



**National Park Service
U.S. Department of the Interior**

**Mount Rainier National Park
Regions 8, 9, 10, and 12**

**FINDING OF NO SIGNIFICANT IMPACT
LAHAR DETECTION SYSTEM**

Recommended:

Greg Dudgeon
Superintendent, Mount Rainier National Park

Date

Approved:

Frank Lands
Regional Director, Interior Regions 8, 9, 10 and 12, National Park Service

Date

1. Introduction

In compliance with the National Environmental Policy Act (NEPA), the National Park Service (NPS) prepared an Environmental Assessment (EA) to examine alternative actions and environmental impacts associated with the proposed project to approve a permit request from the U.S. Geological Survey (USGS) to expand the lahar detection and volcano monitoring system at Mount Rainier National Park (MRNP or park).

The statements and conclusions reached in this finding of no significant impact (FONSI) are based on documentation and analysis provided in the EA and appendices and the associated decision file. To the extent necessary, relevant sections of the EA are incorporated by reference below.

2. Selected Alternative

Based on the analysis presented in the EA, the NPS selects Alternative 4, Reduced Number of Monitoring Sites, as described and analyzed in the Lahar Detection System Environmental Assessment (EA) and the attached errata and other attachments. The rationale for this decision is provided below in Section 4. Three other alternatives were also described and analyzed in the EA: Alternative 1, USGS Proposed Action; Alternative 2, No Action (continue current management); and Alternative 3, Alternative Monitoring Sites.

Under the selected alternative, the NPS will authorize the USGS to expand the lahar detection and volcano monitoring system at nine locations in MRNP.

3. Description of the Selected Alternative

The NPS selects Alternative 4 for implementation. The NPS will approve a permit for the USGS to expand the lahar detection and volcano monitoring system at nine locations in MRNP. Equipment will be installed at Ararat South, Copper Mountain, Emerald Ridge, Gobblers Knob, Mildred Point, Mount Wow, Paradise Parking Lot Tower, Tahoma Bridge, and Tahoma Vista to increase rapid detection and notification along the west flank of Mount Rainier, which is the most vulnerable to a noneruptive landslide-caused large lahar that would travel down the Puyallup River, Mowich River, and/or Tahoma Creek drainages. It is estimated that the monitoring stations will be in place for about 30 years. The installations have no planned removal date but are expected to be replaced in the future as new technology becomes available. It is expected that the project footprint will become smaller over time with technological advances.

Elements of the Selected Alternative

Hut Enclosures

Seven of the proposed monitoring stations will be free-standing hut enclosures with varying dimensions (with a maximum dimension of 60 inches by 60 inches by 80 inches). The huts will typically have a disturbance footprint of about 10 feet by 10 feet.

Monitoring Station on Historic Fire Lookout Tower at Gobblers Knob

The Gobblers Knob monitoring station includes equipment that will be mounted on a historic fire lookout tower. Features added at Gobblers Knob will include a new antenna mast, a small 3-inch by 3-inch by 2.5-inch Global Navigation Satellite System timing antenna and two solar panels. A buried seismometer and data cable trench will be installed, which will require burying the seismometer about 30 feet from the structure and excavating a trench to extend the data cable to the structure and into the basement. All electronic equipment will be housed in the basement of the fire lookout.

Helicopter Use for Installation

Several of the sites will require the use of helicopters for initial installation and subsequent maintenance. Installation will require up to seven round trips to each project location by a helicopter carrying sling loads. Helicopters used will be small (such as A-Stars, Bell Jet Rangers, or Hughes 500 series). Helicopters will take off from the Kautz Helipad or the Sunrise parking area (only available in late September and October).

The total number of helicopter flights will be about 48 during installation and revegetation over a 2-month period (September and October) with installations potentially extending into September and October 2023 if weather or other conditions do not allow for completion of installations in 2022. Sites will be evaluated 1 year post-installation to determine if active restoration is needed to restore natural conditions at monitoring sites. Should revegetation be necessary, helicopter flights may be required to transport seedlings to areas where transport on foot is infeasible. Flight time will be about 1 to 2 hours per day at each site over a period of 2 days, or about 24 to 48 hours of flight time over about 18 to 22 days during installation over a 2-month period (September and October; excluding weekends) over 2 years.

Helicopter Use for Maintenance

Sites will typically be accessed by foot for routine tuning and maintenance, but additional helicopter flights will be required for anticipated equipment and battery replacement, requiring four round trips per site every 5 years. Tuning refers to unexpected adjustments or repairs to stations within the first 2 years after installation. The USGS has found that some sites require tuning after installation, which sometimes requires helicopter use to deliver heavy or bulky equipment, or to remove damaged equipment.

Additional flights may also be needed if urgent repairs are required and foot access is not available, for example during winter months when crews are not able to safely access the site on foot due to inclement weather. Transport of personnel by helicopter will occur in emergency situations when repairs are needed to avoid diminished monitoring capability. An initial flight with personnel may be required to assess the situation, followed by an additional flight once the needed equipment has been determined. In all cases, the USGS will strive to minimize the number of helicopter flights. Based on their experience with other installations, the USGS estimates up to two helicopter flights may be needed annually for emergency maintenance. The sites that will require helicopter access in these situations include Ararat South, Copper Mountain, Emerald Ridge, Gobblers Knob, Mildred Point,

and Tahoma Bridge. The other sites including Mount Wow, Tahoma Vista Overlook, and Paradise Tower could be accessed by foot or vehicle and will not require emergency helicopter access. Flights for emergency repairs could potentially occur in months other than September and October.

About 138 maintenance flights including an estimated 69 to 138 hours of flight time will be performed over a period of 30 years. Flights for tuning and emergency repairs are included in this total.

The project will implement resource protection measures and best management practices to minimize the degree or severity of adverse effects on geology and soils, vegetation, wildlife, special status species, archeological resources, historic structures, cultural landscapes, visitor use and experience, and wilderness character (see list of protection measures in Attachment D).

4. Rationale for the Decision

Alternative 4 was selected because it best meets the project purpose to mitigate human risk by reducing the amount of time it takes for an alert to be sent out to potentially affected populations and communities after a lahar has been generated, while also minimizing the size and extent of the lahar detection system in the Mount Rainier Wilderness and Mount Rainier National Historic Landmark District (NHL). Upgrades to the lahar detection and monitoring system are needed to improve the safety of people in and adjacent to the Mount Rainier Wilderness and to provide an unparalleled opportunity to observe and measure ongoing geological processes and how they change before an eruption.

The selected alternative also meets the park's objectives of providing year-round monitoring capability to inform hazard notification systems; ensuring structural integrity of monitoring stations to minimize failure due to site conditions (e.g., wind, snow, and ice); and installing and maintaining sites in a manner that avoids or minimizes disturbance to park resources and values, including wilderness character, nesting northern spotted owls and marbled murrelets, and the Mount Rainier NHL.

In contrast to Alternative 2 (the No Action Alternative), the upgrades to the lahar detection and monitoring system at MRNP in Alternative 4 will improve the safety of people in and adjacent to the Mount Rainier Wilderness, particularly in the Tahoma Creek and Nisqually River drainages, which, along with the Puyallup River valley, are most vulnerable to future noneruptive landslide-caused lahars from Mount Rainier. The selected alternative will also improve detection capabilities for smaller debris flow events, particularly along Tahoma Creek, which has experienced multiple debris flows since the late 1980s.

The selected alternative will fulfill the scientific and educational purposes of wilderness, providing data from the lahar detection sites that will be useful to the park for hazard mitigation and situational awareness for wilderness users. The park is 97 percent designated wilderness. In 2021, MRNP issued more than 7,000 wilderness permits for more than 50,000 user nights. Most of the park's trail system is located in the Mount Rainier Wilderness and attracts a large number of people who visit the

wilderness on day trips in addition to overnight trips. As such, a substantial number of park visitors will benefit from the improved lahar detection system at Mount Rainier and an even greater number will benefit from the improved scientific understanding of this dynamic landscape.

The selected alternative will be implemented to avoid or reduce adverse effects on park resources and values as described in the EA and mitigation measures (Attachment D). The United States Fish and Wildlife Service (USFWS) has concurred with the determination that the selected alternative may affect, but is not likely to adversely affect, the northern spotted owl and marbled murrelet pursuant to the Endangered Species Act.

The selected alternative does not include the installation of telemetry equipment at the Shriner Peak, Tolmie Peak, and Fremont historic fire lookout towers. It also does not include installation of seismometers at Shriner Peak and Tolmie Peak, which would otherwise improve the accuracy of earthquake locations at Mount Rainier. The selected alternative does not authorize installations at these three locations because these sites are not necessary to improve lahar detection in the highest risk areas of Mount Rainier and because these sites would require additional installations in the Mount Rainier Wilderness and would include placing additional nonhistoric equipment on the historic fire lookout towers at Fremont, Tolmie Peak, and Shriner Peak in Alternative 1; or the installation of three alternate monitoring locations in currently undeveloped wilderness in Alternative 3. Alternative 4 (the selected alternative) is the minimum requirement for administering the Mount Rainier Wilderness for the purpose of wilderness, as documented in the attached minimum requirement analysis (Minimum Requirements Analysis-MRA; Attachment B) and consistent with the Wilderness Act.

The NPS, USGS, and Washington Department of Archaeological and Historic Preservation (DAHP) have signed a Memorandum of Agreement (MOA) to fulfill the requirements of the National Historic Preservation Act. The MOA includes stipulations to mitigate the adverse effects on contributing elements of the Mount Rainier NHL that will result from the expansion of the lahar detection system at Mount Rainier.

The selected alternative fulfills the requirements of the John D. Dingell, Jr. Conservation, Management, and Recreation Act of 2019 (Dingell Act) and the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act). The Dingell Act directs the USGS to establish a system, to be known as the National Volcano Early Warning and Monitoring System, “to monitor, warn, and protect citizens of the United States from undue and avoidable harm from volcanic activity.” The Stafford Act states that “the President shall insure that all appropriate Federal agencies are prepared to issue warnings of disasters to State and local officials” and “the President shall direct appropriate Federal agencies to provide technical assistance to State and local governments to ensure that timely and effective disaster warning is provided.”

5. Mitigation Measures

The selected alternative incorporates by reference the mitigation measures listed in Appendix A of the EA (also Attachment D of this FONSI).

6. Other Alternatives Evaluated in the EA

Alternative 1 – USGS Proposed Action

Under this alternative, lahar detection stations would be installed at 12 sites in the park, of which 9 would be in wilderness. The sites in wilderness would be Ararat South, Copper Mountain, Emerald Ridge (upgrade to an existing University of Washington site), Fremont Lookout, Gobblers Knob Lookout, Mildred Point, Shriner Peak Lookout, Tahoma Bridge, and Tolmie Peak Lookout. The Fremont Lookout, Shriner Peak, and Tolmie Peak stations would function primarily as telemetry nodes for future stations installed along the Carbon, White, Ohanapecosh/Cowlitz, and Mowich River drainages in the event of future volcanic unrest at Mount Rainier and would not repeat data from any current or proposed stations. Instead, these installations would be part of a telemetry backbone that would enable rapid installation of new real-time monitoring stations along the White River drainage, something that would be required to help mitigate lahar hazards along the White River if Mount Rainier were to start exhibiting signs of volcanic unrest. The remaining nine stations would be installed to increase rapid detection along the west flank of Mount Rainier, which is the most vulnerable to a large lahar down the Puyallup River, Mowich River, or Tahoma Creek drainages.

Alternative 1 would require a greater number of helicopter flights than the selected alternative. The total number of helicopter flights would be about 63 during installation. With the addition of potential flights for revegetation, up to 8 total round-trip flights would be needed for each site for installation, and the total number of round-trip flights associated with installation would be about 72. About 219 maintenance flights would be performed over a period of 30 years.

Alternative 2 – No Action

Under the No Action Alternative, the NPS would not approve the USGS permit to install additional lahar monitoring stations. Monitoring of volcanic activity at MRNP would be conducted at existing monitoring stations at Camp Schurman, Camp Muir, Carbon River Ranger Station, Emerald Ridge, Kautz Creek, Longmire, Mount Fremont (approximately 0.7 mile northeast of the lookout), Nisqually Gateway, Observation Rock, Ohanapecosh, Panhandle Gap, Paradise Precipitation Tower, Ski Dorm, St. Andrews Rock (located inside the Sunset Amphitheater), and Sunrise.

The USGS would continue to monitor volcanic activity at the seismic and GPS monitoring sites listed above and would continue to maintain these sites as needed. From 2009 to 2019, the USGS flew 47 total helicopter sling loads to five aircraft-dependent sites, which is about 8 flights per site over 11 years. The USGS estimates that about three to four maintenance trips per site would be needed every 5 years for the five existing monitoring sites that are helicopter dependent, for a total of about 120 flights over 30 years.

Alternative 3 – Alternative Sites

This alternative would be the same as the USGS Proposed Action, except for five specific locations where a modification to the proposed location is included to avoid or minimize potential for adverse

effects on historic properties. Alternative sites were identified for Fremont Lookout, Mount Wow, Shriner Peak, Tahoma Vista, and Tolmie Peak within adjacent undeveloped wilderness areas. Helicopter use would be the same as described for Alternative 1, except that two additional sites, the Mount Wow Talus and Tahoma Vista Ridge alternative sites, would require use of helicopters for installation and maintenance. The number of helicopter flights required would increase to 88 for installation and up to 273 over 30 years for maintenance.

7. Other Alternatives Considered

Under NEPA, alternatives may be eliminated from detailed study for the following reasons: technical or economic infeasibility; inability to meet project objectives or resolve the need for the project; duplication of other less environmentally damaging alternatives; conflicts with an up-to-date valid plan, statement of purpose and significance, or other policy that would require a major change in that plan or policy to implement; or severity of environmental impacts.

During the development of the proposed monitoring stations, alternatives were proposed that were not carried forward for further analysis due to resource impacts or because they did not meet the purpose and need for the project. These alternatives are described below and in the Errata (Attachment A).

Locate All New Lahar Detection Installations Outside Wilderness

Because the intent of the proposed project is to mitigate human risk by reducing the amount of time it takes for an alert to be sent out to potentially affected populations and communities after a lahar has been generated, placing the stations outside wilderness would mean locating them at a greater distance from the volcano. This would not meet the purpose and need for the project because locating stations at a greater distance from the volcano would not achieve the goal of rapidly detecting debris flows and lahars to provide authorities inside and outside the park with as much time as possible to notify and potentially evacuate residents, staff, and visitors.

The existing volcano monitoring network includes many stations outside of wilderness. For example, lahar detection stations for the Puyallup River drainage are sited entirely outside of the Mount Rainier Wilderness and can provide adequate warning for the nearest downstream communities. However, for the Tahoma Creek, Kautz Creek, or Nisqually River, the existing monitoring network would be unable to detect lahar events until several minutes after they initiate, and the impacted drainage would be more difficult to discern in a timely manner, meaning that events would impact wilderness and adjacent use areas in the park with effectively no warning, and the warning time would be delayed for areas outside the park.

The improvements to lahar detection necessary for emergency managers to notify or initiate evacuation of visitors and staff inside the wilderness or other areas of the park, as well as for residential areas near the park entrance, could not be gained by adding more monitoring stations outside of wilderness. In particular, infrasound instruments, which have been shown to be effective in detecting subaudible sound waves created by moving surface flows such as debris flows and lahars,

can be significantly disrupted by topography, so multiple stations within each drainage are needed for reliable detection. Real-time data from stations is sent by digital radio signal, which requires line-of-sight to radio repeaters on high points around the drainages of interest. Most of these high points are in designated wilderness at Mount Rainier.

The effects of installing all new long-term lahar detection installations outside of wilderness is described in the No Action Alternative (Alternative 2).

Increase the Number of Stations Proposed by the USGS

Additional stations would need to be installed by the USGS inside the park to enable robust lahar detection capabilities in other parts of the park besides the Nisqually River drainage, including the Carbon, White (East and West Forks), Muddy Fork of the Cowlitz, and Ohanapecosh River drainages. To enable robust lahar detection capabilities for all of Mount Rainier, the USGS would need to install three to four stations inside the park along each of these drainages, as well as additional high-elevation sites to serve as telemetry repeaters. Most sites would need to be near rivers and would feature a seismometer, an infrasound sensor and/or infrasound array, and in some cases a 300-foot- to 500-foot-long tripwire array. In addition, to bring the Mount Rainier volcano monitoring network up to the USGS's Level 4 standard for Very High Threat volcanoes, at least six additional GPS stations would need to be installed inside the park. In most cases, these GPS stations would not be collocated with the lahar detection sites as GPS stations need a clear sky view, which means the stations would need to be installed on ridgetops or other locations with few or no trees. This would translate to roughly 25 new lahar detection sites inside the park (i.e., 13 sites in addition to the 12 sites proposed in Alternative 1, the USGS Proposed Action).

Additional sites were not carried forward for further analysis because (a) current scientific understanding is that these other drainages are not as vulnerable to spontaneous noneruptive landslide-caused lahars; (b) the primary purpose of this project is to improve lahar detection capabilities, not volcano monitoring capabilities; and (c) the impact on wilderness would be far greater under this alternative. As described in Appendix B of the EA, the primary risk scenario that has informed the design of the proposed lahar detection system expansion is a spontaneous (i.e., not associated with eruptive activity) collapse of a part of the west flank (Sunset Amphitheater), which has been shown by several studies to be the weakest flank of Mount Rainier and most susceptible to a spontaneous collapse.

Consider Alternative Technologies or Equipment to the USGS Proposed Action

The USGS considered several technologies and types of equipment other than those described in Alternative 1 – USGS Proposed Action. The USGS determined that no other technologies exist that would obtain the same data as the monitoring stations proposed or the impacts would be much greater than what is proposed. As such, these monitoring stations represent the best available technology to monitor volcanic activity and detect lahars and represent the minimum tools necessary to accomplish project objectives. Alternative technologies and equipment options described below

were suggested during public review of the environmental assessment. Details regarding the reason for dismissing them from further analysis are included.

Use Drones for Equipment Installation and/or Remote Monitoring

Although unoccupied aircraft systems, or drones, have advanced in their capabilities, they would not be a suitable replacement for helicopters for this project due to the weight of the monitoring equipment, which is too heavy to be transported using drones. The use of drones instead of helicopters is technically infeasible and was not carried forward for further analysis.

Use Other Types of Remote Sensing, Monitoring, and Transmission

In addition to the use of drones, several remote technologies other than those described in Alternative 1 – USGS Proposed Action were considered, such as infrared cameras, lidar, radar, and satellite imagery. The USGS determined that no other technologies are available that obtain the same lahar detection data in the timeframe that is needed (seconds) to provide rapid detection and early warning of these hazards. In addition, such technologies cannot detect small-scale surface deformation and/or seismic activity that might precede a lahar-generating event. Technologies such as radar were dismissed because of the power requirements and large footprint needed for batteries and solar panels (see EA Appendix B). As such, the USGS-proposed monitoring stations represent the best available technology to monitor lahar activity. The use of other types of remote sensing, monitoring, and transmission equipment would not meet the purpose and need for the project and were not carried forward for further analysis.

Repurposing of Existing Monitoring Station Equipment Instead of Installing New Stations

The USGS considered numerous locations for monitoring the drainages most vulnerable to lahars produced by a spontaneous landslide stemming from the west flank of Mount Rainier. The existing monitoring stations do not provide the data needed for rapid lahar detection and warning for all vulnerable drainages (see EA Appendix B). The NPS determined that the locations provided by the USGS are the optimal locations to obtain the data necessary for the system. Use of the existing monitoring equipment to meet the objectives of lahar detection without placing new equipment in targeted drainages is infeasible and was not carried forward for further analysis.

Temporary and Portable Equipment Instead of Proposed Year-round Installations

The USGS considered temporary placement of seismic monitoring equipment; however, temporary placement of equipment would not achieve the purpose of continuous year-round monitoring that is needed to provide rapid detection and early warning of a large lahar. Temporary monitoring stations do not transmit data in real time, are not continuous, and are only functional in the summer months. To provide year-round detection capabilities, a resilient structure is needed to protect monitoring equipment and a battery system is needed to store power generated by solar panels. This equipment is heavy and it is not feasible to carry the equipment to remote locations without aviation support. Temporary and portable equipment would not meet the purpose and need for the project and was not carried forward for further analysis.

Underground Station Siting

During the public comment period, it was suggested that all proposed equipment be located underground to minimize visual disturbance. Although some elements of the proposed lahar detection system are buried, it is not feasible to place all associated equipment underground. In addition to requiring greater ground disturbance and loss of vegetation, burial would be infeasible in several locations due to the presence of bedrock. It would also remain necessary to include solar panels and telemetry equipment aboveground to generate power and transmit data. This option was not carried forward for further analysis due to infeasibility to meet the purpose and need of the lahar detection system.

Install New Stations in Wilderness Only in Locations with Existing or Previously Authorized Developments; Do Not Install New Stations in Undeveloped Wilderness

This alternative would include all stations as proposed in Alternative 1, except Ararat South, Copper Mountain, and Mildred Point. This would avoid new impacts on wilderness character in the locations that are currently least developed and least impacted by modern human activities. Other installations would be collocated with existing fire lookouts, on or near the Westside Road (Mount Wow and Tahoma Vista), or near the large man-made suspension bridge across Tahoma Creek Bridge. This alternative would also eliminate the need for the Paradise Parking Lot Tower installation (which would receive signals from Ararat South and Mildred Point).

Under this alternative, new equipment would be installed at up to nine sites in the park, of which six would be in wilderness. The sites in wilderness would be Emerald Ridge (upgrade to an existing University of Washington site), Fremont Lookout, Gobblers Knob Lookout, Shriner Peak Lookout, Tahoma Bridge, and Tolmie Peak Lookout. As described in Alternative 1 and in Appendix B of the EA, the Fremont Lookout, Shriner Peak, and Tolmie Peak stations would function primarily as telemetry nodes for future stations installed along the Carbon, White, Ohanapecosh/Cowlitz, and Mowich River drainages in the event of future volcanic unrest at Mount Rainier. Two of the lookout sites (Tolmie Peak and Shriner Peak) would also feature seismometers; one site (Fremont Lookout) would not repeat data from any current or proposed stations. Because Ararat South would serve as a data repeater for the Mount Wow site, an alternative means for transmitting real-time data from the Mount Wow site (such as installing a data cable along the Westside Road) would be needed. If an alternate solution cannot be found for transmitting data from the Mount Wow site, then this alternative would eliminate 5 of the 12 proposed station installations in Alternative 1.

This alternative would have limited utility in improving detection of large events with the potential to seriously impact downstream communities. However, it would reduce the number of stations installed or upgraded in the Tahoma Creek drainage area from eight to four or five, which would result in significant degradation in lahar detection capabilities in several ways, as described below, and would not meet the project purpose. Accordingly, this alternative was not carried forward for further analysis.

Reduced Infrasound Detection Capabilities

The number of sites with infrasound detection capabilities would be reduced to only Emerald Ridge, Tahoma Vista, and Tahoma Bridge (Ararat South, Copper Mountain, and Mildred Point would all feature infrasound arrays but are not included in this alternative). Emerald Ridge would likely be destroyed within one minute of lahar initiation, leaving Tahoma Vista and Tahoma Bridge as the only infrasound-capable sites in operation (and Tahoma Vista as the only site with an infrasound array). This would result in significant reduction in infrasound-based lahar detection and flow-tracking capabilities. Infrasound waves, like other sound waves, are heavily impacted by topography. Because Tahoma Bridge and Tahoma Vista are located on the floor of the Tahoma Creek drainage, it is likely that neither site would detect lahar-generated infrasound signals because of topographic obstructions until a lahar reached the southward bend in the drainage, adding minutes of delay time to a potential alarm.

Reduced Ability to Detect Small Precursor Earthquakes

Mildred Point, Copper Mountain, and Ararat South are all in seismically quiet locations that are reasonably close (less than 6 miles) to the summit and west flank, which makes them ideal sites for seismic monitoring and especially for detecting small earthquakes (magnitude less than 1) that could be precursors to an eruption or a large failure of the west flank (small earthquakes were observed up to several weeks prior to a large landslide in 2009 near Naches, Washington (<https://historylink.org/File/9224>)). These sites are not included in this proposal. Of the remaining proposed sites, Mount Wow, Tahoma Vista, and Tahoma Bridge would all be exposed to river noise and would not be useful for detecting small earthquakes, and Gobblers Knob would be too far (more than 8 miles) to detect small earthquakes, leaving Emerald Ridge as the only new/upgraded site that would be quiet enough and close enough to detect small earthquakes. Because a seismic station already exists at Emerald Ridge, this alternative would result in no improvement in the ability to detect and locate small precursor earthquakes at Mount Rainier.

Reduced Timeliness and Reliability of Lahar Detections

Without Mildred Point, Copper Mountain, and Ararat South, the reliability and timeliness of seismic-based lahar detections would be significantly reduced. A large west flank lahar would likely destroy existing stations at Emerald Ridge and St. Andrews Rock; without Mildred Point, Copper Mountain, and Ararat South, the closest stations would then be the existing sites at Paradise, Observation Rock, and Longmire, as well as those proposed at Tahoma Bridge and Tahoma Vista, none of which is closer than 5 miles to the source area. This would negatively impact the ability of the USGS to confirm the presence of a lahar as well as to determine which drainage it is traveling down. Confirmation of a lahar traveling down Tahoma Creek would only come from the destruction of the Tahoma Bridge station, which would occur about 3 to 4 minutes after lahar initiation, leaving only about 6 to 8 minutes before the lahar would reach the main park road and entrance station area. When only a short window of time is available to detect an event and provide emergency hazard notification, every available minute is essential.

No Improvement in GPS-Based Volcano Monitoring at Mount Rainier

At present there is no continuous GPS site in operation on the western and southwestern flanks of Mount Rainier (the closest GPS sites are at Observation Rock, Camp Muir, and Paradise). This represents the largest gap in the USGS's deformation monitoring network at Mount Rainier. Without Copper Mountain, there would be no improvement in GPS-based volcano monitoring capabilities at Mount Rainier. In addition, Copper Mountain would be the closest operating GPS site to the potential failure area; without Copper Mountain, the USGS would be unable to detect any subtle precursory deformation of the west flank that may precede a flank failure (precursory deformation was observed for several weeks prior to the May 18, 1980, eruption of Mount St. Helens, which was initiated by a large landslide).

In addition, an alternative means of obtaining real-time data from the Mount Wow station would need to be devised, such as a hard-wired data conduit to another transmitting station (e.g., running fiber optic cables up the Westside Road), or it would be unusable for real-time data. To reach the station as it is currently sited, such a cable would need to span the drainage to the north of the trailhead so as not to be damaged by frequent small debris flows that regularly damage the road at that point. If the station were sited to the south of the drainage, power along with a fiber optic cable would need to be run up the Westside Road. Without the Mount Wow site, there would be additional significant loss in the detection system's capability to provide situational awareness about the progression of a large lahar down Tahoma Creek, and also smaller and more frequent debris flows that often reach as far as the Mount Wow location (see Alternative 1 in the EA for a full description of the capabilities that would be enabled by the Mount Wow site).

8. Public Involvement/Agency Consultation

Public Scoping

The park initiated public scoping on October 5, 2020, in accordance with NPS guidance under NEPA. The public comment period ran through October 30, 2020. The park received 49 correspondences during the 25-day comment period, which were considered during the development of the EA. As part of the scoping process, the NPS hosted a virtual public meeting on Wednesday, October 21, 2020, from 4:30 to 5:30 p.m. The meeting included a presentation at 4:30 p.m., and NPS and USGS staff were available after the presentation to answer questions from the public. Public notices were distributed through the following sources:

- A news release posted on the park website:
<https://parkplanning.nps.gov/moralaharea>
- A news release sent electronically (via email) to various stakeholders, agencies, and media groups
- A public scoping announcement posted to the PEPC website:
<https://parkplanning.nps.gov/projectHome.cfm?projectId=95553>
- A news release posted on the park's social media accounts (Facebook and Twitter)

- Letters sent to affiliated tribes:
 - Cowlitz Indian Tribe
 - Muckleshoot Indian Tribe
 - Nisqually Indian Tribe
 - Puyallup Tribe of Indians
 - Squaxin Island Tribe
 - Confederated Tribes and Bands of the Yakama Nation

Draft EA Public Review

Public comments on the Draft EA were invited for 30 days beginning on May 27, 2021. After receiving several extension requests, the NPS extended the comment period to July 9, 2021. During the review period, 1,301 comment correspondences were submitted to the NPS through the PEPC website. From each correspondence, comments were extracted and coded into categories; similar comments that were identified as substantive were grouped into concern statements. Concern statements summarize the nature and content of public comments. NPS responses to concern statements are in Attachment F. All comments, including all form letters received, are incorporated into the project record and are available upon request; contact information is available on the project website: <https://parkplanning.nps.gov/projectHome.cfm?projectID=95553>.

As part of the public review process, the NPS hosted a virtual public meeting on Wednesday, June 9, 2021, from 4:30 to 5:30 p.m. The meeting included a presentation at 4:30 p.m., and NPS and USGS staff were available after the presentation to answer questions from the public. Public notices of the comment period and meeting were distributed through the same sources listed above.

Washington Department of Archaeology and Historic Preservation

Documents related to the National Historic Preservation Act, in accordance with the Advisory Council on Historic Preservation regulations implementing Section 106 (36 CFR Part 800), were completed and submitted to the Washington State Historic Preservation Officer (SHPO) at the Washington DAHP. The NPS determined that the selected alternative will have an adverse effect on contributing elements to the Mount Rainier National Historic Landmark District and requested concurrence from the SHPO on April 20, 2021. The SHPO concurred with this determination in a letter dated May 20, 2021. A memorandum of agreement (MOA) has been developed among the NPS, the USGS and the Washington SHPO to mitigate adverse effects. The MOA includes stipulations that must be completed to mitigate adverse effects to historic properties associated with the expansion of the lahar detection system at MRNP (Attachment C).

U.S. Fish and Wildlife Service (USFWS)

The NPS prepared a Biological Assessment for the proposed project and requested concurrence from the USFWS on April 9, 2021, to fulfill interagency consultation requirements of the Endangered Species Act. The Biological Assessment contains an evaluation of potential effects on threatened and endangered species. The NPS made the determination that the selected alternative *may affect, and is not likely to adversely affect*, the northern spotted owl and marbled murrelet; will not jeopardize the whitebark pine; and will have *no effect* on other federally listed species or their critical habitat. The USFWS concurred with this determination on June 22, 2021 (Attachment E). The Biological Assessment also determined that the project will not adversely affect gray wolf, although consultation is not required for recovered species. Resource protection measures provided in Attachment D include USFWS measures.

9. Finding of No Significant Impact

As defined in 40 Code of Federal Regulations (CFR) § 1501.3 – Determine the appropriate level of NEPA review, (b) “In considering whether the effects of the proposed action are significant, agencies shall analyze the potentially affected environment and degree of the effects of the action.” (2) In considering the degree of the effects, agencies should consider the following, as appropriate to the specific action: (i) Both short- and long-term effects; (ii) Both beneficial and adverse effects; (iii) Effects on public health and safety; (iv) Effects that would violate Federal, State, Tribal, or local law protecting the environment.

As described in the EA and below, the selected alternative has the potential for adverse impacts on special status species, historic properties in the Mount Rainier NHL, public health and safety, and wilderness values; however, no potential for significant adverse impacts was identified as described below.

In addition, the selected alternative will not violate Federal, State, Tribal, or local laws protecting the environment.

Special Status Species

Northern Spotted Owl

The total number of helicopter flights under the selected alternative will be about 48 during installation over a 2-month period (September and October) over 2 years, and about 138 maintenance flights over a period of 30 years. Most of the proposed helicopter flights will fly over northern spotted owl habitat; however, helicopters will stay at least 2,000 feet above the ground, except during takeoff, approach, and landing, to minimize impacts on northern spotted owls. Helicopter flights within 110 yards of suitable habitat will only occur at Tahoma Bridge. Flights at this site will occur after September 30 (after the nesting season), and landings will occur about 0.7 mile or greater from activity centers. Flight time at this site will be about 1 to 2 hours per day over a period of 2 days in October, and about 13.5 to 27 hours for tuning and maintenance flights over a period of 30 years.

Work will also occur at Tahoma Vista Overlook and Mount Wow in October, but no helicopters will be needed because these sites are on existing roads.

Based on the distance from activity centers and implementation of mitigation measures, impacts on roosting or nesting spotted owls will be minimized to the extent that negative effects from helicopter overflights and sling-load deliveries will be unlikely. Project-related disturbance will be short in duration and will not result in harassment or harm to spotted owls. It is not expected that the local spotted owl population will be measurably affected, especially with implementation of mitigation measures, which greatly reduce the chances of any adverse impacts.

Marbled Murrelet

Project activities will not reduce available habitat for marbled murrelets because most activities will occur in nonhabitat areas above 3,800 feet in elevation. Where vegetation disturbance occurs below 3,800 feet (at Mount Wow and Tahoma Vista), it will not impact suitable marbled murrelet habitat. No trees that provide suitable nesting habitat for the marbled murrelet will be removed. Ground-disturbing activities will be confined to the smallest area necessary to complete the work, and all areas of temporary vegetation disturbance will be restored with native vegetation following construction.

Project work will occur in September and October and will overlap the end of the murrelet nesting season (April 1 through September 23). There is limited information concerning murrelet vulnerability to disturbance effects. However, studies have shown (Long and Ralph 1998; Hébert and Golightly 2006) that murrelets are not easily disrupted from nesting attempts by human disturbance except when confronted at or very near the nest itself.

Helicopter transport of equipment, materials, and personnel (when necessary) to the sites will occur after Labor Day (near the September 23 end of the nesting season for marbled murrelets, after most of the young have fledged) and will stay at least 2,000 feet above the ground except during takeoff, approach, and landing. This will avoid most marbled murrelet habitat in the park, including the Carbon, Puyallup, and Mowich River valleys where most murrelets have been documented in the park.

The Kautz Helipad site is not suitable murrelet nesting habitat; however, murrelets pass this site during their inbound and outbound daily movements along the Nisqually River. The Kautz Helipad will be used for most helicopter operations associated with the selected alternative, including during the murrelet nesting season, which ends on September 23. The area within 110 yards of the Kautz Helipad is not suitable nesting habitat for murrelets and, therefore, landing and takeoff from the Kautz Helipad will not affect nesting murrelets. The baseline level of noise at the Kautz Helipad will not increase because this location has operated as a helicopter base for many years. Helicopter flights from the Kautz Helipad will begin 2 hours after official sunrise and cease 2 hours before official sunset to avoid potential disruption to marbled murrelets during peak activity periods for feeding and incubation exchanges.

Based on the short duration of work, avoidance of murrelet habitat by flying helicopters at 2,000 feet, and implementation of timing restrictions as described in Attachment D, impacts on nesting marbled murrelets will be minimized to the extent that negative effects from ground disturbance and helicopter noise are unlikely to occur. The NPS will follow USFWS guidance on disturbance, disruption, and physical injury distance thresholds for marbled murrelets (Attachment D). Impacts on the murrelet population in the park will not rise to the level of significance, especially with implementation of mitigation measures, which greatly reduce the chances of any adverse impacts.

The NPS submitted a biological assessment (BA) to the USFWS (NPS 2021) to document the potential impacts and proposed mitigation measures to protect northern spotted owls and marbled murrelets. The BA included a determination of *may affect, not likely to adversely affect* for northern spotted owls because impacts will be unlikely and therefore discountable. The NPS also determined that the selected alternative will not jeopardize the whitebark pine, and will have *no effect* on other federally listed species or their critical habitat. The USFWS concurred with the NPS determination on June 22, 2021 (Attachment E). As such, no significant impacts will occur to special status species.

National Historic Landmark District and Associated Historic Properties and Cultural Landscapes

The installation of additional nonhistorical elements on Gobblers Knob, such as adding solar panels to the roofs and shutters, and adding new antenna masts will affect the integrity of design and materials that comprise the structure, which will affect the visual setting and feeling of the structure. However, nonhistorical elements already exist on the Gobblers Knob fire lookout and, as such, the newly added elements will not result in a substantial contrast to the existing elements. Mitigation measures will be implemented such as placing equipment in unobtrusive locations and painting elements in neutral colors to match the structure and/or natural landscape. In addition, the selected alternative does not authorize the installation of monitoring stations at Fremont, Tolmie Peak, and Shriner Lookouts, which will avoid adverse effects on these lookouts by not installing additional nonhistorical elements on these historic structures.

Installation of the monitoring station at Tahoma Vista will introduce a new visual element affecting the setting of the overlook, which contributes to the Westside Road cultural landscape and NHL. The Mount Wow proposed location will be situated directly adjacent to Westside Road and will add nonhistorical elements to the setting of the NHL, including a fiberglass hut with a solar panel extending no more than 12 feet above the hut and an antenna mast and solar panel. The visual effect of installing huts and antennas will be mitigated by placing the equipment in unobtrusive locations within the historic setting to the extent possible and will incorporate additional screening measures.

To ensure appropriate treatment of historic properties, the NPS, USGS, and SHPO signed a MOA with stipulations in March 2022, for the treatment of historic properties that may be adversely affected by project implementation. Because of the mitigation measures and stipulations that will be implemented under the MOA, the project will not result in the loss or destruction of significant cultural or historical resources and will not result in significant adverse effects on the integrity of

the Mount Rainier NHL and contributing elements, which will remain suitable for listing in the National Register of Historic Places.

Public Health and Safety

The selected alternative will provide long-term beneficial effects for public health and safety by reducing the amount of time it takes for an alert to be sent out to potentially affected populations and communities after a lahar has been generated. The expansion will also increase the number of total drainage areas covered by the alert system to include the Tahoma Creek and Nisqually River drainages, which, along with the Puyallup River valley, are vulnerable to future spontaneous landslide-caused lahars from Mount Rainier. Although visitors to more remote wilderness areas will likely not hear warning signals if a lahar is detected, early detection could help with quicker emergency response for these wilderness users. In addition, visitors to lower reaches of wilderness areas could be within range of warning signals.

Installation and maintenance of the proposed monitoring stations will pose short-term risks to staff and workers during installation and maintenance because of steep and rough terrain, high-altitude conditions, unpredictable weather events such as snow or lightning storms, and use of helicopters to access several of the sites. Installation and maintenance protocols will be used to reduce these risks, and staff will hike to installation sites whenever possible. Staff will be trained and experienced with wilderness and/or backcountry travel and working in these conditions. Weather will be tracked closely prior to any work being performed, and protocols will be in place if unanticipated inclement weather arises during work in backcountry areas. With the implementation of training, safety protocols, and other mitigations for helicopter use, impacts on public health and safety will not rise to a level of significance.

Wilderness Values

As described in the EA and Wilderness MRA, Attachment B, the selected alternative will result in both short-term and long-term adverse impacts on qualities of wilderness character.

Under the selected alternative, six of the nine proposed lahar detection stations will be constructed in the Mount Rainier Wilderness. The natural quality of the Mount Rainier Wilderness will be affected by small-scale, localized, and temporary impacts on the natural environment. The selected alternative will alter less than 0.1 acre of vegetation in the 228,400-acre wilderness. Due to the small scale and widely separated nature of the proposed sites, and the implementation of mitigation measures to reduce impacts, the selected alternative will have only minimal adverse effects on plants, animals, air, water, and ecological processes.

Use of mechanized equipment such as power tools and use of helicopters for material delivery will introduce unnatural sounds during installation and maintenance work. Impacts on the undeveloped quality during construction will generally be low, occurring only during construction over a brief period. Use of a helicopter to transport material will result in a temporary increase in noise that will affect the undeveloped quality of wilderness for about 1 to 2 hours per day over a period of about 2 days at each site. The total helicopter flight time in the park will increase by about 17 to 34 percent

during the late summer/early fall of the 2-year installation period and will increase about 2 to 3 percent compared to the existing number of flights over the 30-year maintenance period.

Under the selected alternative, the number of standalone seismic installations in wilderness will increase from five to nine. The other installations will be collocated with existing developments and installations. Impacts will be minimized because the standalone lahar detection stations will be situated so they will be hard to see from established trails; however, visitors traveling off-trail could come across these facilities or may see them from a distance.

Installation and maintenance of the structures will have a small adverse effect on solitude or primitive and unconfined recreation during installation. Helicopter trips to install monitoring stations will affect solitude when aircraft are flying over or landing in wilderness (sling load delivery). After installation, the structures will have small effects on solitude or primitive and unconfined recreation.

The proposed monitoring stations in the NHLD will affect contributing features to the NHLD, including the Gobblers Knob fire lookout, which predates the wilderness designation and contributes to wilderness character to the extent that it tells the story of historical use of the wilderness area. Modern installations and modifications contribute to a shift in visitor perception of the structures as historic features toward a perception as modern administrative facilities. Instruments will be painted to reduce their visibility and placed strategically to minimize detection by the casual visitor; however, several of the instruments will be visible to the public.

The dynamic glacial and volcanic features of Mount Rainier contribute to wilderness character as a geologic feature of value. Study of these unique features will fulfill the public purposes of scientific and educational use. Data collected by the detection sites will be useful to the park for hazard mitigation and situational awareness for wilderness users.

The primary impacts from the selected alternative are on the undeveloped quality of wilderness and opportunities for solitude. The selected alternative will double the number of monitoring installations in wilderness, which necessitates an increase in the use of motorized equipment and helicopters. These are long-term recurring impacts that have the potential to affect dozens of visitors during each occurrence; however, wilderness visits are dispersed over 228,000 acres and flights will be scheduled to avoid peak visitation. In addition, the new sites will not be encountered by the majority of wilderness users as few sites in wilderness are visible from established trails. For these reasons, the impacts on wilderness values will not be significant.

10. Conclusion and Decision

As described above, the selected alternative does not constitute an action meeting the criteria that normally requires preparation of an environmental impact statement (EIS). The selected alternative will not have a significant effect on the human environment in accordance with Section 102(2)(c) of NEPA.

Based on the foregoing, it has been determined that an EIS is not required for this project and accordingly will not be prepared.

In conclusion, the NPS has decided to approve a permit for the USGS to expand the lahar detection and volcano monitoring system at MRNP as described in Alternative 4 of the EA and final Wilderness MRA (Attachment B). This alternative best meets the purpose and need for the project while meeting the statutory requirements of multiple federal laws that provide direction to improve public health and safety, preserve wilderness character, protect and recover threatened and endangered species, preserve our cultural heritage, ensure that national park resources and values remain unimpaired for the enjoyment of future generations, and ensure that decisions made thoughtfully consider the potential impacts on the human environment through a public planning and review process.

The selected alternative reflects the approach that best meets these fundamental responsibilities and is approved for implementation as described with the inclusion of the conservation measures and mitigation measures included as attachments to the EA and FONSI.

11. References

- Hébert, P.N. and R.T. Golightly. 2006. Movements, Nesting, and Response to Anthropogenic Disturbance of Marbled Murrelets (*Brachyramphus marmoratus*) in Redwood National and State Parks, California. Unpublished Report, Department of Wildlife, Humboldt State University, Arcata, CA and California Department of Fish and Game Report 2006-02, Sacramento, CA.
- Long, L. and C.J. Ralph. 1998. Regulation and Observation of Human Disturbance Near Nesting Marbled Murrelets. USDA Forest Service, Pacific Southwest Research Station, Redwood Sciences Laboratory, Arcata, CA.
- National Park Service (NPS). 2021. Mount Rainier National Park Lahar Detection System Biological Assessment. April.

Determination of Non-Impairment for Lahar Detection System, Selected Alternative

Introduction

By enacting the National Park Service (NPS) Organic Act of 1916 (Organic Act), Congress directed the U.S. Department of the Interior and the NPS to manage units "to conserve the scenery, natural and historic objects, and wildlife in the System units and to provide for the enjoyment of the scenery, natural and historic objects, and wildlife in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (54 United States Code 100101). Before approving a proposed action that could lead to an impairment of park resources and values, a NPS decision maker must consider the impacts of the proposed action and determine, in writing, that the activity will not lead to an impairment of park resources and values.

Sections 1.4.5 and 1.4.6 of NPS *Management Policies 2006* provide an explanation of impairment. Section 1.4.5 defines impairment as, "an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values." Section 1.4.5 goes on to state that, "an impact to any park resource or value may, but does not necessarily, constitute an impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- Identified in the park's general management plan or other relevant NPS planning documents as being of significance.

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

Fundamental resources and values for Mount Rainier National Park (park) are identified in the enabling legislation for the park, the 2001 *Mount Rainier National Park General Management Plan*, and the 2015 *Mount Rainier National Park Foundation Document*. Based on a review of these documents, the fundamental resources and values for the park are:

- Mount Rainier and its associated geologic and glacial features;
- Dynamic landscape-scale processes;
- Biological diversity that contributes to the integrity of the Cascade ecosystem;
- Mount Rainier Wilderness values and experiences;

- Year-round access to a range of high-quality recreational experiences from the wild and challenging to the indoor and refined;
- Natural sounds and dark night skies;
- Mount Rainier National Historic Landmark District;
- Archeological record that documents more than 9,000 years of human connection with the land and sustains a living connection to the park for contemporary descendant tribes;
- Clean air, scenic vistas, and viewsheds;
- Opportunities to understand Mount Rainier's resources and heritage;
- Opportunities for first-hand observation, scientific research, and learning; and
- Curatorial collections.

Non-Impairment Determination for the Selected Alternative

Based on the identification and evaluation of impacts in the Lahar Detection System Environmental Assessment (2021 EA), the following park resources and values were evaluated for impairment: special status wildlife species – northern spotted owl and marbled murrelet, the Mount Rainier National Historic Landmark District (NHLD) and associated historic properties and cultural landscapes, and wilderness character.

Section 1.4.6 of *NPS Management Policies* 2006 identifies several park resources and values that are subject to evaluation in a non-impairment determination. Consistent with the September 2011 NPS Guidance for Non-Impairment Determinations and the NPS NEPA Process, non-impairment determinations do not include discussion of impacts on visitor experience, socioeconomics, public health and safety, environmental justice, land use, park operations, etc., as these do not constitute impacts on park resources and values identified through the NPS Organic Act or General Authorities Act that are subject to the non-impairment standard.

Special Status Wildlife Species – Northern Spotted Owl and Marbled Murrelet

As described in the Lahar Detection System Expansion EA and the Biological Assessment prepared to support consultation under the Endangered Species Act, the selected alternative has the potential to affect, but is not likely to adversely affect, northern spotted owls and marbled murrelets. The selected alternative will be implemented to avoid adverse effects on the northern spotted owl and marbled murrelet by scheduling installation at sites that are within or adjacent to suitable habitat to occur after the nesting season. The limited vegetation disturbance that will occur during installation will not impact nesting trees or habitat.

Although flights and work at the other lahar detection sites will occur in September or October and may overlap the last month of the nesting season, these flights will be to support installation at locations that are at high elevations and outside of suitable spotted owl and marbled murrelet habitat.

The Kautz Helipad will be used for helicopter operations during implementation of the selected alternative. The Kautz Helipad is not suitable murrelet nesting habitat; however, murrelets pass this site during their inbound and outbound daily movements along the Nisqually River. The nearest suitable nesting habitat for marbled murrelets is more than 110 yards from the Kautz Helipad; therefore, landing and takeoff from the Kautz Helipad will not affect nesting murrelets. The baseline level of noise at the Kautz Helipad will not increase because this location has operated as a helicopter base for many years. In addition, as described in the 2021 EA and Finding of No Significant Impact (FONSI), helicopter flights from the Kautz Helipad will begin 2 hours after official sunrise and cease 2 hours before official sunset to avoid potential disruption to marbled murrelets during peak activity periods for feeding and incubation exchanges.

Based on the location of new installations, which are primarily outside of suitable habitat for northern spotted owl and marbled murrelet, and implementation of timing restrictions as described in the 2021 EA and FONSI, impacts on roosting or nesting spotted owls and marbled murrelets will be minimized to the extent that negative effects from ground disturbance and helicopter overflights will not likely occur. The U.S. Fish and Wildlife Service concurred with the determination that the selected alternative may affect, but is not likely to adversely affect, northern spotted owl and marbled murrelet.

Given the anticipated low likelihood of adverse effects on listed species as proposed, the selected alternative will not result in an impairment of special status wildlife species.

Mount Rainier National Historic Landmark District and Associated Historic Properties and Cultural Landscapes

As described in the 2021 EA, the project will occur in and adjacent to the Mount Rainier National Historic Landmark District (NHL), which is listed in the National Register of Historic Places under Criterion A for its association with the American Park movement and Criterion C for landscape architecture, master planning, and transportation. Under the selected alternative, additional equipment will be mounted on the historic Gobblers Knob fire lookout, which is a contributing structure to the NHL. Installation of monitoring stations at the Tahoma Vista Overlook and Mount Wow locations will also add nonhistorical elements to these areas in the NHL.

The installation of nonhistorical elements at the Gobblers Knob fire lookout, such as adding solar panels to the roofs and shutters and adding new antenna masts on historic structures, will affect the integrity of design and materials that comprise the structure, which will affect the visual setting and feeling of the structure. Installation of the monitoring stations at Tahoma Vista Overlook and Mount Wow will introduce new visual and nonhistorical elements affecting the setting of the NHL. The visual effect of installing the stations will be mitigated by placing the equipment in an unobtrusive location with additional screening measures. Because the selected alternative will adversely affect historic properties, a Memorandum of Agreement (MOA) has been executed among the NPS, the USGS and the Washington State Historic Preservation Office (SHPO) to fulfill the regulatory requirements of the National Historic Preservation Act. The MOA includes stipulations that must be completed to mitigate the adverse effects on contributing elements of the Mount Rainier NHL.

Although the selected alternative will introduce nonhistorical elements that adversely affect contributing elements to the NHL, these impacts will be mitigated through the implementation of measures identified in the MOA, which include reducing the equipment in the NHL to the greatest extent possible. This includes selecting an alternative that avoids new installations on three of the four historic fire lookout towers and coordination with park staff to ensure that the equipment is the smallest possible to meet lahar detection needs and is placed in a manner that minimizes visible intrusion to the greatest extent practicable. Stipulations also include development and sharing of information to help inform the public about the historic fire lookout towers and the development of a historic structures report to inform future maintenance and use of these structures.

These measures will help ensure that the integrity of the Mount Rainier NHL is not adversely affected to the extent that it will diminish the eligibility of the individual structures or the NHL as a whole for listing in the National Register of Historic Places and will not result in impairment to the park resources and values that comprise the Mount Rainier NHL.

Wilderness Character

Under the selected alternative, six of the nine proposed lahar detection stations will be constructed in the Mount Rainier Wilderness. The natural quality of the Mount Rainier Wilderness will be affected by small-scale, localized, and temporary impacts on the natural environment. The selected alternative will alter less than 0.1 acre of vegetation in the 228,400-acre wilderness. Due to the small-scale and widely separated nature of the proposed sites, and the implementation of mitigation measures to reduce impacts, the selected alternative will have only minimal adverse effects on plants, animals, air, water, and ecological processes.

Use of mechanized equipment such as power tools and use of helicopters for material delivery will introduce unnatural sounds during installation and maintenance work. Impacts on the undeveloped quality during construction will generally be low, occurring only during construction over a brief period. Use of a helicopter to transport material will result in a temporary increase in noise that will affect the undeveloped quality of wilderness for about 1 to 2 hours per day over a period of about two days at each site. The total helicopter flight time in the park will increase by about 17 to 34 percent during the late summer/early fall of the 2-year installation period and will increase about 2 to 3 percent compared to the existing number of flights over the 30-year maintenance period.

Under the selected alternative, the number of standalone seismic installations in wilderness will increase from five to nine. The other installations will be collocated with existing developments and installations. Impacts will be minimized because the standalone lahar detection stations will be situated so they will be hard to see from established trails; however, visitors traveling off-trail could come across these facilities or may see them from a distance.

Installation and maintenance of the structures will have a small adverse effect on solitude or primitive and unconfined recreation during installation. Helicopter trips to install monitoring stations will affect solitude when aircraft are flying over or landing in wilderness. After installation, the structures will have small effects on solitude or primitive and unconfined recreation.

The collection of seismic data in the Mount Rainier Wilderness satisfies one of the public purposes of wilderness, “scientific use,” as defined in Section 4b of the Wilderness Act. Data collected using the detection sites will further scientific and educational wilderness values and public purposes and therefore contributes to wilderness character, even with the impacts on the undeveloped quality of wilderness.

Overall, when considering the analysis of impacts and mitigation measures included in the 2021 EA and FONSI, and the Wilderness Minimum Requirements Analysis (MRA), the impacts on wilderness character from the selected alternative will not result in an impairment due to the short-term and temporary nature of impacts associated with the use of helicopters and motorized tools to complete installation and maintenance of the lahar detection equipment and the very small footprint of the monitoring equipment installations in the context of the Mount Rainier Wilderness as a whole.

Although the selected alternative includes the installation of lahar detection equipment, these installations are the minimum necessary as documented in the MRA and are comparable to other permanent improvements that support the scientific, educational, scenic, and historical values in the wilderness. This includes, but is not limited to, the wilderness trail system and the built environment that comprises the Mount Rainier NHL in the Mount Rainier Wilderness.

Following implementation of the selected alternative, the Mount Rainier Wilderness will continue to be a place where, as described in Section 2(c) of the Wilderness Act, “in contrast with those areas where man and his works dominate the landscape, is...recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain.” The Mount Rainier Wilderness will retain “its primeval character and influence,” which is “managed so as to preserve its natural conditions and which generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; which has outstanding opportunities for solitude or a primitive and unconfined type of recreation; is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and [may] also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.”

Summary

The NPS has determined that implementation of the selected alternative will not constitute an impairment of the resources or values of the park. This conclusion is based on a thorough analysis of the environmental impacts described in the 2021 EA and appendices, relevant scientific studies and resource reports, and the professional judgment of the decision maker guided by the direction in *NPS Management Policies 2006*. The selected alternative will not result in major adverse impacts on a resource or value, the conservation of which is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park’s general management plan or other relevant NPS planning documents.

Attachment A: Errata

Mount Rainier National Park Lahar Detection System Environmental Assessment

Attachment B: Final Minimum Requirement Analysis

Mount Rainier National Park

Lahar Detection System Environmental Assessment

**Attachment C:
Memorandum of Agreement**

Mount Rainier National Park

Lahar Detection System Environmental Assessment

Attachment D: Mitigation Measures to Minimize Environmental Harm

Mount Rainier National Park

Lahar Detection System Environmental Assessment

The following practices will be implemented under the selected alternative.

Geology and Soils

- U.S. Geological Survey (USGS) staff will travel on existing maintained and way trails when possible.
- USGS staff will travel cross-country over nonwoody plants using minimum impact/diffuse travel techniques and will walk on rock to the degree possible to avoid creating a new trail or widening impact areas in places where trails do not already exist or where they have been decommissioned (restored).
- Sites have been designed to be the minimum necessary size to enable installation of a functioning station.
- Helicopter landings will be the minimum number needed to safely insert personnel and equipment (as determined appropriate per site location).
- Helicopters will land on bare rock or snow wherever possible.
- Burying of seismometers will include naturalization of the surface to minimize the appearance of disturbance and potential added soil erosion.
- If trenching will occur on a slope, installation will include erosion control measures (e.g., soil bars, down woody debris, etc.) in consultation with the park geologist and/or vegetation specialist on site in order to reduce potential for soil loss and to support passive revegetation.
- Seismic stations will be located on barren areas where possible.
- Walking on the site and temporary storage of supplies will be on rock or barren ground rather than on plants or soil.
- Excavated rock and soil will be scattered to blend with the site.

Vegetation

- Site selection will avoid areas of intact vegetation with continuous cover.

- Where intact vegetation must be disturbed by digging, it will be carefully dug up and immediately replanted in a nearby barren area of similar habitat and thoroughly watered or replaced as the excavated area was filled in and thoroughly watered (if transplanting, the vegetation will cause no additional impacts on vegetation and soil).
- Equipment used for digging will be cleaned prior to entry into the Mount Rainier National Park (park) and before being used at other sites in the park to avoid the potential introduction of nonnative plants or pathogens or the transfer of soil organisms between sites. Example cleaning protocols include the Clean Equipment Protocol developed by Ontario Ministry of Natural Resources and Forestry (2016) and the U.S. Forest Service's Vehicle Cleaning guidelines (U.S. Forest Service 2005).
- Staff will clean all personal equipment and personal gear (e.g., boots, pack, and pant cuffs) following a park-approved protocol before entering the park and before moving between sites.
- Access trails to sites that are near areas of heavy existing seasonal visitor use will be camouflaged to discourage visitors from approaching the sites.
- If access to the sites requires travel through a recently revegetated area, then trampling of plants that have been planted will be avoided. Instead, access will avoid formerly existing user-defined (social) trails and will instead be cross-country over nonwoody, un-revegetated areas using minimum impact/diffuse travel techniques.
- On sites where surface rocks will be disturbed, rocks will be replaced in their original orientation after installation to retain lichen and nonvascular plant habitat with the least amount of disturbance.
- When working in a vegetated area, park vegetation specialists will be advised as sites are delineated to provide input on salvage and recovery from plant disturbance.
- Trenching will avoid the critical root zones of trees, as possible. Critical root zones can be estimated as 1 foot for every 1 inch of tree basal diameter (approximately 10 centimeters (cm) for every 1 cm of tree diameter). When avoiding critical root zones is not possible, impacting less than 25 percent of the critical root circumference will minimize impacts.
- No trenching will occur in the critical root zones of whitebark pine. This is defined as 1.5 feet for every 1 inch of tree diameter.
- Vegetation staff will be provided with a detailed map of the extent of site ground disturbances to follow up on treatments for any potential weed introductions in those areas.

Wildlife

- To the extent possible, installation and maintenance activities will be timed to avoid sensitive periods, such as nesting seasons.

- Aircraft will attempt to avoid disturbance to wildlife. If animals are observed within 500 feet of a station (this is the usual distance for elk surveys), the team will evaluate postponement of the site visit and measures to ensure the safety of staff and wildlife.
- To avoid the potential for disturbance, USGS staff will generally hike in for repairs to the lahar monitoring sites, except for rare occasions when emergency repairs may be necessary.
- In addition to meeting all Federal Aviation Administration and National Park Service (NPS) helicopter policy and aircraft requirements, mitigation common to all alternatives for both fixed-wing and helicopter flight paths will include maintaining a 2,000-foot vertical or horizontal clearance whenever feasible and no hovering, circling, harassing, or pursuing wildlife in any way.
- If an active wolf den or rendezvous site becomes established, no ground-disturbing work or helicopter landings will occur within 0.25 mile, as needed, until wolves are no longer using the area.

Special Status Species

- Helicopter transport of equipment, materials, and personnel to the sites will occur after Labor Day, at the end of the nesting season for both marbled murrelets and northern spotted owls and after most juveniles have fledged.
- For sites below 3,800 feet in elevation (Mount Wow and Tahoma Vista Overlook) and for helicopter flights from the Kautz Helipad, project activities will begin 2 hours after official sunrise and cease 2 hours before official sunset to avoid potential disruption to marbled murrelets during peak activity periods for feeding and incubation exchanges. This restriction will apply to the marbled murrelet nesting period from April 1 through September 23.
- Helicopter flights will avoid the Carbon, Puyallup, and Mowich River valleys by flying at 2,000 feet and will begin flying after Labor Day to avoid impacts on both visitors and reduce the potential for impacts on nesting marbled murrelets and northern spotted owls.
- Sites below 4,800 feet in elevation (Mount Wow, Tahoma Bridge, and Tahoma Vista Overlook/Tahoma Vista Ridge) will be installed after September 23 to minimize impacts on nesting spotted owls and marbled murrelets.
- Helicopter flights will occur a minimum of 2,000 feet above ground level except during takeoff, approach, and landing in accordance with park recommendations for avoiding impacts.
- After sites are installed, routine and other maintenance will occur either by foot or, in the event of equipment malfunction at a site, by helicopter, with helicopter-based maintenance occurring only after Labor Day.
- Construction personnel will be informed of the occurrence and status of special status species (including federally listed species) and will be advised of the potential impacts on the species and potential penalties for taking or harming a special status species.

- Feeding or approaching wildlife will be prohibited.
- To the extent possible, current year spotted owl surveys will be performed and preliminary results completed in early June of that year. Active owl territories will be based on the most recent information available and may change during a season as new information is gained. If surveys reveal activity centers have shifted, then construction limitations will be adjusted accordingly.

Archeological Resources

- Archeological monitoring will occur during installation of equipment where prior archeological investigations indicate this need (i.e., Copper Mountain, Ararat South, Tahoma Vista, and Emerald Ridge).
- Should unknown archeological resources be uncovered during construction, work will be halted in the discovery area, the park archeologist contacted, the site secured, and the park will be consulted according to 36 Code of Federal Regulations 800.11 and, as appropriate, provisions of the Native American Graves Protection and Repatriation Act of 1990. In compliance with this act, the NPS will also notify and consult concerned tribal representatives for the proper treatment of human remains, funerary objects, and sacred objects should these be discovered during the course of the project.

Historic Structures / Cultural Landscapes

- Equipment will be placed to minimize visibility in or into the Mount Rainier National Historic Landmark District (NHLHD) to the extent practicable.
- Where possible, the antenna on the seismic stations will be installed in such a way as to not protrude beyond the silhouette/horizon of the ridge.
- Antennas and equipment boxes will be painted with appropriate colors to blend in with each environment in consultation with the park historical landscape architect.
- The equipment boxes will be painted a neutral color (as selected by the park historical landscape architect) to blend into most landscapes including a variety of steep, rocky, and alpine settings.
- Because the project may affect historic structures that contribute to the NHLHD, the NPS must consider the effects of the undertaking on historic properties and afford the State Historic Preservation Office (SHPO) an opportunity to comment on the potential effects of the project on the NHLHD and contributing structures. If consultation results in a determination of adverse effect, the NPS, in consultation with the SHPO and other consulting parties, will work to minimize or mitigate the effects of the undertaking on historic properties.

Visitor Use and Experience

- Helicopter installation flights will occur after Labor Day and will be a minimum of 2,000 feet above ground level in accordance with park recommendations for avoiding impacts.

- An approved Helicopter Use Plan and Aviation Safety Plan will be completed by the USGS at least 2 weeks prior to any helicopter flights.
- As appropriate, flight path suggestions or requirements will be made by the park to minimize impacts on wildlife and visitors.
- Monitoring stations will be located or concealed away from primary visitor use areas to the extent possible.
- USGS-contracted flights will be under USGS helibase management but will be supported by NPS communications center operations and staffing (crews) as appropriate.
- Signs will be posted on the station equipment explaining its purpose and listing a person to contact if visitors to the site have any questions.
- As appropriate, areas exposed on the surface will be covered with rocks gathered from the vicinity of the station, or with excavated rocks.
- A USGS flight manager will be on-site during all flight operations, and all personnel involved in helicopter operations will be fully trained to USGS and Department of the Interior (DOI) standards. The helicopter and pilot will be DOI Office of Aviation Services certified for working in mountainous terrain, snow landings, working with external loads, and other aspects specific to working at Mount Rainier.
- See also measures listed under *Wilderness* below.

Wilderness

- The USGS will submit an Aviation Safety Plan and Operations Plan to the park for approval as part of this project, specifying the number of landings and hours of flight time over wilderness.
- Guidelines set forth by the Aviation Safety Plan and Operations Plan will be followed.
- Flights will only be authorized consistent with an approved wilderness Minimum Requirements Analysis (MRA) and decision.
- Access to sites will be by foot unless specific hazards exist that prevent safe access (e.g., considerable or higher avalanche danger or exposure to steep icy slopes or crevasses). Physical fitness will not be a primary consideration for authorizing crew transport by aircraft.
- In planning flight paths, all feasible measures will be undertaken to avoid and minimize impacts on wilderness visitors, including no flights on weekends and restricting planned flights to fall after Labor Day. However, the USGS estimates up to two helicopter flights may be needed annually for emergency maintenance, based on their experience with other installations.
- Observation flights (i.e., site orientation; project showcasing) not directly in support of installation or maintenance are not authorized by the Environmental Assessment (EA) and must be authorized through a separate MRA.

- A park liaison role will be used to ensure coordination between the USGS and NPS.
- Researchers will use the principles of Leave No Trace impact minimization techniques in installing the sites.
- No rock shelters or other evidence of camping at the monitoring stations will be added or used.
- Travel and camping will be on snow-hardened or nonvegetated surfaces to the extent possible.
- Annual reviews of helicopter operations will be conducted jointly by the NPS and USGS.

References

- Ontario Ministry of Natural Resources and Forestry. 2016. Clean Equipment Protocol. Inspecting and cleaning equipment for the purposes of invasive species prevention. Best Management Practices in Ontario. http://www.ontarioinvasiveplants.ca.php56-30.ord1-1.websitetestlink.com/wp-content/uploads/2016/07/2016-Clean-Equipment-Protocol_Feb-17-2016.compressed.pdf. Last accessed December 16, 2020.
- U.S. Forest Service. 2005. Vehicle Cleaning Technology for Controlling the Spread of Noxious Weeds and Invasive Species. United States Department of Agriculture Forest Service Technology & Development Program. <https://www.fs.fed.us/eng/pubs/pdf/05511203.pdf>. Last accessed December 16, 2020. October.

Attachment E:
U.S. Fish and Wildlife Service Letter of Concurrence

Mount Rainier National Park

Lahar Detection System Environmental Assessment

Attachment F: Comments and Responses

Mount Rainier National Park

Lahar Detection System Environmental Assessment