NPS knowledge of limited or easily impacted resources. A brief rationale for the selection of each impact topic is given in Table 1, as well as the rationale for dismissing specific topics from further consideration.

## Impact Topics Selected for Detailed Analysis

**Table 1. Impact Topics Retained for Further Evaluation and Relevant Laws, Regulations and Policies**

Impact Topic	Reasons for Retaining Impact Topic	Relevant Laws, Regulations and Policies
<i>Soils</i>	The project would involve excavation and manipulation of small areas of soil for installation of the underground utility lines and the tower. Therefore, impacts to soil will be further evaluated in this environmental assessment.	<i>NPS Organic Act; NPS Management Policies; Resource Management Guidelines (NPS-77)</i>
<i>Vegetation</i>	The project would require the removal of small areas of vegetation for the installation of the underground utility lines and the tower. Therefore, impacts to vegetation will be further evaluated in this environmental assessment.	<i>NPS Organic Act; NPS Management Policies; Resource Management Guidelines (NPS-77)</i>
<i>Wildlife</i>	The project would have the potential to affect wildlife during construction activities and periodic maintenance. Therefore, this topic will be further evaluated in this environmental assessment.	<i>NPS Organic Act; NPS Management Policies; Resource Management Guidelines (NPS-77)</i>
<i>Cultural Resources</i>	This project would involve ground disturbance of small areas of soil for the installation of the underground utility lines and the tower. Since archeological resources are abundant in high country areas throughout the park, cultural resources are an impact topic that will be addressed in this document.	Chapter 5 of <i>Management Policies 2006</i> , and <i>Director's Order # 28: Cultural Resource Management</i> , as well as other related policy directives such as the <i>NPS Museum Handbook</i> and the <i>NPS Manual for Museums</i> .
<i>Visual Resources</i>	Visual resources would be affected by the project by the placement of a tower. Therefore, this topic will be addressed in this document.	<i>NPS Management Policies</i>
<i>Visitor Experience</i>	Placement and improvements to avalanche forecasting would affect the visitor enjoyment in Olympic National Park. Therefore, visitor experience will be addressed as an impact topic in this environmental assessment.	<i>NPS Organic Act; NPS Management Policies; NPS-77; The Redwood Act, 1978</i>
<i>Park Safety &amp; Operations</i>	Park operations associated with the safety of park visitors and employees could be affected by this project. Therefore, safety and park operations will be addressed as an impact topic in this environmental assessment.	<i>NPS Management Policies</i>

### Impact topics dismissed from further analysis

The following topics were eliminated from detailed study because there would be no potential impacts or only negligible impacts expected.

#### *Air Quality*

The 1963 Clean Air Act, as amended (42 USC 7401 et seq.), requires land managers to protect air quality. Section 118 of the Clean Air Act requires parks to meet all federal, state and local pollution standards. *Management Policies 2006* address the need to analyze potential impacts to air quality during park planning. Under the Clean Air Act, Olympic National Park is designated as a Class I area, which implies the strictest requirements for protection of air quality (NPS 1990). The use of a backhoe or small trencher for project work would add some fumes to the air but this would be temporary,

slight and negligible. None of the other activities associated with this project would affect air quality; therefore this topic will not be evaluated within this document.

#### *Threatened and Endangered Species and Species of Special Concern*

The Endangered Species Act (1973), as amended, requires an examination of impacts on all federally listed threatened or endangered species. NPS policy also requires examination of the impacts on federal candidate species, as well as state-listed threatened, endangered, candidate, rare, declining and sensitive species.

The project area is at an elevation well above potential breeding habitat for marbled murrelets and northern spotted owls. No other listed threatened or endangered species exist in the project area. The only sensitive species that could occur in the project area is the *Mazama* pocket gopher (federal candidate, state threatened). However, the project area was surveyed and determined to be absent of burrows or other evidence of pocket gophers, and the area is not typical of pocket gopher habitat. Therefore, threatened, endangered and special-status species will not be addressed in this environmental assessment and no biological assessment will be prepared since there would be no effect to any federally listed species.

#### *Fish and Fish Habitat*

There are no water resources in the immediate project area. Distance to the nearest fish bearing waters from the project site is more than 5 miles. Therefore, this topic will not be evaluated.

#### *Socioeconomic Environment*

No alternatives associated with this project have the potential to directly affect economic activities outside the park. While the ability to better predict avalanches would have a positive impact on local government planning and emergency response, direct economic benefits would be difficult to quantify and would likely be negligible. Therefore, socioeconomics will not be addressed in this environmental assessment.

#### *Geology and Geologic Hazards*

There would be no impacts to geologic features. Although ground-disturbing activities would be anticipated within the alternatives, the area of impact would be small and only within shallow soil horizons. Geologic features or hazards (e.g., landslides) would not be affected. Therefore, geology and geologic hazards have been dismissed as an impact topic in this environmental assessment.

#### *Wetlands and Floodplains*

Executive Order 11988 (Floodplain Management), Executive Order 11990 (Protection of Wetlands), and NPS policies require an examination of impacts to floodplains and wetlands. The project site would not be within any floodplain. There are no jurisdictional or NPS-defined wetlands within the project area. Equipment requires well-drained, level benches and would not be placed within or near wetland areas. Wetlands and floodplains have been dismissed as an impact topic in this environmental assessment.

*Designated Critical Habitat, Ecologically Critical Areas, Wild and Scenic Rivers, Other Unique Natural Areas*

The project area is not located in an ecologically critical area, designated critical habitat, nor is it along any existing or potential wild and scenic rivers. Olympic National Park is an important natural area, but the project would not threaten the associated qualities and resources that make the park unique. Therefore, designated critical habitat, ecologically critical areas, wild and scenic rivers, and other unique natural areas have been dismissed as impact topics in this environmental assessment.

*Water Quality and Water Resources*

The 1972 Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, is a national policy to restore and maintain the chemical, physical and biological integrity of the nation's waters; to enhance the quality of water resources; and to prevent, control and abate water pollution. *Management Policies 2006* provide direction for the preservation, use and quality of water in national park units. While project installation would result in some minor soil disturbance, the project area is not near any lake, stream, or water resource. The project would not create run off or impact water quality and water resources. Therefore this topic will not be further analyzed in this document.

*Wilderness Character and Values*

In accordance with NPS *Management Policies 2006* and Director's Order 41, Wilderness Preservation and Management, superintendents will apply the minimum requirement concept in the context of wilderness management planning as well as to all other administrative practices, proposed special uses, scientific activities and equipment use in wilderness. Since the project site is not within potential, proposed, or designated wilderness and would not affect wilderness use, values, or character, this topic is dismissed from further evaluation.

*Soundscape*

Minimal noise would be generated from the use of a small backhoe or trencher during the installation of the utility line, tower and the placement of the weather station. Since impacts would be short-term, and would involve only one piece of equipment in a development zone, resulting in negligible effects, this topic is dismissed from further evaluation.

*Indian Trust Resources*

Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by Department of the Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. The lands comprising Olympic National Park are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians. Therefore, Indian trust resources have been dismissed as an impact topic in this environmental assessment.

*Environmental Justice*

Executive Order 12898 (General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations), requires all 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 or communities. No alternative under consideration would have health or environmental effects on minorities or low-income populations or communities as defined in the Environmental Protection Agency's Draft Environmental Justice Guidance (July 1996). Therefore, environmental justice has been dismissed as an impact topic in this environmental assessment.

*Prime Farmland and other Downstream Water Users*

In 1980, the Council on Environmental Quality directed federal agencies to assess the effects of their actions on farmland soils classified as prime or unique by the United States Department of Agriculture, Natural Resources Conservation Service. Prime farmland soil produces general crops such as common foods, forage, fiber and oil seed; unique farmland produces specialty crops such as fruits, vegetables and nuts. There are no prime or unique farmlands within the project area. Therefore, this topic is dismissed from further analysis.

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## Chapter 2: Alternatives

### Introduction

This chapter describes the alternatives that were considered for the improvements and relocation of the Hurricane Ridge Weather Station within Olympic National Park. During the scoping process, a full range of alternatives for meeting the project purpose and need were developed.

Criteria were formulated by park staff and NWAC staff to develop the action alternatives. To be considered, the alternative must meet the purposes and objectives of the project as described in Chapter 1. In addition, alternatives must:

- Provide reliable and accurate snow and precipitation data and avalanche forecasting.
- Protect the park's natural and cultural resources and scenic values.
- Ensure that park designated wilderness and visitor wilderness experience is protected.

Several sites were evaluated during the development of the alternatives. Determining an appropriate location for the weather station involved consideration of many factors. The following are the installation requirements that were considered for site selection, understanding that all goals could not be met or certain goals contradicted others and required prioritization:

- The site must be located at Hurricane Ridge.
- The site must have access to AC power and phone lines.
- The site must be well positioned for accurate capture of precipitation. A preferred site should be a small, tree-sheltered opening that is away from ridge tops, major divides or other areas subject to wind or unusual snow loading.
- A preferred site should be outside of park wilderness.
- To minimize impacts to visitors, a preferred site should be hidden from view.
- Site characteristics should allow for a minimum amount of disturbance to soils and vegetation (i.e., level, well-drained, minimal vegetation).
- The site should be easily accessible for annual maintenance.
- The site would not be placed in cultural landscapes or areas likely to have extensive archeological resources.

Park and NWAC staff studied climate records, topographic maps, and aerial photographs to identify potential areas for the new site. A site visit was conducted during the winter months to evaluate actual snow conditions and snow characteristics of considered sites. Site visits were also conducted during the summer to assess vegetation, habitat, and conduct initial cultural surveys. During this process, several areas were considered and then dismissed. This information is provided later in the document, in the "Alternatives Considered but Dismissed" section.

## **Alternative A: No Action**

The no-action alternative describes the action of continuing the present management operation and condition; it does not imply or direct discontinuing the present action or removing existing uses, developments or facilities. The no-action alternative provides a basis for comparing the management direction and environmental consequences of the action alternatives.

Under the no-action alternative, the existing NWAC site would continue to operate in its current location, co-located on the NPS radio tower and on the generator building at Hurricane Ridge. A variety of sensors would be located on either the 25-foot tower attached to the generator building (heated precipitation, air temperature, relative humidity) or on the main 80 foot tall radio tower immediately adjacent to and just west of the generator building (wind speed and direction, snow depth).

Maintenance visits would continue to occur once or twice a year and take approximately 2 hours per visit. One vehicle would be parked at the Hurricane Ridge parking lot, and one or two NWAC staff members walk to the site. Equipment used for the maintenance of the weather station includes small hand tools, such as wrenches and screwdrivers. Extensive maintenance is needed only if the towers are damaged by high winds or snowpack.



Photo 1. Existing NPS Radio Tower with NWAC Weather Station



Photo 2. Generator Building with NWAC Components

### **Alternative B: Relocate Hurricane Ridge Weather Station to Existing Snow Stake Site (Management Preferred Alternative)**

Under this alternative, a portion of the Hurricane Ridge Weather Station (wind speed and direction) would remain at its existing location, and the precipitation, snow depth, temperature and relative humidity measurement devices would be moved to the location of the existing snow stake. The Hurricane Ridge snow stake site is the location for the manual snow depth pole and has been the location for Hurricane Ridge snow depth measurements for the past 20 years. The site is located about 100 yards to the east of the existing tower and generator building, about 50 yards east of the Cirque Rim Trail that crosses the Ridge in a north-south direction, and west of the Hurricane Ridge Lodge. Inspection of snow drift activity at this location indicates that the site is much less windy than the existing site.



Photo 3. Existing Snow Stake Site and Proposed Relocation Site

In order to complete a relocation of precipitation, snow depth, temperature and relative humidity measurements, a new 30-foot high tower would be placed at this site. The tower would require installation of a 2- by 2- by 2-foot concrete base (poured on location). There would be no lights on the tower. Buried AC power would be extended to the site from the generator building along with one 6-pair shielded telemetry cable. These would be buried in a 2-foot-wide by 1½-foot-deep trench through an opening in the forest to the existing trail. This involves trenching the cable through a small patch of meadow approximately 130 feet from the existing generator building to the trail north of the existing site. Then, an approximately 150-foot-long trench would extend parallel to the trail to the proposed site; and, approximately 60 to 75 feet would be trenched in the meadow corridor leading to the proposed relocation site. A backhoe or small trencher would be used to accomplish this work.



Photo 4. Cirque Rim Trail, Proposed Utility Corridor



Photo 5. Proposed Utility Corridor Site Conditions

A phone line and telemetry line would be installed adjacent to the power line trench. Communication devices would transmit wind speed and direction information from the radio tower sensors and junction box to the new site via a shielded multi-conductor telemetry cable. The datalogger would be moved from the generator building to the new tower, and would be housed in a 12- by 18-inch white box in the new tower.

Construction of the new tower would involve the use of a small backhoe or trencher for utility line placement. Hand tools would be used to dig the hole for the tower foundation. A small concrete mixer would be used. A truck may be used on the existing trail to deliver supplies and tower parts to

the generator building, and then they would be either hand carried or wheeled to the site using a wheelbarrow.

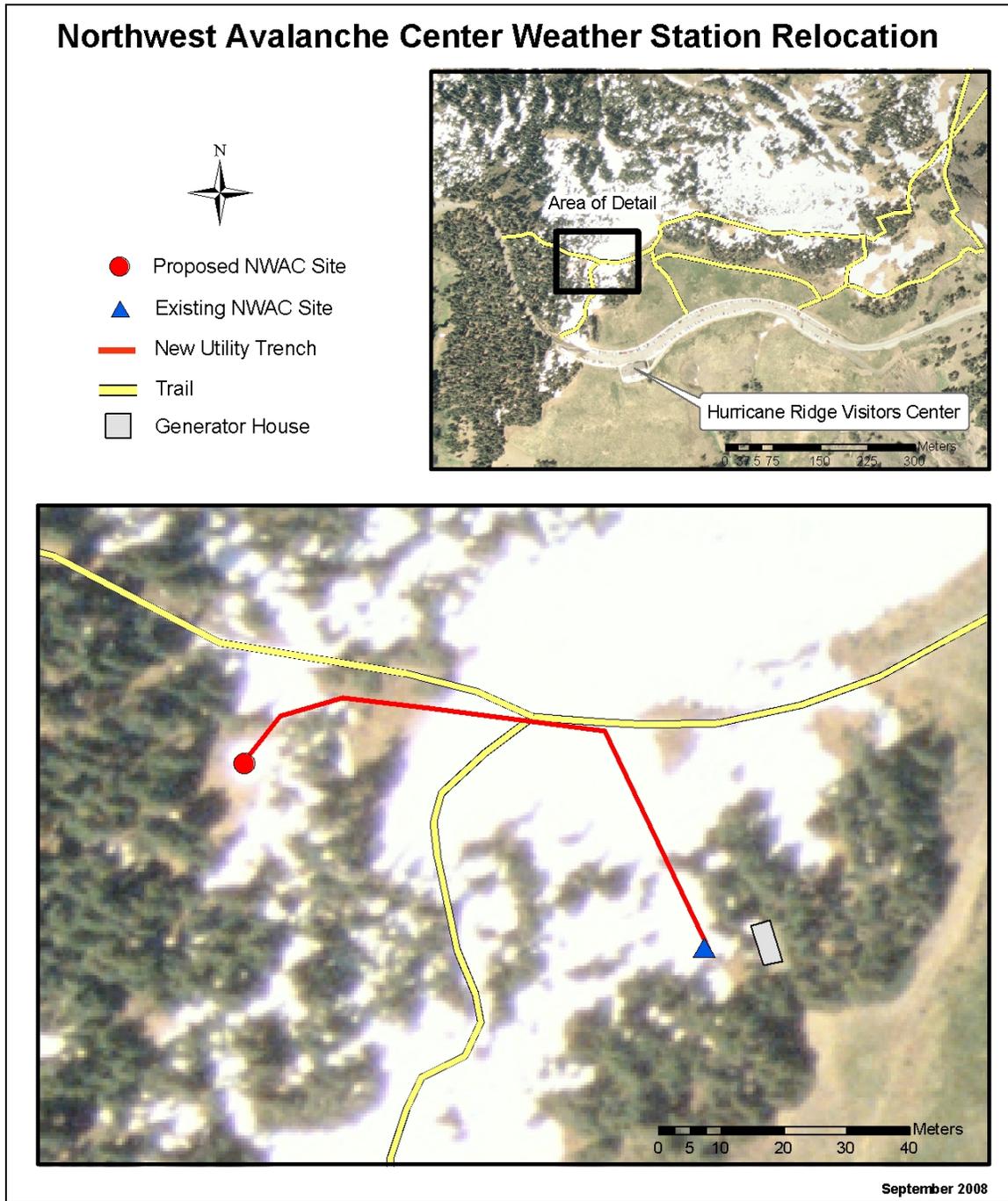
#### *Annual Site Maintenance*

Annual site maintenance requirements would be the same as described under the no action alternative. Additional long-term maintenance may require trimming, pruning or removing invading trees in order to keep the proposed installation site open. This would prevent any unusual snow loading and thus provide more accurate and consistent data collection. All work would be conducted as advised by the Park's vegetation specialist.

During the first few years of installation, manual measurements of snow depth and snow water equivalent might be taken to ensure that all instruments are calibrated and recording accurate data.

In the long-term, if riming or snowpack causes deformation of the tower, then it may need to be replaced.

Figure 3. Alternative B - Proposed tower and utility trench location



## **Mitigation Measures of the Action Alternatives**

### *Soil and Vegetation*

To minimize impacts to vegetation and decrease the overall footprint of the installation, all instruments would be installed in as tight an arrangement as possible, while allowing adequate spacing so that installations do not intercept or interfere with snow deposition.

Native vegetation would be carefully salvaged by revegetation experts and placed in holding areas during installation of the utility line. The top 6 to 8 inches of soil would be removed to preserve the seed base and top layer of ground cover. These soils would be placed onto clean tarps and stored until backfilled into trenches. Salvaged vegetation would be restored to all areas except at the concrete base of the tower.

All equipment, tools, boots, clothes and packs would be cleaned to ensure that no exotic species are transported to the site. Any fill used would be from the local area and free of exotic seed sources.

### *Visitor Experience, Visual Resources*

Potential impacts to visitor experience and visual resources were mitigated with careful selection of the proposed installation site. The chosen site is surrounded by trees and is situated mostly out of sight. All equipment would be painted in green or brown tones to provide additional camouflage. During installation and maintenance of the facility, “leave no trace” practices would be used.

### *Cultural Resources*

Archeological resources in the project area would be further tested and evaluated by conducting archeological surveys prior to construction, and monitoring would occur during construction. If significant archeological materials are found, then instrument locations would be moved or data recovery (archeological excavation and documentation) would occur. Park archeologists would be on site before and during the installation.

## **The Environmentally Preferred Alternative**

In accordance with DO-12, the NPS is required to identify the “environmentally preferred alternative” in all environmental documents, including environmental assessments.

According to the Council on Environmental Quality (CEQ) guidelines, the environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in Section 101 of the National Environmental Policy Act (NEPA), which considers:

1. fulfilling the responsibilities of each generation as trustee of the environment for succeeding generations;
2. assuring for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;

3. attaining the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
4. preserving important historic, cultural and natural aspects of our national heritage and maintaining, wherever possible, an environment that supports diversity and variety of individual choice;
5. achieving a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and
6. enhancing the quality of renewable resources and approaching the maximum attainable recycling of depletable resources (NEPA, section 101).

The NPS is required to identify the environmentally preferred alternative in its NEPA documents for public review and comment. Further guidance from the CEQ states that the environmentally preferred alternative means “the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves and enhances historic, cultural and natural processes” (CEQ 1981).

The no action alternative (alternative A) would keep the weather station and tower in place at its existing location. All facilities currently located at the generator building would remain. In alternative B, the existing facilities at the generator building would remain (tower and building) and an additional tower and utility corridor would be constructed in the Hurricane Ridge area. This would add another human-made structure to the area. Both alternatives result in an adverse effect to the natural environment of Hurricane Ridge, but Alternative A would have no additional effect on the biological and physical environment; therefore it is identified as the environmentally preferred alternative. However, alternative B would establish an additional weather station in the park, which would allow for better understanding of the natural environment and processes, and would provide a safer environment for visitors and park staff through improved avalanche forecasting. Even though alternative A is the environmentally preferred alternative, it does not meet plan objectives and therefore is not the management preferred alternative.

To identify the management preferred alternative, the interdisciplinary planning team evaluated each alternative based on the ability to meet the project requirements and the potential impacts on the environment (“Chapter 4: Environmental Consequences”). Alternative B is the only alternative that fully meets all of the plan objectives. Therefore alternative B was identified as the management preferred alternative.

### **Alternatives Considered but Dismissed**

Several locations were considered in the development of alternatives, but dismissed from further analysis. Table 2 describes those locations and reasons for their dismissal.

**Table 2. Locations Considered and Dismissed**

Considered Location	Primary Reason for Dismissal
Hurricane Ridge Well House	This location does have AC power and is partially protected from winds by tree cover, however, the local topography includes a steeply sloped creek drainage which is likely to produce some channeling of winds (especially from the south), and the steep side slopes do not allow for accurate or representative snow depth measurements. Also, the same tree cover that allows for partial wind sheltering is high enough and close enough to the well house that snowfall accumulating on tree boughs may impact precipitation measurements during warming events. There is no communication capability at this location (no phone line) and the ridge to the east that lies in between this site and the current ridge weather system would make radio communication either problematic or impossible. In addition, archeological resources were found at this location during initial surveys. Hence this location does not meet all of the project objectives.
Hurricane Ridge Lodge	The Lodge meets the requirements for AC power and communication; however, the Lodge is located in an extremely windy location with major snow drifts. Also, the Lodge provides spectacular views of the Olympic Mountains that the park wants to preserve. A tower would interfere with those views. Therefore, this location does not meet all of the project objectives.
Top of Poma Lift	This location is in a previously disturbed area, however, power and phones were not available nearby, and the site was not sheltered or level. Therefore, the location does not meet the project objectives.

There were several preliminary options considered for getting power to proposed weather station site:

1. Trench through trees
2. Skirt around meadow on south side (visitor center side)
3. Trench to existing trail north of existing site and follow trail to new location

The straight line west from the generator house (existing tower) to the snow stake was thick with trees and downed logs. A path would have to be cut through the trees and trees removed to accomplish the trenching. Trenching though this area would cause an unacceptable amount of damage by removing the trees, and damage to the tree roots from trenching, and it would be too difficult to trench through this area. Therefore, this option was ruled out.

Trenching from the generator building through the meadow on the south side of the project area would create a visual disturbance and disturb native plants in the fragile meadow area. In addition, the trench would still have to go through an area of dense trees and downed logs, creating damage. Even with mitigation and the restoration of the meadow area, these fragile resources can take years to recover. Therefore, because this option would cause unacceptable impacts, it was not considered further in the analysis.

**Table 3. Summary of Environmental Consequences**

<b>Impact Topic</b>	<b>Alternative A No Action</b>	<b>Alternative B Relocation of Weather Station</b>
<b>Soils</b>	There would be no new impacts or cumulative impact to soils under this alternative and therefore no impairment to soil resources.	Direct, localized, long-term minor adverse impacts to soil resources would occur in the immediate project area. This alternative would contribute slightly to the cumulative effects of soils within the Hurricane Ridge area. Because the impacts to soils are minor, there would be no impairment to soils.
<b>Vegetation</b>	There would be no impacts, no cumulative impacts, and no impairment to vegetation under this alternative.	Direct, localized, long-term, negligible to minor adverse impact to vegetation would occur in the immediate project area. Alternative B would contribute slightly to the long-term minor cumulative impacts. Because the impacts from this alternative would be negligible to minor, there would be no impairment to vegetation.
<b>Wildlife</b>	There would be no new impacts to wildlife and therefore no impacts, cumulative impacts, or impairment to wildlife species under this alternative.	Overall, adverse impacts to wildlife species would be direct, localized, short-term and negligible to minor in the immediate project area. Cumulative impacts would be indirect, long-term and minor and this alternative would contribute slightly to the cumulative effects. Because impacts would be no more than minor, there would be no impairment to wildlife resources.
<b>Cultural Resources</b>	There would be no impacts, cumulative impacts or impairment to cultural resources in this no action alternative.	This proposed alternative would have a minimal impact on archeological resources. The area of proposed project disturbances is the same as the area that will be tested and evaluated. Archeological testing activities and installation of environmental monitoring units are covered under programmatic exclusion in the NPS nation-wide programmatic agreement. For the purposes of Section 106 and the National Historic Preservation Act, the determination of effect would be <i>no adverse effect</i> and any impacts would be minor. Because there would be no major adverse impacts to cultural resources, there would be no impairment of park resources or values related to archeological resources.
<b>Visual Resources</b>	Because no new facilities or activities are proposed in this alternative, there would be no new impacts, cumulative impacts, and no impairment to visual resources under this alternative.	Scenic values of the Hurricane Ridge area where the proposed installation is visible could be impacted in this alternative, however, the site will be mainly sheltered by trees and out of

Impact Topic	Alternative A No Action	Alternative B Relocation of Weather Station
		the public view. Plus, because of the proximity to existing facilities, including the Hurricane Ridge Ski area and Lodge, the adverse impact is considered local, long-term and negligible, and cumulative effects are minor, long-term, and adverse. Because under this alternative the impacts would be negligible, there would be no impairment to visual resources.
<b>Visitor Experience</b>	If no real-time data were available from the weather station, there would be an indirect, long-term, but minor impact to visitor experience. There would be no cumulative effects.	Real-time data and more accurate weather and avalanche forecasting from a new weather station would create an indirect, long-term, minor beneficial effect to the visitor experience.
<b>Safety and Park Operations</b>	Under the no action alternative, avalanche forecasting, natural resource studies and research would continue to rely on existing instrumentation and data resulting in an indirect, long-term, moderate adverse impact to safety and park operations at Olympic National Park.	Safety is vital to the NPS. This alternative, by increasing the accuracy of avalanche forecasting, and providing baseline data for better understanding impacts to park ecosystems from global climate change, would create an indirect, long-term, moderate beneficial effect to safety and park operations.

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## Chapter 3: Affected Environment

### Introduction

This chapter describes the resources associated with the project. More detailed information on resources in Olympic National Park may be found in the *Olympic National Park Final General Management Plan and Environmental Impact Statement* (2008).

#### *Soils*

Soils within the project area are shallow, rocky and well developed. (Well developed soils have evidence of significant leaching of minerals & organics – indicative of areas with high rainfall amounts). Classified as silty loam and silty clay loams, the soils at this site are fairly typical for subalpine meadow areas of the Olympics. Throughout the site, the organic (O) or surface horizon is shallow (2 inches) with abundant charcoal and root masses throughout. This likely indicates a history of wildfire and the probable origin of this forest clearing (Information provided by Olympic National Park archeologist and physical science technician).

#### *Vegetation*

The vegetation in vicinity of the proposed new tower and connecting utility trench is subalpine meadow, with some small subalpine firs (*Abies lasiocarpa*). The vegetation is dominated by graminoids, including showy sedge (*Carex spectabilis*), black alpine sedge (*C. nigricans*), alpine timothy (*Phleum alpinum*), mountain hairgrass (*Vahlodea atropurpurea*), and small-flowered woodrush (*Luzula parviflora*). Forbs are also abundant, including broadleaf lupine (*Lupinus latifolius*), fan-leaf cinquefoil (*Potentilla flabellifolia*), partridgefoot (*Lutkea pectinata*), American bistort (*Polygonum bistortoides*), and fawnlily (either *Erythronium montanum* or *E. grandiflorum*). The subalpine firs are mostly up to four inches in diameter at breast height (dbh) and up to approximately 20 feet tall.

There are vascular plant species listed as threatened or sensitive by the state of Washington in the park. Given our current knowledge of the distribution and ecology of these species, it is unlikely that any occur in the vicinity of the proposed new tower and connecting utility trench.

#### *Wildlife*

Wildlife species are abundant throughout the montane and subalpine vegetation zones of the Olympic Mountains. The project area includes a small forest clearing (subalpine meadow) and subalpine forest.

The Columbia black-tailed deer (*Odocoileus hemionus columbianus*) is the most common ungulate occurring in this area. Other mammals likely to frequent this area would include black bear (*Ursus americanus*), spotted skunk (*Spilogale putorius*), weasel (*Mustela* sp.), cougar (*Felis concolor*), bobcat (*Lynx rufus*), deer mouse (*Peromyscus maniculatus*), Olympic chipmunk (*Eutamias amoenus caurinus*), mountain heather vole (*Phenacomys intermedius*), snowshoe hare (*Lepus americanus*) and several shrew (*Sorex* sp.) species.

Two mammal species of particular management concern in subalpine areas of Olympic National Park are the Olympic marmot (*Marmota olympus*) and the Mazama pocket gopher (*Thomomys mazama melanops*). The project area, however, is not typical of habitat used by either of these species as they typically inhabit grassy, forb meadow habitats. Surveys were conducted to ensure no burrows or other evidence of either species occurred in or near the project area.

The project area is likely frequented by a number of resident and migratory bird species. Bird species likely to be found in the project area include the gray jay (*Perisoreus canadensis*), sooty grouse (*Dendragapus fuliginosus*), common raven (*Corvus corvus*), American robin (*Turdus migratorius*), hermit thrush (*Catharus guttatus*), dark-eyed junco (*Junco hyemalis*), chestnut-backed chickadee (*Parus rufescens*), golden-crowned kinglet (*Regulus satrapa*), yellow-rumped warbler (*Dendroica coronata*), winter wren (*Troglodytes troglodytes*) and olive-sided flycatcher (*Contopus borealis*).

Amphibians, while rarely encountered in open subalpine meadows, will occasionally traverse or reside in seeps and rotting logs in and adjacent to forest openings. Possible species would include the Northwestern salamander (*Ambystoma gracile*), long-toed salamander (*Ambystoma macrodactylum*), the rough-skinned newt (*Taricha granulose*), and the Cascades frog (*Rana cascadae*).

#### *Cultural Resources*

Prior to this project there has been one cultural resource inventory in the immediate vicinity of the project. Schalk (1988) completed a reconnaissance level survey and recorded one site (45-CA-302) that is located within the project area boundary. There have been several other archeological surveys within a 5-mile radius of the project, none of which resulted in the documentation of any significant resources. These projects were limited in scope and largely driven by park operations, such as water line replacement and trail rehabilitation projects.

In general, the high country of the Olympic Mountains, specifically ridgelines, basins and saddles, exhibit a high density of archeological sites. For the park as a whole, archeological site density is around 13 sites per square kilometer surveyed, whereas for the area of the park above 4,000 feet in elevation, the site density per square kilometer surveyed is 58. These figures highlight the importance of mountain environments to Native American groups on the peninsula and make clear the need for careful archeological survey.

Additional archeological testing would be conducted prior to installation of the tower and trenching. Archeologists would monitor ground disturbing activities associated with the installation of the utility corridor and tower.

#### *Visual Resources*

Hurricane Ridge provides a variety of visual and scenic resources. Park visitors enjoy spectacular views of the Olympic Mountains from the Hurricane Ridge Visitor Center. There are numerous nature trails that offer different views from Hurricane Ridge. One of the most obvious features from the Cirque Rim Trail is a large fire scar, several miles east of the project site. Visitors can also view several human made features from the trail, such as the generator building, radio tower, ski lift and ski patrol cabins.

#### *Visitor Experience*

The proposed project site is located adjacent to an area of high visitor use. The Hurricane Ridge area is one of the most frequently visited park areas within Olympic National Park. It is accessed by the Heart O' the Hills Parkway and Hurricane Ridge Road. The area offers superb views of the Olympic Mountains. Frontcountry nature trails, a concession-operated gift shop and snack bar, a NPS visitor information station, various picnic areas, and wilderness trailheads are available. In the winter months, the area is open on weekends and holidays, weather permitting.

A small ski and snowboarding area is operated by a local non-profit organization. Visitors also snowshoe and cross country and alpine ski in the area, and enjoy sledding and tubing nearby.

The existing weather station site is located near an existing nature trail (Cirque Rim Trail) at the generator building. The proposed relocation site is also located near the Cirque Rim Trail at the location of the existing snow manual measurement pole. This site is somewhat sheltered from view because it is surrounded on three sides by 30 to 40 foot high trees.

#### *Safety and Park Operations*

The project area is currently used for park operations. The existing tower site includes the Hurricane Ridge NWAC Weather Station which is composed of a variety of sensors located on a 25-foot-high tower attached to the generator building and on the main radio tower immediately adjacent to and just west of the generator building. The existing 80-foot-high radio tower is used for park communications and emergency response. The proposed relocation site lies about 100 yards to the west of the current site at the location of existing manual snow depth observations. This site is basically a long pole comprised of PVC placed in an opening in the forest.

Snowpack data is currently used by scientists for a variety of purposes, including avalanche forecasting and forecasting potential natural disasters such as floods. The park currently conducts monthly snow surveys at three locations: at Deer Park, near the Wolf Creek Road, and in Cox Valley. In addition, there are several snow telemetry (SNOTEL) sites within and near the park. An additional SNOTEL site was approved for the Elwha watershed and was added in late summer 2008. The SNOTEL instruments effectively and reliably collect and transmit hourly snowpack and climate data. The data allows for better water supply forecasting and for short-term forecasting of events such as floods and avalanches. However, the SNOTEL sites do not provide site specific information for avalanche forecasting at the Hurricane Ridge area.

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## Chapter 4: Environmental Consequences

This chapter analyzes both the beneficial and adverse impacts that would result from the implementation of any of the alternatives considered in this environmental assessment. It is organized by impact topics that were derived from internal park and external public scoping. This chapter includes definitions of impact thresholds, methods used to analyze impacts, and the analysis methods used for determining cumulative impacts. Impacts are evaluated based on context, duration, intensity, and whether they are direct, indirect, or cumulative impacts. NPS policy also requires that impairment of resources be evaluated in all environmental documents.

### Methodology and Assumptions for Impact Analysis

This section contains the environmental impacts, including direct and indirect effects and their significance to the alternatives. The analysis is based on the assumption that the mitigation identified in the *Mitigation* section of this environmental assessment would be implemented under any of the applicable alternatives.

Impacts are evaluated based on the most current and comprehensive scientific and social data available. Overall, the NPS based these impact analyses and conclusions on the review of existing literature and Olympic National Park studies; information provided by experts at the park and other agencies; professional judgment and park staff insights; input from interested local American Indian tribes; and public input. Impacts can be beneficial or adverse. Beneficial impacts would improve resource conditions while adverse impacts would deplete or negatively alter resources.

There are several terms used within the environmental consequences section to assess the impacts of each alternative on each impact topic. Unless otherwise stated, the standard definitions for these terms are:

*Negligible* - the impact is at the lower level of detection; no measurable change would occur.

*Minor* - the impact is slight, but detectable; a small change would occur over the life of the plan.

*Moderate* - the impact is readily apparent; a measurable change would occur and could result in a small but permanent change.

*Major* - the impact is severe; resulting in a permanent measurable change.

*Localized Impact* - the impact occurs in a specific site or area. When comparing changes to existing conditions, the impacts are only detectable in the localized area.

*Short-term* - the impact occurs only during or immediately after the actual management or project activity.

*Long-term* - the impact could occur for an extended period of time after the management or project activity has been completed. The impact could take several years or more.

*Direct* – an effect that is caused by an action that occurs at the same time and in the same place.

*Indirect* – an effect that is caused by an action that is later in time or farther removed in distance, but is still reasonably foreseeable.

## Criteria and Thresholds for Impact Analysis

Definitions of duration and intensity vary by resource. Therefore, the definitions for each impact topic are described separately. These definitions were formulated through the review of existing laws, policies and guidelines, and with assistance from park, region and Washington office specialists. In all cases the impact thresholds are defined for adverse impacts. Beneficial impacts are addressed qualitatively.

### *Soils*

The area of consideration for this topic is the project area. Defining potential impacts from management actions is based on professional judgment and experience with similar actions. The thresholds of change for the intensity of an impact are defined as follows:

<b>Impact Intensity</b>	<b>Intensity Description</b>
<b>Negligible</b>	The effects to soils would be below or at the lower levels of detection. Any effects on productivity or erosion potential would be slight.
<b>Minor</b>	An action's effects on soils would be detectable. It would change a soil's profile in a relatively small area, but it would not appreciably increase the potential for erosion of additional soil. If mitigation were needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.
<b>Moderate</b>	An action would result in a change in quantity or alteration of the topsoil, overall biological productivity, or the potential for erosion to remove small quantities of additional soil. Changes to localized ecological processes would be of limited extent. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.
<b>Major</b>	An action would result in a change in the potential for erosion to remove large quantities of additional soil or in alterations to topsoil and overall biological productivity in a relatively large area. Key ecological processes would be altered, and landscape-level changes would be expected. Mitigation measures to offset adverse effects would be necessary, extensive, and their success could not be guaranteed.

### *Vegetation*

All available information on vegetation and vegetative communities potentially impacted in the project area was compiled. Locations of known sensitive vegetation species, populations and communities were identified and avoided. A park botanist conducted a survey of the project area and documented the type and quantity of species likely to be affected in the project area. Predictions about short- and long-term site impacts were based on previous projects with similar vegetation. Also included in the evaluation of the vegetative communities was the introduction or promotion of non-native species. The thresholds of change for the intensity of an impact are defined as follows:

<b>Impact Intensity</b>	<b>Intensity Description</b>
<b>Negligible</b>	No native vegetation would be affected or some individual native plants could be affected as a result of the alternative, but there would be no effect on native species populations. The effects would be on a small scale and no species of special concern would be affected.
<b>Minor</b>	The alternative would affect some individual native plants and would also affect a relatively minor portion of that species' population on a short-term basis. Mitigation to offset adverse effects, including special measures to avoid affecting species of special concern may be needed to offset adverse effects and would be relatively simple to implement and likely be successful.
<b>Moderate</b>	The alternative would result in short-term effects to some individual native plants and could also affect a sizeable segment of the species' population and over a relatively large area. Permanent impacts could occur to native vegetation but in a relatively small area. Some species of special concern could also be affected. Mitigation measures, for both vegetation and soil, would be necessary to offset adverse effects and likely be successful
<b>Major</b>	The alternative would have a considerable effect on native plant populations, including species of special concern, and affect a relatively large area in and out of the park for a long-term basis or permanently. Mitigation measures to offset the adverse effects would be required, extensive; success of the mitigation measures would not be guaranteed.

### **Wildlife**

Information on Olympic National Park wildlife was taken from park documents and records. ONP natural resource management staff surveyed and documented the immediate project area for evidence of wildlife. Management goals for wildlife include maintaining components and processes of naturally evolving park ecosystems, including natural abundance, diversity and the ecological integrity of plants and animals. The thresholds of change for the intensity of an impact to wildlife are defined as follows:

<b>Impact Intensity</b>	<b>Intensity Description</b>
<b>Negligible</b>	There would be no observable or measurable impacts to native species, their habitats or the natural processes sustaining them. Impacts would be well within natural fluctuations.
<b>Minor</b>	Impacts would be detectable, short-term, and they would not be expected to be outside the natural range of variability of native species' populations, their habitats or the natural processes sustaining them. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
<b>Moderate</b>	Breeding animals of concern are present; animals are present during particularly vulnerable life-stages, such as migration or juvenile stages; mortality or interference with activities necessary for survival can be expected on an occasional basis, but is not expected to threaten the continued existence of the species in the park unit. Impacts on native species, their habitats or the natural processes sustaining them would be detectable, short-term, and they could be outside the natural range of variability. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
<b>Major</b>	Impacts on native species, their habitats or the natural processes sustaining them would be detectable, long-term, and they would be expected to be outside the natural range of variability. Key ecosystem processes might be disrupted. Loss of habitat might affect the viability of at least some native species. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

### ***Cultural Resources***

Information used in this assessment was obtained from relevant literature and documentation, maps, consultation with park archeologists and site visits. The National Historic Preservation Act requires agencies to take into account the effects of their actions on properties listed or eligible for listing in the National Register of Historic Places (NRHP). The process begins with identification and evaluation of cultural resources for NRHP eligibility, followed by an assessment of effects on eligible resources. In Washington, this process includes consultation with the state historic preservation officer (SHPO). If an action could change in any way the characteristics that qualify the resource for inclusion in the national register, it is considered to have an effect. No adverse effect means there could be an effect, but the effect would not be harmful to the characteristics that qualify the resource for inclusion in the national register. Adverse effect means the action could diminish the integrity of the characteristics that qualify the resource for the national register. For the purposes of this analysis, the intensity of impacts on cultural resources was defined as follows:

<b>Impact Intensity</b>	<b>Intensity Description</b>
<b>Negligible</b>	The effects on cultural resources would be at the lowest levels of detection, barely measurable without any perceptible consequences, either beneficial or adverse to cultural landscape resources, historic buildings or structures, or archeological resources. For the purposes of Section 106 and the National Historic Preservation Act, the determination of effect would be <i>no adverse effect</i> .
<b>Minor</b>	The effects on cultural resources would be perceptible or measurable, but would be slight and localized within a relatively small area. The action would not affect the character or diminish the features of a National Register (NRHP) eligible or listed cultural landscape, historic structure, or archeological site, and it would not have a permanent effect on the integrity of any such resources. For the purposes of Section 106 and the National Historic Preservation Act, the determination of effect would be <i>no adverse effect</i> .
<b>Moderate</b>	The effects would be perceptible and measurable. The action would change one or more character-defining features of a cultural resource, but would not diminish the integrity of the resource to the extent that its National Register eligibility would be entirely lost. For the purposes of Section 106 and the National Historic Preservation Act, the cultural resources' NRHP eligibility would be threatened; the determination of effect would be <i>adverse effect</i> .
<b>Major</b>	The effects on cultural resources would be substantial, discernible, measurable and permanent. For National Register eligible or listed cultural landscapes, historic structures or archeological sites, the action would change one or more character-defining features, diminishing the integrity of the resource to the extent that it would no longer be eligible for listing in the national register. For purposes of Section 106, NRHP eligibility would be lost; the determination of effect would be <i>adverse effect</i> .

### ***Visual Resources***

Visual resources are measured as the potential impact to park scenery a proposed action might have. Similar to visitor experience, the beneficial or adverse quality is somewhat qualitative and relies on the perspective of the park visitor. Olympic National Park is renowned for its natural qualities. Because of the proposed development that occurs within the project area, for the purposes of this document we assume that a visitor in the Hurricane Ridge area expects to have views of both human constructed structures and pristine landscapes generally free of human influences.

<b>Impact intensity</b>	<b>Impact Description</b>
Negligible	Effects to the visual quality of the landscape would be at or below the level of detection for nearly all visitors; changes would be so slight that they would not be of any measurable or perceptible consequence to the average visitor experience.
Minor	Effects to the visual quality of the landscape would be detectable, localized and would be small and of little consequence to the average visitor experience. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
Moderate	Effects to the visual quality of the landscape would be readily detectable, localized, with consequences at the regional level. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
Major	Effects to the visual quality of the landscape would be obvious, with substantial consequences to the visitor experience in the region. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

### ***Visitor Experience***

NPS *Management Policies 2006* state that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks. Part of the purpose of Olympic National Park is to offer opportunities for recreation, education, inspiration and enjoyment. Consequently, one of the park’s management goals is to ensure that visitors safely enjoy and are satisfied with the availability, accessibility, diversity, and quality of park facilities, services and appropriate recreational opportunities.

Public scoping input and observation of visitation patterns combined with assessment of what is available to visitors under current management were used to estimate the effects of the actions under each alternative. The potential for change in visitor use and experience proposed by the alternatives was evaluated by identifying projected increases or decreases in visitor uses, and determining whether or how these projected changes would affect the desired visitor experience and to what degree and for how long. The thresholds of change for the intensity of an impact to visitor experiences are defined as follows:

<b>Impact Intensity</b>	<b>Intensity Description</b>
<b>Negligible</b>	Changes in visitor use, experience and recreational resources would be below or at the level of detection. The visitor would not likely be aware of the effects associated with the alternative.
<b>Minor</b>	Changes in visitor use, experience and recreational resources would be detectable, although the changes would be slight. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.
<b>Moderate</b>	Changes in visitor use, experience and recreational resources would be readily apparent. The visitor would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.
<b>Major</b>	Changes in visitor use, experience and recreational resources would be readily apparent and severely adverse or exceptionally beneficial. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.

### ***Safety and Park Operations***

NPS *Management Policies 2006* state that although there are limitations on the NPS ability to totally eliminate all hazards, the NPS will strive to provide a safe and healthful environment for visitors and employees, to protect human life and to provide for injury-free visits. Safety, for the purposes of this analysis, refers to the potential for each alternative to directly or indirectly inflict injury to park visitors and staff. The accuracy of climate and snowpack information to evaluate and predict events such as avalanches could have a direct or indirect effect on staff and visitor safety.

Impact to park operations refers to the potential of the alternatives to interfere with or benefit the activities relating to park management. In this EA, the analysis relates to the effects the improved quality of avalanche forecasting could have on park operations, and the effect the placement of the new weather station would have on park staff. Park staff members knowledgeable about these issues were members of the planning team that evaluated the impacts of each alternative. Impact analysis is based on the current description of park operations presented in the “Affected Environment” section of this document.

Impact intensity	Impact Description
<b>Negligible</b>	The impacts to visitor or staff safety would not be measurable or perceptible. Park operations would not be affected.
<b>Minor</b>	The effect would be detectable, short-term, but would be limited to a relatively small number of visitors or park staff at a localized area and would not have an appreciable effect on public health and safety.  For park operations, the effect would be detectable, but short-term and would not have an appreciable effect on park operations.
<b>Moderate</b>	The effects would be sufficient to cause a permanent change in forecasting accuracy or would be readily apparent and result in substantial, noticeable effects to safety on a local scale on a short- or long-term basis.  For park operations, the effects would be readily apparent, short-or long-term, and would result in a substantial change in park operations in a manner noticeable to park staff and the public.
<b>Major</b>	The impact to visitor or staff safety would be substantial. Effects would be readily apparent and result in substantial, noticeable effects to safety on a regional scale and long-term basis.  For park operations, the effects would be readily apparent, would result in a substantial change in park operations in a manner noticeable to park staff and the public, and be markedly different from existing operations.

### **Cumulative Effects**

To determine potential cumulative impacts, affected resources were first identified through internal and external scoping. These resources were then evaluated to determine whether the resource is particularly vulnerable to incremental effects, whether the action is one of several similar actions in the same geographic areas, whether other activities in the area have similar effects on the resource, whether these effects have been historically significant for this resource, and whether other analyses in the area have identified a cumulative effect concern.

Through this process, the appropriate boundaries for each resource were identified on both a spatial and temporal basis. Spatial boundaries are the geographical boundaries within and outside

the project area where potential impacts could occur. This generally is considered to be the distance an effect can travel, or an appropriate regional boundary, and varies with each resource impact topic. Temporal boundaries are the appropriate past and future time frames to consider for the project-specific analysis. Temporal boundaries were developed considering the timing of past impacts and the timing of resource recovery from those past actions, and the identification of future proposed or planned activities and the potential for resource impacts, either beneficial or adverse.

Projects near the proposed project area or within and directly adjacent to the Hurricane Ridge area were identified. Potential projects identified as cumulative actions included any planning or development activities that occurred in the past; those currently being implemented; or that are planned or would be implemented in the reasonably foreseeable future. These projects were then assessed to determine whether they would have similar effects to identified resources as the proposed project.

### **Summary of Cumulative Effects**

The following past, present, and future potential actions were considered in the cumulative impacts analysis.

- The continued existence of the Hurricane Ridge Visitor Center, parking area, and ski area.
- The placement and operation of the existing weather station and radio tower.
- The future potential to improve the ski facilities at the area.
- The existence and maintenance of the area's frontcountry trails.
- The ongoing replacement of the existing Hurricane Ridge waterline near the meadow and visitor center.
- Ongoing visitor use of the area.

### **Impairment of Park Resources or Values**

In addition to determining the environmental consequences of the alternatives, NPS *Management Policies 2006* and DO-12 require an analysis of potential effects to determine if actions would impair park resources. The fundamental purpose of the national park system established by the *Organic Act* and reaffirmed by the *General Authorities Act*, as amended, begins with a mandate to conserve park resources and values. NPS managers must seek ways to avoid, or minimize to the greatest degree practicable, adversely impacting park resources and values. Congress has given NPS managers direction, however, to allow impacts to park resources and values when necessary and appropriate to fulfill the purpose of the park, so long as the impact does not constitute impairment of the affected resources and values.

The prohibited impairment is an impact that would, in the professional judgment of the responsible NPS manager, harm the integrity of park resources or values, including opportunities that would otherwise be present for the enjoyment of those resources or values. An impact would be more likely to constitute impairment to the extent that it has a major or severe adverse effect upon a resource or value whose conservation is:

- Necessary to fulfill specific park purposes identified in the establishment legislation or proclamation of the park;

- Key to the natural and cultural integrity of the park or to opportunities for enjoyment of the park; or, is
- Identified as a goal in the park’s general management plan or other relevant NPS planning documents.

Impairment may result from NPS activities in managing the park, visitor activities or activities undertaken by concessionaires, contractors and others operating in the park. In this “Environmental Consequences” section, a determination on impairment is made in the conclusion statement of the appropriate impact topics for each alternative. Impairment statements are not required for recreational values/visitor experience, park operations, or health and safety topics. In addition, neither NPS policies nor managerial determinations regarding impairment apply to non-NPS lands or resources.

## **ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE A – NO ACTION**

Under alternative A, the weather station would remain in its existing location. A new tower and weather station would not be placed at Hurricane Ridge. Avalanche forecasting would continue to be conducted by park staff and volunteers reading the manual snow measuring pole, and would not occur consistently.

### ***Soils***

No action would be taken in this alternative; therefore there would be no impacts to soils.

**Cumulative Effects:** Soils in the immediate project area are impacted from past activities, such as the past construction of the road, visitor center and parking area, ski area, waterline, generator building, tower, and trails, which have permanently altered approximately 8 acres of soils in the localized area. Ongoing maintenance of the trails and the replacement of the existing waterline have the potential to disturb soils. Ongoing and future visitor trampling on the meadow and on areas adjacent to the trails also impacts soils in the vicinity of the project area. Future soil disturbance could occur from the replacement of the waterline through the meadow area, and potential improvements to the ski lifts, which would disturb the soils in a localized area. The impacts include trampling and erosion causing soil loss due to increased surface flow and frost action associated with bare ground and recently disturbed ground. This is limited to a few areas in the frontcountry developed area, and near the existing nature trails. Because the no action alternative would have no additional effect on soils, there would be no cumulative impacts on soil resources.

**Conclusion:** There would be no new impacts or cumulative impacts to soils under this alternative and therefore no impairment to soil resources.

### ***Vegetation***

No action would be taken in this alternative; therefore there would be no direct or indirect impacts to vegetation.

**Cumulative Effects:** Vegetation in the immediate project area has been impacted in similar ways as soils, from past and present development, maintenance projects, and visitor use in the area. Vegetation has been permanently removed from approximately 8 acres as a result of the development of roads and facilities in the area. Vegetation is being impacted from visitor use and

trampling on a limited basis, as most visitors do not go off the trail into the fragile meadow areas. However, there is disturbance from trampling of vegetation on the edges of the existing nature trails. Vegetation is periodically trimmed and small trees are cut to maintain the openings and ski runs for the ski area, resulting in minor effects to a limited number of small trees. Because the no action alternative would have no additional effect on vegetation, there would be no cumulative impacts.

**Conclusion:** There would be no impacts, no cumulative impacts and no impairment to vegetation under this alternative.

### ***Wildlife***

No action would be taken in this alternative; therefore there would be no direct impacts to wildlife species. Wildlife in the area has generally become accustomed to the existing tower and generator site, and no additional effects would occur as a result of the no action alternative.

**Cumulative Effects:** The project area is located within the frontcountry zone of Hurricane Ridge, where human presence and facilities have existed for many years. It is possible that individual animals have become accustomed to the existing facilities and associated human use, resulting in less flight response behavior. Ongoing maintenance projects and minor construction projects in the frontcountry areas have caused short-term, localized adverse impacts on wildlife populations in those areas from noise and the presence of humans.

In addition, roads and trails can fragment habitat, and their use can cause temporary displacement of individuals. Impacts from the presence of park infrastructure, continued maintenance activities or area improvements, and visitor use at Hurricane Ridge are likely to continue in the future. Because the no action alternative would have no additional effect on wildlife, there would be no cumulative impacts.

**Conclusion:** There would be no new impacts to wildlife and therefore no impacts, cumulative impacts or impairment to wildlife species under this alternative.

### ***Cultural Resources***

No action would be taken in this alternative; therefore there would be no impacts to cultural resources existing at the proposed project site.

**Cumulative Effects:** Because much of the Hurricane Ridge area was not surveyed in the past prior to the development, it is likely that archeological sites were disturbed by past development, construction, management actions, and natural processes. Now, as part of routine park service cultural resource management activities, sites are tested and evaluated against National Register of Historic Places eligibility criteria when feasible prior to any disturbance or project. Because no action would be taken in this alternative, no additional cumulative impacts would occur.

**Conclusion:** There would be no impacts, cumulative impacts or impairment to cultural resources in this no action alternative.

### ***Visual Resources***

Visual resources are generally measured as the potential impact to scenery from the perspective of a park visitor, and are qualitative in nature. Under this alternative the existing radio tower and generator building would continue to house the Hurricane Ridge weather station. The generator

building can not be easily seen from the existing nature trails on the ridge, but the 85-foot tall radio tower is evident from several locations on the ridge, including from the nature trail and from portions of the ridge parking lot. This can cause adverse effects to the scenic views, particularly to those visitors with expectations of natural scenery. There would be no new tower constructed on the ridge, thus there would be no additional adverse impacts from the presence and views of human-made structures as a result of this alternative.

**Cumulative Effects:** The previously existing park infrastructure such as the roads, visitor center, trails, ski area facilities, and the existing tower and maintenance buildings located on Hurricane Ridge have an adverse effect on the visual resources in the area as they detract from the scenic views. While there are some visitor expectations of constructed facilities in developed areas within the park, many visitors expect to see more of a natural environment even in frontcountry areas. The facilities were constructed in a way to minimize the impacts to views of the surrounding mountains, which is one of the primary purposes that visitors travel to the ridge. But there still are minor adverse effects from the existing facilities and from periodic maintenance and construction activities. Because no action would be taken in this alternative, no cumulative impacts would occur.

**Conclusion:** Because no new facilities are proposed in this alternative, there would be no new impacts, cumulative impacts and no impairment to visual resources under this alternative.

### ***Visitor Experience***

The no action alternative could have a minor impact on visitor experience at Olympic National Park. Providing for visitor enjoyment is one of the basic purposes of the NPS according to the *Organic Act*. One can assume that reasonable and safe access, appropriate facilities, personal freedoms (the ability to travel off trail, camp wherever one wants, and seek hazardous or unknown areas), solitude, scenery and wildlife encounters are some of the experiences that would comprise a positive park visitor experience. However, the quality of a visitor experience can be difficult to quantify. What one set of visitors perceives as a positive experience, another set might find detracts greatly from the overall experience. Each visitor seeks his or her own unique experience.

Some visitors may feel that leaving the area in a natural state is more important than having accurate weather and avalanche forecasting. However, winter visitors to the park may believe that accurate weather and avalanche forecasts are very important to their experience. Climate stations providing real-time data on the web are routinely accessed by park visitors inquiring about the conditions they might find in the park. Initial scoping of this project found public interest in real-time weather data and more accurate avalanche forecasting for Hurricane Ridge. This group of people might, therefore, experience a minor adverse impact to their visitor experience if this project were not completed, particularly if the Hurricane Ridge Road is closed more frequently as a result of storms or unknown snow conditions.

**Cumulative Effects:** The immediate project area is within the Hurricane Ridge developed area which provides a wide range of visitor experiences, from the more natural experiences of walking on nature trails and accessing wilderness trails, to more developed experiences such as going to the visitor center, gift shop, and using the lifts at the ski area. Each visitor may have different expectations for this area, resulting in different levels of visitor satisfaction. Since no facilities would be constructed under this alternative, there would be no cumulative effects to the visitor experience.

**Conclusion:** Data would still be available from the existing weather station; however this data would be somewhat inaccurate and would not provide the most up-to-date avalanche forecasting for the Hurricane Ridge area, and could result in a direct, long-term minor impact to visitor experience. There would be no cumulative effects.

### ***Safety and Park Operations***

This alternative would have a moderate adverse impact to safety and park operations at Olympic National Park because the park would continue to rely on the manual snow measurements to determine when conditions warrant closures for avalanches and storms. The manual snow depth measurement is used for snow depth since the NWAC weather station does not provide accurate information. If there is a storm and no one is able to access Hurricane Ridge, the park has no way to determine the snow depth on a daily basis and no way to determine if it is safe to open the road and area. Accurate snow depth measurements (daily and total snow depth) are critical to predict snow stability to understand snow compaction and the snow's probability of sliding. Currently the park relies on one volunteer who takes snow depth on a daily basis (except on his days off). Without the volunteer or the installation of the automated measurement system, the NPS would not have the ability to measure daily snow pack on a regular basis, which could lead to more closures for safety reasons.

Without the appropriate information for avalanche forecasting, park road crews and rangers would be required to plow the roads without knowledge of snow stability. This could create a dangerous situation for park staff, increasing their risk during winter months when they conduct weekly road opening activities.

**Cumulative Effects:** There are no additional cumulative safety and operations factors associated with this alternative.

**Conclusion:** Under the no action alternative, avalanche forecasting would continue to rely on existing instrumentation and data resulting in an indirect, long-term, moderate adverse impact to safety and park operations at Olympic National Park.

## **ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVE B**

Under alternative B, a new NWAC weather station would be placed approximately 150 yards from the existing site at Hurricane Ridge.

### ***Soils***

The proposed action would involve excavation and manipulation of small areas of soil for the installation of the tower and the underground utility line. The total area of soil disturbance for the utility corridor would be 656 sq. ft. (0.01 acres). Mitigation, including preserving the top soil and revegetation, would minimize this disturbance. Approximately 4 sq. ft. of additional disturbance would be permanent surface disturbance associated with the placement of the 2- by 2- by 2-foot concrete base for the tower. There would be little potential for soil erosion associated with the disturbance because the site is flat and the majority of the disturbed area would be replaced with concrete or revegetated using salvaged vegetation and soils from disturbed sites. This alternative would result in direct, localized, long-term negligible adverse impact to soil resources in the project area.

**Cumulative Effects:** Approximately 8 acres of soils in the vicinity of the project area are permanently impacted from the existing development and visitor use. Soils have been permanently altered from the past construction of roads, facilities, and trails in the project vicinity, and from ongoing visitor use. This project would add 4 square feet to the existing permanently disturbed area, which would contribute only slight to the overall cumulative effects to soil resources.

**Conclusion:** Direct, localized, long-term negligible adverse impacts to soil resources would occur in the immediate project area. This alternative would contribute slightly to the cumulative effects of soils within the Hurricane Ridge area. Because the impacts to soils are negligible, there would be no impairment to soils.

### ***Vegetation***

The proposed action would involve the permanent removal of a small area of native grasses and forbs for the installation of the concrete foundation. It would also result in the removal of vegetation, including small trees, for the utility trenching, but this effect would be temporary as mitigation would be used to restore this area. The total area of temporary vegetation disturbance for the placement of the utility corridor would be 656 sq. ft. This would include removal of approximately 85 seedling and sapling subalpine fir (less than 20" tall), and one 7 foot high subalpine fir. An additional 4 sq. ft. of vegetation would be disturbed permanently and replaced with the concrete base for the new tower. In the event that young trees continued to invade the proposed installation site during the lifetime of the monitoring station, periodic trimming, pruning or removing saplings would be necessary to keep the proposed installation site open. This would prevent any unusual snow loading and thus provide more accurate and consistent data collection. All work would be conducted as advised by the Park's vegetation specialist. Overall, the placement of the utility corridor and tower would result in negligible adverse effects to vegetation.

**Cumulative Effects:** Approximately 8 acres of vegetation has been permanently disturbed in the vicinity of the project area by existing facilities and visitor use. This alternative would result in an additional 4 square feet of permanent disturbance. Because alternative B would result in negligible adverse impacts, it would contribute slightly to the overall minor cumulative effects on vegetation.

**Conclusion:** Direct, localized, long-term, negligible adverse impact to vegetation would occur in the immediate project area. Alternative B would contribute slightly to the long-term minor cumulative impacts. Because the impacts from this alternative would be negligible, there would be no impairment to vegetation.

### ***Wildlife***

The installation of the NWAC weather station under alternative B would disturb small areas of soil and vegetation which may provide food or cover for birds, amphibians and small mammals. Wildlife may avoid the area temporarily during construction activities. However, the loss of habitat would be minimal, as total affected area would be very small when compared with the amount of similar habitat in the immediate project area. Although the new weather station would be located adjacent to deer trails, it would not block or deter travel of deer or other mammals.

Radio and other communications towers have the potential to adversely impact some wildlife species including birds and bats. Fatalities can result from collisions to the towers; however,

most of the bird and bat deaths have occurred from collisions to higher, lighted towers. Since this tower would be at or below tree level, and would not be lighted, the potential for bird and bat deaths due to collisions is very low. Overall, the installations would have a local, long-term negligible impact on wildlife resources.

**Cumulative Effects:** In the Hurricane Ridge area, existing facilities and maintained trails have impacted the area through visitor presence, maintenance projects and through habitat loss (estimated at 8 acres). This area of impact is a small proportion of the total available habitat in the project vicinity. Alternative B would result in 4 sq. ft. of additional permanent habitat disturbance, resulting in long-term negligible adverse effects. Possibly more significant is the popularity of Hurricane Ridge throughout spring, summer and winter months with visitors. Visitor use likely creates some level of disturbance to small mammals, amphibians and birds. Likewise, large mammals such as deer may alter their travel or feeding areas to avoid areas with high human use, or become accustomed to human presence. The existence of the facilities and visitor use at Hurricane Ridge has created long-term, minor to moderate adverse effects on park wildlife in the area. This alternative's contribution to these effects would be very small.

**Conclusion:** Overall, adverse impacts to wildlife species would be direct, localized, short-term and negligible in the immediate project area. Cumulative impacts are direct, long-term and minor to moderate, and this alternative's contributions to those effects would be very small. Because impacts would be no more than minor, there would be no impairment to wildlife resources.

### ***Cultural Resources***

The proposed action would involve excavation and manipulation of small areas for the installation of the instruments. The total area of soil disturbance would be 660 sq. ft. Approximately 656 sq. ft. would be surface disturbance (1 ½ feet deep) associated with the utility trenching. The additional 4 sq. ft. of disturbance would be excavation associated with concrete foundations for the new tower.

Archeological surveys within the project area revealed a low density of precontact artifacts in the area proposed for construction of the utility corridor and tower.

**Cumulative Effects:** The proposed project site has had some recent human disturbance, including the existing site and trail corridor. Overall, the Hurricane Ridge area has had extensive human disturbance from the construction of roads, facilities, and trails. Ongoing maintenance activities and future projects in the area have the potential to effect archeological resources.

**Conclusion:** This proposed alternative would have a minimal impact on archeological resources. The area of proposed project disturbances is the same as the area that will be tested and evaluated. Archeological testing activities and installation of environmental monitoring units are covered under programmatic exclusion in the NPS nation-wide programmatic agreement. For the purposes of Section 106 and the National Historic Preservation Act, the determination of effect would be *no adverse effect* and any impacts would be minor. Because there would be no major adverse impacts to cultural resources, there would be no impairment of park resources or values related to archeological resources.

### ***Visual Resources***

Visual resources are measured as the potential impact on scenery from the perspective of a park visitor. The expectation of a visitor in the Hurricane Ridge area is to have views of facilities such as the visitor center, roads, and trails, and also of distant pristine landscapes generally free of human influences.

The new tower site is somewhat sheltered by trees. The tower would be approximately the same height as the perimeter trees in the project site, and it would be surrounded on three sides by trees. There is a small clearing that could be visible to visitors using the Cirque Rim Trail if visitors happen to glance in that direction. These views would be somewhat obscured by non-reflective paint on the tower. The likelihood of visitors seeing the tower from distant trails or park areas is very low since it would not be higher than the surrounding trees.

**Cumulative Effects:** The previously existing park infrastructure such as the roads, visitor center, trails, ski area facilities, and the existing tower and maintenance buildings located on Hurricane Ridge have an adverse effect on the visual resources in the area as they detract from the scenic views. While there are some visitor expectations of constructed facilities in developed areas within the park, many visitors expect to see more of a natural environment even in frontcountry areas. The facilities were constructed in a way to minimize the impacts to views of the surrounding mountains, which is one of the primary purposes that visitors travel to the ridge. But there still are minor adverse effects from the existing facilities and from periodic maintenance and construction activities. This alternative's contribution to these effects would be very small.

**Conclusion:** Scenic values of the Hurricane Ridge area where the proposed installation is visible could be affected in this alternative; however the likelihood that many visitors would see the tower is low and expectations in this area are to see some human made structures. Because the tower would not be visible from distant trails and areas, the adverse impact is considered local, long-term and negligible. Because under this alternative the impacts would be negligible, there would be no impairment to visual resources.

### ***Visitor Experience***

Current snow conditions, weather and avalanche forecasts are of high importance to many park visitors. Climate stations providing real-time data on the web are routinely accessed by park visitors inquiring about the conditions they might find in the backcountry. Initial scoping of this project found a public interest in real-time climate data from this site. This group of people might, therefore, experience a direct, long-term, minor beneficial impact to their visitor experience if this project were completed.

In contrast, some visitors seeking a pristine park experience might happen upon or view the proposed tower site. Since the project area is in a developed area with existing facilities and it is not likely to be noticeable by most park visitors, this would likely result in negligible to minor, temporary adverse effects to the visitor experience.

**Cumulative Effects:** The immediate project area is within the Hurricane Ridge developed area which provides a wide range of visitor experiences, from the more natural experiences of walking on nature trails and accessing wilderness trails, to more developed experiences such as going to the visitor center, gift shop, and using the lifts at the ski area. Each visitor may have different expectations for this area, resulting in different levels of visitor satisfaction. Recent surveys found that the majority of park visitors are highly satisfied with their experiences within

Olympic National Park. Some winter visitors may be disappointed in the past because of road closures due to snow and avalanche conditions. Implementing this alternative would provide visitors and park staff with real-time snow data and avalanche forecasting information, and could result in fewer or more closures based on more accurate forecasting, so it is likely to improve the experience of winter visitors who utilize this data.

**Conclusion:** Real-time data and more accurate forecasting from a new weather station would create a direct, long-term, minor beneficial effect to the visitor experience. This alternative would add slightly the beneficial cumulative effects to the visitor experience during the winter.

### ***Safety and Park Operations***

As previously described throughout this document, accurate real-time climate and snowpack data from the Hurricane Ridge area would increase the accuracy of avalanche forecasting, and would result in a moderate beneficial impact to employee and visitor safety and park operations at Olympic National Park.

**Cumulative Effects:** There is an inherent risk from storms and avalanches to park employees who maintain and patrol the Hurricane Ridge Road during the winter months. There is also a risk to ski resort staff and winter visitors who use the road and adjacent areas for winter recreation. In the past and currently, the park bases the road openings and closures on manual snow measurements, which are not always available due to lack of staff or storm conditions. Therefore, the park errs on the side of safety, closing the ridge when conditions are undetermined.

**Conclusion:** Visitor and employee safety is a vital mission of the NPS. This alternative, by increasing the accuracy of forecasts and providing better data for predicting timing and extent of avalanche events would create a direct, long-term, moderate beneficial effect to visitor and employee safety and improve the safety of park operations.

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## **Chapter 5: Consultation and Coordination**

A news release and scoping letter initiating public scoping and describing the project was issued on July 24, 2008 (Appendix A). The press release was sent to approximately 50 media outlets, interested groups, public officials, agencies, and individuals in the Puget Sound and Olympic Peninsula area. Comments were solicited during a public scoping period that ended September 10, 2008. Five responses were received. Comments received were generally in support of the project,

### **Agencies and Individuals Consulted**

Agencies and organizations contacted to assist in identifying issues and provided an opportunity to review or comment on this EA include, but are not limited to, the following:

#### **Federal Agencies**

Department of Agriculture, Natural Resource Conservation Service  
National Water and Climate Center

Department of Agriculture, U.S. Forest Service  
Olympic National Forest

Department of Commerce  
National Oceanic and Atmospheric Administration  
Olympic Coast National Marine Sanctuary

Department of Interior  
U.S. Fish and Wildlife Service, Western Washington Office

Department of Transportation  
Federal Highway Administration

#### **Congressional Representatives**

Senator Parry Murray  
Senator Maria Cantwell  
Senator Jim Hargrove  
Rep. Norm Dicks  
Rep. Lynn Kessler

#### **State Agencies**

Department of Natural Resources  
Department of Ecology  
Department of Fish and Wildlife  
Department of Parks and Recreation  
Office of Archeology and Historic Preservation

#### **Local Agencies**

Port Angeles Chamber of Commerce  
Clallam County Commissioners

City of Sequim  
City of Forks

### **American Indian Tribes**

Lower Elwha Klallam Tribe  
Jamestown S'Klallam Tribe

### **Organizations and Businesses**

Clallam Networks Economic Development Council  
Conservation Northwest  
Friends of Lake Crescent  
Institute for Policy Research  
National Audubon Society  
National Parks and Conservation Association-NW Regional District  
North Cascades Conservation Council  
North Olympic Peninsula Resource Conservation & Development Council  
Northwest Ecosystem Alliance  
Olympic Forest Coalition  
Olympic Natural Resource Center  
Olympic Park Associates  
Olympic Peninsula Audubon Society  
Olympic Peninsula Intertribal Cultural Advisory Committee  
Olympic Region Clean Air Agency  
Protect the Peninsula's Future  
Sierra Club-Cascade Chapter  
Sunnydell Shooting Grounds  
The Wilderness Society  
Washington Environmental Council  
Washington's National Park Fund  
Wilderness Watch

### **Area Libraries**

North Olympic Library System  
Port Angeles Branch  
Sequim Branch  
Forks Branch  
Clallam Bay Branch

### **List of Preparers and Reviewers**

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Mike Danisiewicz, Park Ranger, Olympic National Park  
Patti Happe, Wildlife Biologist, Olympic National Park  
Garth Ferber, Northwest Avalanche Center

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## REFERENCES

- Brady, N.C. 1984. *The Nature and Property of Soils*. Macmillan Publishing Company, New York.
- Daly, C., Gibson W., Taylor G., Johnson G., Pasteris P. 2002. *A knowledge-based approach to the statistical mapping of climate*. CLIMATE RESEARCH, Vol. 22: 99–113, 2002.
- Department of Agriculture, Forest Service
- 2006 Personal communication with Mark Moore, Director and Avalanche Meteorologist, Northwest Avalanche Center, 2006.
  - 2006 USDA NRCS, SNOTEL Data Collection Network Fact Sheet, 2006, accessed through < <http://www.wcc.nrcs.usda.gov/factpub/sntlfct1.html>>.
  - 2006 USDA NRCS, Snow Survey background information, 2006, access through <<http://www.wcc.nrcs.usda.gov/snowcourse/sc-geninfo.html>>.
- Department of Agriculture, National Resources Conservation Service
- 2006 Personal communication with Rick Eastlund, NRCS electronic technician, 2006, Colorado State Office.
- Department of the Interior, National Park Service
- 1996 “Statement for Management, Olympic National Park: *Conserving for the Future.*” Olympic National Park, Port Angeles, Washington.
  - 1999 Wilderness Preservation and Management, Director’s Order 41 and Reference Manual.
  - 2000 *Beaver Pass SNOTEL Environmental Assessment*, prepared by North Cascades National Park, September 2000.
  - 2000(a) Conservation Planning, Environmental Impact Analysis, and Decision Making: Director’s Order 12 and Handbook.
  - 2002 *Wild Basin Snow Survey Improvement Project Environmental Assessment*, prepared by Rocky Mountain National Park and the Natural Resources Conservation Service, Colorado, August 2002.
  - 2005 *Olympic National Park Draft General Management Plan and Environmental Impact Statement*. Olympic National Park, Port Angeles, Washington.
  - 2006 *Weather and Climate Inventory National Park Service North Coast and Cascades Network*, Natural Resource Technical Report NPS/NCCN/NRTR—2006/010, WRCC Report 2006-09. Prepared by the Western Regional Climate Center – Desert Research Institute, October 2006.

2006 Management Policies 2006. National Park Service, Washington, D.C.

2007 Personal communication with Patti Happe, NPS Wildlife Biologist, 2007, Olympic National Park.

Hitchcock & Cronquist. 1973. *Flora of the Pacific Northwest*. University of Washington Press, Seattle, Washington.

#### Oregon State University

2004 Personal communication with Christopher Daly, Director, PRISM Group, date unknown. Oregon State University, Oregon.

2007 PRISM Group, Project Home Page, 2007, <<http://prism.oregonstate.edu/>>.

Pojar & MacKinnon. 1994. *Plants of the Pacific Northwest Coast*. British Columbia Ministry of Forest and Lone Pine Publishing. Vancouver, Canada.

Schalk, R. 1988. The Evolution and Diversification of Native Land Use Systems on the Olympic Peninsula. Report submitted to the National Park Service, Pacific Northwest Region by the Institute for Environmental Studies, University of Washington, Seattle.

#### Washington State, Office of Washington State Climatologist

2006 eWaCH.net - Workshop Summary and Action Plan, 2007, accessed through <<http://climate.washington.edu/ewachnet/>>.

## APPENDICES



## Appendix A. Scoping News Release



National Park Service  
U.S. Department of the Interior

Olympic National Park

600 East Park Avenue  
Port Angeles, WA  
98362

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### Olympic National Park News Release

July 24, 2008  
For Immediate Release  
Barb Maynes 360-565-3005

#### **Public Invited to Provide Input on Proposed Improvements to Hurricane Ridge Weather Station**

Public input is being sought regarding proposed improvements and relocation of the Hurricane Ridge Weather Station, which is operated by the Northwest Weather and Avalanche Center (NWAC) in cooperation with Olympic National Park.

The weather station provides hourly readings on wind speed and direction, temperature, snow depth and precipitation. These are posted online at <http://www.nwac.us/~nwac/products/OSOHR> and are used to develop specialized mountain weather forecasts, including avalanche forecasts important to both park staff and winter visitors.

"Accurate and reliable weather information is a vital element in avalanche forecasting, which in turn is vital to visitor and staff safety," said Olympic National Park Superintendent Karen Gustin.

In its current location, the Hurricane Ridge Weather Station provides accurate data on wind speed and direction, but wind exposure at the site causes snow to drift there in winter, making the precipitation and snow depth data unreliable.

To address this problem and improve the accuracy and reliability of the data, NWAC and Olympic National Park propose to relocate the precipitation, snow depth and temperature sensors to a nearby location at Hurricane Ridge. The proposed site has been used for many years for manual measurement of snow depth. The sensors would be mounted on a small structure that would be built at the site.

Olympic National Park is preparing an Environmental Assessment (EA) to be released later this year that will evaluate the environmental effects of this proposal. Comments received during the scoping period will be used to help define the issues and concerns to be addressed in the EA.

Comments should be submitted online by visiting <http://parkplanning.nps.gov>, the website for the National Park Service's Planning Environment and Public Comment system, no later than August 25, 2008.

(more)

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EXPERIENCE YOUR AMERICA

The National Park Service cares for special places saved by the American people so that all may experience our heritage.

Comments may also be sent to:

Superintendent – Hurricane Ridge Weather Station Scoping  
Olympic National Park  
600 East Park Avenue  
Port Angeles, WA 98362

Fax: 360-565-3015  
Website: <http://parkplanning.nps.gov>

Commentors should be aware that their entire comment – including personal identifying information – may be made publicly available at any time. While commentors can ask that their personal identifying information be withheld from public review, the NPS cannot guarantee that this will be possible.

For more information about this project, people may visit National Park Service's Planning Environment and Public Comment website at <http://parkplanning.nps.gov> or call the park at 360-565-3004.

NWAC is administered by the U.S. Forest Service, but it is cooperatively funded by a variety of federal, state, and private agencies, including the Washington State Department of Transportation, Washington State Parks and Recreation Commission, National Weather Service, Pacific Northwest Ski Areas Association, Friends of the Avalanche Center, the National Park Service, and others.

NWAC promotes safety by helping reduce the impacts of avalanches and adverse mountain weather on recreation, industry and transportation in Washington and northern Oregon through data collection, mountain weather and avalanche forecasting and education. The program provides detailed weather and avalanche forecasts for the Washington Cascades and Olympics, and the northern Oregon Cascades and manages the most comprehensive real-time mountain weather data network in the U.S.

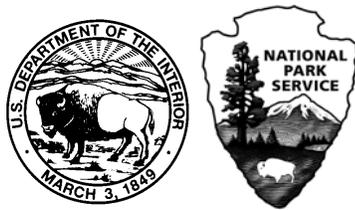
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EXPERIENCE YOUR AMERICA

The National Park Service cares for special places saved by the American people so that all may experience our heritage.





As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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