Winter 2012

Hurricane Ridge downhill ski area improvement plan proposal: environmental impact assessment

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**Recommended Citation**  
Bellamy, Rachel; Campen, Ben; Chappelle, Patrick; Cheyette, Donald; Sewell, Tristan; and Smith, Sarah, "Hurricane Ridge downhill ski area improvement plan proposal: environmental impact assessment" (2012). *Huxley College Graduate and Undergraduate Publications*. 18.  
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Hurricane Ridge Downhill Ski Area Improvement Plan Proposal
Environmental Impact Assessment

Western Washington University
Huxley College of the Environment
Environmental Science 436
Winter, 2012
Dear Concerned Citizens,

Enclosed you will find the Environmental Impact Assessment (EIA) complied in accordance with the National Environmental Policy Act (NEPA, 42 U.S.C. §§ 4321-4347), which examines the implications of the Hurricane Ridge Winter Sports Club proposal for a downhill ski area improvement plan.

Under the supervision of Professor Leo Bodensteiner, this EIA was created for academic purposes by Western Washington University students who are completing the Huxley capstone course, Environmental Science 436 Environmental Impact Assessment.

This document analyzes the environmental effects of proposed modifications and improvements to the equipment and infrastructure of the Hurricane Ridge Downhill Ski Area located in the Olympic Mountains of Olympic National Park in Washington State. Additionally, the EIA assesses the impacts of an alternative proposal devised by the project team, as well as a no action alternative.

Our team recommends the implementation of a proposed alternative, which will mitigate many of the negative environmental impacts of the original proposal.

This EIA adequately summarizes the impacts of the project on the built and natural environment. We hope this EIA offers valuable insight into the environmental issues raised by the proposal.

Sincerely,

Rachel Bellamy
Ben Campen
Patrick Chappelle
Donald Cheyette
Tristan Sewell
Sarah Smith
Western Washington University
Huxley College of the Environment

Hurricane Ridge Downhill Ski Area Improvement Plan Proposal

Environmental Impact Assessment

Environmental Science 436
Professor Leo Bodensteiner

Rachel Bellamy
Ben Campen
Patrick Chappelle
Donald Cheyette
Tristan Sewell
Sarah Smith

This document represents a class project carried out by students of Western Washington University, Huxley College of the Environment. It has not been undertaken at the request of any people representing local governments or private individuals, nor does it necessarily represent the opinion or position of individuals from government or the private sector.
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<td>Sarah Smith</td>
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Fact Sheet

Title:
Hurricane Ridge Downhill Ski Area Improvement Plan Proposal

Description of Project:
This Environmental Impact Assessment (EIA) aims to evaluate the potential impacts of updating the infrastructure of Hurricane Ridge Ski and Snowboard Area in Olympic National Park. The Hurricane Ridge Winter Sports Club (HRWSC) plans to replace the current lifts that have been in service more than 50 years and are on the end of their service lives. In this document, the proposed action and an alternative action are investigated for potential impacts on the National Park land and surrounding communities; the future prospects of removing the Ski Area's lifts are likewise considered. Both action alternatives replace the current POMA lift and rope tows with a Magic Carpet lift, a new rope tow, and a similar surface lift, all powered by electricity produced by a central diesel generator, rather than the current system of gasoline powered, mechanically driven lifts. No action would involve removing the lift systems once they have depreciated beyond repair.

Legal Description of Location:
Hurricane Ridge Ski and Snowboard Area is located in the Olympic National Park, 17 miles south of the city Port Angeles on the Washington state Olympic Peninsula. Hurricane Ridge Ski and Snowboard Area is located at latitude N47° 58' 27.7134" and longitude W123° 31' 3.378".

Proposer:
Hurricane Ridge Winter Sports Club
Port Angeles, Washington 98362

Lead Agency:
National Park Service: Olympic National Park
Port Angeles, Washington 98362

Permits:
Below is a list of possible permits:

Air Quality Notice of Construction (NOC) Permit – Olympic Region Clean Air Agency

401 Water Quality Certification – Department of Ecology

Underground Storage Tank Facility Compliance Tag/Permit - Department of Ecology
Building Permit - Clallam County Land Use and Development Department
Discharge of Dredge of Fill Material Into Water (Section 404 Permit) - US Army Corps of Engineers

Hydraulic Project Approval - Department of Fish and Wildlife

National Park Service
• Special Use Permit
• Oil and Gas Operations Permit
• Commercial Use Permit
• Director’s Order
• Growth Management Plan

Author Contributions:
Rachel Bellamy – Water, Aesthetics, Fact Sheet, Presentation location logistics

Ben Campen – Fish, Wildlife, Vegetation, Permits

Patrick Chappelle – Health, Safety, Transportation, Project Objectives

Donald Cheyette – Earth, Public Services, Utilities, Land Use, Decision Matrix

Tristan Sewell – Noise, Culture and History, Socioeconomic, Recreation, Executive Summary

Sarah Smith – Air Quality, Cover Page, Concerned Citizens Letter, Title Page, Table of Contents, Editor

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Acknowledgements:
We would like to thank the following people for their contributions and guidance:

Harry Edward Grant – Environmental Natural Resources Attorney
Gary Holmquist – National Park Liaison for Hurricane Ridge Winter Sports Club
Dr. Leo Bodensteiner - Professor, Western Washington University
Frank Crippen – North by Northwest Surf Company, Owner
Olympic National Park Info Center Front Desk
Pat Crain – Fish and Hydrology; Olympic National Park
Steve Acker – Plants; Olympic National Park
Patti Happe – Wildlife; Olympic National Park
Janis Burger – Hurricane Interpretive Ranger, Olympic National Park
Chris Gerston – Backcountry Essentials

Issue Date:
March 5, 2012

Public Presentation Date and Time:
Monday March 5, 2012, 7:30 pm
Backcountry Essentials
214 West Holly Street
Bellingham, WA 98225
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1.0 Executive Summary

1.1 Purpose
This Environmental Impact Assessment (EIA) aims to evaluate the potential impacts of updating the infrastructure of Hurricane Ridge Ski and Snowboard Area in Olympic National Park. The Hurricane Ridge Winter Sports Club (HRWSC) means to replace the current lifts, which have been in service more than 50 years, and are on the end of their service lives. In this document, the proposed action and an alternative are investigated for potential impacts on the National Park land and surrounding communities; the future prospects of removing the Ski Area’s lifts are likewise considered. Both action alternatives replace the current POMA lift and rope tows with a Magic Carpet lift, a new rope tow, and a similar surface lift, all powered by electricity produced by a central diesel generator, rather than the current system of gasoline powered, mechanically driven lifts. No action would involve removing the lift systems once they have deprecated beyond repair.

1.2 Site
Hurricane Ridge Ski and Snowboard Area is the westernmost lift-operated ski area in the Lower 48, one of 3 located within National Park lands, and the only one on the Olympic Peninsula. Seventeen miles up Heart O’ the Hills Road from Port Angeles, Hurricane Ridge provides downhill and cross-country skiing, snowboarding, and snowshoeing opportunities to residents of the Olympic and Kitsap Peninsulas. With two rope tows and one surface lift, the Ski and Snowboard Area aims to serve some 5,500 people each winter, depending on weather conditions. The POMA surface lift is dependent on snow accumulation to open, often pushing back its first day of operation to the end of January. The rope tows tend to begin operation a couple weeks prior to the POMA lift opening. Cross-country skiers and snowshoers typically see their season start in December. The Winter Sports Club provides lessons and hosts some events each season, which tend to last until April. Hurricane Ridge has a base elevation of approximately 4,800 feet, with a peak of 5,500. The Ski Area installation predated the National Environmental Protection Act, so no Environmental Impact Statement was required at the time it was built.

1.3 Problem
Hurricane Ridge Ski and Snowboard Area is no longer eligible for or capable of repairs—the manufacturer will not issue parts for liability reasons related to the age of the equipment. In order to preserve skiing in the Olympics for the future, Hurricane Ridge Winter Sports Club wants to replace the lifts with modern equipment.
1.3.1 Proposed Action
The proposed action is to replace the POMA lift with a modern surface lift, the beginner rope tow with a Magic Carpet surface lift, and a new rope tow on the intermediate rope tow. All three lifts will be powered by electricity produced by a central diesel power generator rather than the current three independent gasoline motors mechanically driving the lifts. The new surface lift in the POMA bowl would include filling gullies to allow for an earlier opening of the POMA lift, therefore increasing the length of the viable ski season.

1.3.2 Alternative Action
The alternative course of action proposed is identical to the initial proposal, except for filling the gullies in the POMA bowl. The alternative proposal is to build a bridge-type structure above the gullies, which would allow the lift to open earlier but also permit melt water runoff to drain into the gullies and down into the Elwha watershed. The alternative action aims to mimic the benefit of bumping up opening day for the HRSSA by effectively leveling the gullies under snowfall, but in a way sensitive to hydrology present in the landscape. All other upgrades to the lifts remain the same as the initial proposal.

1.3.3 No Action Alternative
No action on the HRSSA would lead to inevitable closure due to the lifts falling into disrepair within five years, as estimated by the Winter Sports Club. Once all three lifts are unusable they would be removed, and the landscape of Hurricane Ridge would restore itself to its natural condition. No lifts would operate on the Olympic Peninsula.

1.4 Recommendation
The recommended action is to follow the alternative action because it reflects the benefits of the proposed action, while minimizing the impacts that would result from gully fill. By creating a structure that would permit runoff and melt water to pass down the slope, erosion would remain in its natural state. Filling the gullies would alter the hydrology, and likely be eroded swiftly if too soft or not anchored with plant life, thus impacting the watershed of the Elwha River. Fill may also be sourced from a location that would not match the soil profile of the lift path or may be contaminated. These risks can be avoided by installing permanent structures, which would fix the path of the T-bar lift in the ski season while not interrupting natural hydrological processes.
## 2. Decision Matrix

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Table 2. Proximity to salmon habitat: Little R.

Table 3. Proximity to salmon habitat: Lillian R.

Table 4. Endemic wildlife

Figure 1. Preferred Alternative

Figure 2. Ski Area Boundary

Figure 3. Ski Area Boundary Continued

Figure 4. Proposed Ski Area Improvement (Topographical Map)

3 Glossary

Anadromous: Fish that spawn in freshwater and mature in salt water.

Backcountry: skiing or snowboarding with no lift service, utilizing specialized equipment for avalanche safety and touring.

Bunny Slope: Beginner area of a ski area.

Elwha River: A 45-mile long river located on the Olympic Peninsula that flows north to the Strait of Juan de Fuca.

Endemic: Unique to a particular geographic region.

Hurricane Ridge/Heart O’ the Hills Road: the 17-mile road from Port Angeles to Hurricane Ridge. The gate to Olympic National Park is located five miles in.

Invertebrate: animals lacking a spine.

Kitsap Sports: a sporting goods store that carries ski and snowboard equipment in Silverdale, WA.

Leachate: a solution or product obtained by water while moving through media.

Lower Elwha Klallam Tribe: the local tribe, whose reservation is located on the Elwha River. They have been located in the region more than 5,000 years.
Magic Carpet lift: a skier and snowboarder lift that utilizes a conveyor belt to move patrons up a gradual slope.

North by Northwest Surf Company: the local winter sports shop in Port Angeles, which rents and services skis and snowboards.

POMA bowl: the backside ski bowl where the POMA lift is currently located.

POMA lift: Short for Pomagalski S.A., a French company specializing in the construction of cable-driven lift systems.

Port Angeles: the largest city on Olympic Peninsula and nearest to Hurricane Ridge.

Potamodromous: Fish that undertake breeding migrations exclusively in freshwater.

Recolonization: Re-growth of an area following a disturbance

Redd viability: The ability of fish eggs nested in sediment to survive through to hatching.

Salmonid: A fish from the family Salmonidae. These include: salmon, trout, chars, freshwater whitefishes, and graylings.

Sedimentation: The settling of particles suspended in water. If abundant, these particles can fill in gaps between cobbles and gravel.

Sno-Cat: Tracked vehicle designed to move on snow; used for moving snow and grooming trails.

Stevens Pass Ski Area: a ski area on US Highway 2, about two hours by car from Seattle in winter.

Strait of Juan de Fuca: The large body of water that connects the Salish Sea to the Pacific Ocean off of Washington State.

Subalpine: Transition zone between the treeless alpine at higher elevation and the dense forested areas at lower elevation.

Summit at Snoqualmie: a ski area on I-90 Snoqualmie Pass, about an hour from Seattle in winter.

Turbidity: The cloudiness of a fluid caused by suspended solids. Turbidity is measured in Nephelometric Turbidity Units (NTU).
4 Acronyms and Abbreviations
EIA: Environmental Impact Assessment

GMP-General Management Plan

HRSSA: Hurricane Ridge Ski and Snowboard Area

HRWSC: Hurricane Ridge Winter Sports Club

NPS-National Park Service

NxNW: North by Northwest Surf Company

ONP-Olympic National Park

PPE-Personal Protective Equipment

5 Objectives

5.1 Proposed Action
The objective of the proposed action is to upgrade the current lift systems and generator infrastructure to maintain the viability of Hurricane Ridge Ski and Snowboard Area. In order to achieve this, all lifts will be replaced and powered by electricity produced by a single diesel generator. The Bunny Rope Tow will be replaced by a magic carpet lift, which will be deconstructed and removed in the summer. The Intermediate Rope Tow will be replaced with a new rope tow, which will also be removed each summer. The POMA Lift will be replaced with a new T-Bar lift system, which will be permanent.

These three lifts are currently powered by individual gas-powered engines. The new lifts will be powered by electricity generated from a central diesel generator. The generator will be located in a small, building insulated for sound reduction, which will be significantly quieter than the existing three gas-powered generators. A single diesel generator will eliminate the transportation of 55-gallon drums of gasoline, which must be trucked up the Hurricane Ridge Road and transported across snow via Sno-Cat to the three lift locations. The new central diesel generator will have a single diesel tank in a secondary location that will be filled by a diesel tanker.

In addition to the replacement of the lifts and gasoline engines, two gullies in the POMA Bowl will be permanently filled with soil. These gullies are located under the POMA Lift and currently must be filled with snow before the lift can operate safely. Filling these gullies will allow Hurricane Ridge Ski and Snowboard Area to open earlier in the season.
5.2 Alternative Action
The objective of the alternative action is to upgrade the lift systems and generator infrastructure to maintain the viability of Hurricane Ridge Ski and Snowboard Area, but without the environmental impacts of filling the gullies in the POMA Bowl. In order to mitigate those impacts, bridges will be built across the two gullies. This will eliminate the need to fill the gullies with soil as planned in the proposed action, but allow the POMA Lift to operate earlier in the season. The Bunny Rope Tow, Intermediate Rope Tow, POMA Lift, and diesel generator will be installed as explained in the proposed action.

5.3 No Action Alternative
Under the no action alternative, there will be no changes to the lifts, generators, or gullies. The existing lift system has been in place for approximately 50 years, and parts for the POMA Lift are no longer manufactured. The lifts have an estimated life of five or more years. Once the lifts are no longer operational, they will need to be deconstructed and removed from Hurricane Ridge. Once this is accomplished, Hurricane Ridge Ski and Snowboard Area will no longer operate and all infrastructure will be removed.

The Natural Environment

6 Earth
Earth is composed of geology, soil, topography, and erosion.

6.1 Geology
The geologic layers in Olympic National Park were formed in the Oligocene-Eocene era approximately 40-million years ago as marine sedimentary and basalt layers. However, the geology of ONP has not been significantly studied. The northern slopes were eroded by glacial activity during the Pleistocene cooling period. Rivers have filled valley bottoms with sand and gravel deposits.

6.1.1 Proposed Action
Impacts: There would be minimal impacts on geologic features of the area, as most components of the ski area are seasonally removed and thus not anchored to bedrock. Impacts, if any, would be in the POMA bowl where the POMA lift will be replaced and its lift towers are anchored to the ground.

Mitigation: Minimal impacts are expected during removal of existing infrastructure and subsequent construction of the new surface lift. Localized restoration of soil and vegetation may be required.
6.1.2 Alternative Action

*Impacts:* There will be the same potential impacts from the lift towers on the POMA bowl, but there may be impacts from building bridges over the gullies. Two bridges will need to be structurally anchored into the bedrock to meet building code. The bridges may span anywhere from three to 15 meters, depending on final location.

*Mitigation:* Impacts will be minimal, as geology will only be impacted if it is close to the surface.

6.1.3 No Action Alternative

*Impacts:* The No Action Plan does not involve any new construction, and will require eventual disassembly of existing structures including the POMA lift. It is not known if the POMA lift is anchored to bedrock or not, as it has been in place for more than 50 years and original data has not been found.

*Mitigation:* Mitigation is removal of existing infrastructure and restoration of soils and vegetation at tower locations.

6.2 Soils

Soils in Olympic National Park (ONP) have not been fully surveyed, but most north-facing slopes at this latitude and elevation have high concentrations of glacial till deposited at the end of the Pleistocene as continental ice sheets retreated northward (USGS, Mt. Olympus Quad).

6.2.1 Proposed Action

*Impacts:* There will be temporary disturbances during construction, specifically on the POMA bowl where the permanent lift will be installed. The two gullies are to be filled with soil from outside ONP boundaries. Oil and industrial chemicals and lubricants from construction activities may come into contact with the environment during removal of old equipment and installation of new equipment. Burying the electrical cable lines will be required for the proposed diesel-electric generator system, and will also have localized impacts on soil. Electric cable lines need to be buried a minimum of one meter below surface level. Approximate total electrical cable length to the three lifts is 850' (Hurricane Ridge Ski Area Improvement Plan, 2011).

The current state of the metal support frame of the POMA lift is unknown below ground level, but it will be removed and replaced for safety and liability reasons. The removal process of the existing infrastructure and subsequent construction activities will have limited localized impacts.

*Mitigation:* Extra care will need to be taken to isolate the machinery and its associated chemicals from the surrounding soils during construction. Soil disturbance during fill processes of the gullies will need to be mitigated with soil erosion prevention, planting,
and invasive species controls. Soil disturbance during electric cable burial will need to be mitigated to prevent erosion and soil loss. Careful soil management during burial will prevent this, and replanting of the soil surface will provide long-term soil protection. During removal special care will need to be taken to stop leachate from old metal and equipment from mobilizing into the surrounding environment. Culverts will need to be installed in the gullies or new flow patterns developed to regulate storm and melt-water runoff. Additionally, removal of existing infrastructure and restoration of the site will mitigate leachate and any further contamination.

6.2.2 Alternative Action

*Impacts:* There will be similar impacts to soil during construction of the surface lift on the POMA Bowl and potential disturbance during bridge construction. Normal construction activity and stresses will be heightened by the construction’s location which is on a 30-40° slope. During bridge construction and lift tower construction, anchors will need to be buried and anchored into the bedrock, which may impact soils due to exploratory drilling and installing anchor points.

*Mitigation:* Care will need to be taken during construction to prevent soil erosion and runoff. Bridge construction will need to account for soil erosion under the two bridges where original plant cover holding surface layers in place will not be able to grow. Total bridge length will be between 3-15 meters per bridge, and width is unknown. Bridge height will not exceed the sides of the gullies it is crossing.

6.2.3 No Action Alternative

*Impacts:* Minimal impacts will result from removal of permanent infrastructure equipment, mainly from the POMA lift.

*Mitigation:* Extra care will need to be taken during removal to protect the soil surrounding old equipment. HRSSA’s use of ONP land will require complete removal of any infrastructure.

6.3 Topography

HRSSA is located on the southeast ridge of Hurricane Hill, and the topography of the area is the main attribute as a ski area. The Bunny Slope has an average slope angle of 10° or less. The intermediate slope serviced by a rope tow has a slope angle averaging 25-30°. The POMA bowl, where more advanced terrain is located, has an average slope angle of 40°. The parking lot and ski area are located at the top of the hill, but the bottom of the POMA bowl is lower in elevation than the parking lot.
6.3.1 Proposed Action

**Impacts:** There will be no impacts to topography from either the surface lift on the bunny hill or the intermediate rope tow. Replacing the POMA lift will require construction activities in an area with no service roads, at the bottom of a steep bowl. Additionally, filling in the gullies will affect the topography of the POMA bowl.

*Mitigation:* No mitigation will be required for the front side of Hurricane Ridge Ski and Snowboard Area. Construction activities will require mitigation, especially if a road is needed to access the POMA bowl to aid construction. The proposed action calls for filling in the gullies with soil to enable opening the POMA bowl earlier in the season. Current conditions require filling the two gullies with snow, which means HRSSA has variable opening dates and a potential loss of revenue. Filling in gullies will require mitigation of stormwater and snow-melt runoff. Decommissioning the construction road and restoring local vegetation will be required as well.

6.3.2 Alternative Action

**Impacts:** There will be the same impacts as the proposed action, except the gullies will not be filled. Bridge construction will have little to no impact on topography.

*Mitigation:* There will be no mitigation required.

6.3.3 No Action Alternative

**Impacts:** Removal of lift equipment will have no impact on topography. However, excavating equipment may be required for removal. A road may be required for removal of existing infrastructure.

*Mitigation:* There will be no mitigation required. Road construction may alter the natural topography. Mitigation may entail re-shaping or recreating portions of HRSSA.

6.4 Erosion

Erosion in HRSSA is mostly due to spring and summer storm and snow-melt runoff on steep slopes. Wind and human erosion effects are minimal. The ski area maintains runs by culling tree growth on ski slopes. There is shrub and grass growth when the ground is not covered that persists through the winter, the roots of which provide slope-stabilizing effects. Storm and snowmelt runoff, especially in spring, can erode steeper slopes.

6.4.1 Proposed Action

**Impacts:** There would be no impact caused by the replacement Intermediate tow or the magic carpet bunny hill lift, as both are seasonally installed and removed. The POMA lift replacement crosses two deep gullies that have seasonal creeks. The proposed action would fill both gullies with sediment to allow the ski area to open earlier. Waiting for the gullies to fill with snow is the main reason the ski area does not open earlier.
Mitigation: Surface water is channeled into gullies from higher elevations, and during storm events with high runoff water the gullies are carved out further by the erosive actions of the runoff water. Filling a gully would require mitigation for water erosion and stormwater and snowmelt runoff plus culvert design to accommodate maximum flows.

6.4.2 Alternative Action
Impacts: Building bridges would prevent any changes to drainage patterns in the POMA bowl.

Mitigation: Impacts of construction may be mitigated by minimizing time bare soil is exposed or by laying ground cover that prevents erosion. Long-term impacts are limited.

6.4.3 No Action Alternative
Impacts: Removal of existing infrastructure will lead to temporarily exposed soils, which could lead to localized erosion.

Mitigation: Limited mitigation of native species will be necessary after infrastructure removal to prevent future soil erosion.

7 Air
The Hurricane Ridge Downhill Ski and Snowboard Area currently operates two rope tow lifts and one POMA lift, which are powered by three 10-horsepower gasoline motors. Engines are refueled individually and gasoline is transported in 55-gallon drums, which are delivered to each lift in the back of a volunteer’s pickup truck. Operating at 75% capacity, the current gasoline motors require 151 gallons or more of unleaded gasoline each year (Conversion table). The combustion of 151 gallons of gasoline releases approximately 2,953 pounds of carbon dioxide into the atmosphere. Other chemical by-products released into the air from the combustion of gasoline include: carbon monoxide, hydrocarbons, nitrogen oxides, ozone, and sulfur dioxide (CO2 information analysis).

In addition to emissions from the ski lift engines, the emissions from patrons’ vehicles affect air quality. With an estimated 5,500 visitors per year and no public transportation or shuttle, many visitors arrive to Hurricane Ridge in their personal vehicles. Assuming that each visitor carpools with at least one other person, during the ski season at least 2,700 vehicles travel a total of 25 miles on park land to and from the Hurricane Ridge Ski Area. With an estimate of an average of one gallon of fuel consumption per vehicle, visitor transportation releases an additional 52,920 pounds of carbon dioxide emissions each year (Cool It Campaign).
7.1.1 Proposed Action

*Impacts:* Assuming that energy requirements remain congruent with current demand, converting to a centralized diesel generator would require 120 gallons of fuel, which would reduce fuel consumption by 20.5% each year. Since diesel engines are generally 20 percent more efficient than gasoline engines, the diesel generator would emit 2,352 pounds of carbon dioxide, and reduce carbon dioxide emissions by 601 pounds each year. However, in addition to carbon dioxide, diesel exhaust contains other air pollutants including fine particulate matter, nitrogen oxides, and ozone. However, diesel engines have a longer lifespan and create far more torque than gasoline engines (Spring Board Diesel). Therefore, the increase in variety of pollutants is offset by reduction in replacement maintenance.

Grading, excavation, and soil disposal during the removal of old equipment as well as the construction of new lifts may generate large amounts of dust, which could result in windblown dust storms due to the high elevation of the site. Dust has the potential to become a significant, short-term air quality problem, attributable to potentially dangerous levels of particulate matter in the air.

Additionally, the construction and removal processes require the transportation of machinery and material to and from the site. This will require vehicles to travel long distances from source to site, where they will encounter steep slopes and navigate 25 miles of Olympic National Park roads round trip to and from Port Angeles. The transportation and use of construction machinery requires fossil fuel consumption, which would result in emissions both on and off site, including on Federally protected land.

*Mitigation:* Implementing the use of biodiesel to mitigate the carbon footprint of diesel fuel is not a viable option for Hurricane Ridge Downhill Ski and Snowboard area. Although B100, pure biodiesel can reduce carbon emissions up to 78 percent compared to diesel fuel, the high freezing point of the fuel makes it an infeasible option for the cold climate of Hurricane Ridge. Pure biodiesel begins to cloud at 35° to 60°F, which would make it an inefficient option in the freezing temperatures experienced on Hurricane Ridge (Biodiesel Handling and Use Guide).

7.1.2 Alternative Action

*Impacts:* The alternative action would not affect air quality.

*Mitigation:* No mitigation efforts are necessary.
7.1.3 No Action Alternative

*Impacts:* The removal of lift equipment at Hurricane Ridge would result in a temporary influx in greenhouse gas emissions during the deconstruction and transportation of equipment and materials to and from the site.

*Mitigation:* No mitigation efforts are necessary.

8 Water

Hurricane Ridge Ski and Snowboard Area receives anywhere between 30 and 50 feet of snow annually (National Park Service). Once the weather begins to warm up in the spring, most snow melts into water that flows into streams, and eventually the Elwha River. Although there are several watersheds in Olympic National Park, Hurricane Ridge Ski and Snowboard Area only feeds into the Elwha River basin. The water in the Elwha provides habitat for anadromous and potamodromous salmonid species along with many other species of invertebrates, plants, and animals. Eighty percent of the precipitation at Hurricane Ridge falls October through March, and five percent falls in July and August (Woodward, 1998). Therefore much of the precipitation tends to linger in the snow pack until the warmer months. Just as the melt water makes its way downhill in low-lying valleys and flow ways, the water also runs off the impervious surfaces at Hurricane Ridge. These include the Hurricane Ridge Road, parking lot, visitor center roof, and the various other small operational buildings. The water that lands on these surfaces runs off into drainage ditches along the road and makes its way to the Elwha River and subsequently the Strait of Juan de Fuca (see wetlands map).

8.1.1 Proposed Action

*Impacts:* The new surface lift and rope tow will likely not have adverse impacts on water flow or quality in comparison to the equipment that is currently operating. The Magic Carpet lift may force water to travel a different course than from the rope tow. Also, pile-ups of snow that were swept off of the Magic Carpet may take longer in the spring to melt away. Since the lifts would be switching from three gasoline-powered engines to electricity produced one diesel generator, opportunities for leaks and seepage of harmful chemicals will be reduced. However, diesel leakage from the generator house or from the refill truck may contribute to pollution in the watershed. Water pollution from visitors should remain unchanged (Grant).
Filling the gully under what is now the POMA lift will most likely cause particles of sand, gravel, cobble, and silt to end up in the streams which drain into the Elwha River. Fine sediment deposited into the river and its tributary may cause sedimentation in streambeds and increase turbidity. Turbidity affects fish health, redd viability, and habitat for macro invertebrates. The Elwha river is home to many salmonid species including the federally listed Chinook (*Oncorhynchus tshawytscha*), steelhead trout (*Oncorhynchus mykiss*), and bull trout (*Salvelinus confluentus*) (Brenkman et al.).

*Mitigation:* Using a material for gully fill that has minimal impacts on sedimentation would reduce impacts. Using native substrate and vegetation may increase the fill’s ability to stay in place.

**8.1.2 Alternative Action**

*Impacts:* The alternative action should not have any adverse changes on water flow through the ski area. Similarly, water quality will not change significantly with comparison to its current condition. With an exception for the same possible affects that the Magic Carpet may have in the proposed action. The bridges may cause some extra sediment to run downstream during construction, but once in place the structure should not have any effect on water flow or quality. Chemically treated wood or painted metal building materials could leach toxins into the soil and water near the bridges.

*Mitigation:* The use of building materials and methods of installation that have low impacts on water quality should be used in order to mitigate the installation of the bridges. Bridges made of naturally-derived or inert materials would be a better option in comparison to materials manufactured with chemical treatments.

**8.1.3 No Action Alternative**

*Impacts:* Letting the existing equipment run until it is no longer operable may have adverse effects on the watershed if the equipment starts emitting more exhaust than normal or incurs gasoline leaks. These problems could be result from aging equipment failures, which may result in catastrophic rope tow and POMA lift failures.

*Mitigation:* Once the equipment is completely removed, any potential negative effects the equipment may have will be ceased. Water drainage should return to normal and there will not be any additional pollutants into the watershed from the ski lift equipment.
9 Fish

The Hurricane Ridge Ski and Snowboard Area does not contain fish-bearing streams. There is snow-melt runoff and rain runoff in ephemeral streams, but no streams that persist year round which are necessary to support fish populations. The ski area is part of two different watersheds, Little River watershed to the north and Lillian River watershed to the south. The majority of the ski area including the POMA bowl is within the Little R. watershed, while the parking lot, bunny hill rope tow and intermediate rope tow are part of the Lillian R. watershed. The Little R. and the Lillian R. both flow into the Elwha River, historically one of the most productive rivers in the Pacific Northwest (Hurricane Ridge). The Elwha river is home to many salmonid species including the federally listed Chinook (Oncorhynchus tshawytscha), steelhead trout (Oncorhynchus mykiss), and bull trout (Salvelinus confluentus) (Brenkman et al.). When the Glines Canyon and Elwha dams were built in the early 1900’s, salmon habitat was restricted to the lowest five miles of river (Elwha Fisheries). Dam removal is projected to be completed in 2014 and re-colonization of stream habitat by anadromous salmon is expected. Distances from the Hurricane Ridge Ski and Snowboard Area to the first section of expected regained fish habitat following dam removal is shown in Tables 2 and 3.

Currently there are populations of bull trout, rainbow trout and cutthroat trout that are found above and between the two dams (“Fish Species”). The closest habitat in relation to the Hurricane Ridge Ski and Snowboard Area for any of the fish species found above the dams is 2.6 miles downstream via Little R. Most of the proposed construction would be in the Little R. watershed where the nearest fish habitat is 7.3 miles downstream.

9.1.1 Proposed Action

Impacts: Filling in the creek gullies to provide for an earlier and more consistent operation period would ultimately lead to an increase in siltation of the downhill streams. The proposed area for adding fill is in the POMA bowl and the Little R. watershed. Depending on the construction of the fill (whether culverts are used, size of fill, etc.) there is potential for some or all of the fill material to be washed downhill and into streams during heavy rain events. However, the nearest fish habitat is 7.3 miles downstream (Table 2), and therefore the amount of fill and construction methods would determine whether the impacts to the fish currently inhabiting the area and the fish projected to return would be minimal or moderate.

Mitigation: Construction methods to prevent the washout of gully fill and sedimentation of downstream creeks would reduce the impact of the proposed action plan. Appropriately-sized and shaped culverts with vegetation planted on exposed fill would reduce increased sedimentation.
9.1.2 Alternative Action

*Impacts:* Constructing bridges over the gullies instead of filling in gullies would greatly reduce any sediment added to downstream waters. This would greatly reduce any potential impact on fish downstream. Impact to fish from the alternative action plan would be minimal.

9.1.3 No Action Alternative

*Impacts:* Removal of the ski lift towers and equipment after the eventual breakdown of the lifts would have minimal to no impact on fish downstream from the project area.

10 Wildlife

Prominent examples of wildlife found in the subalpine region of the Olympic National Park include: Gray jays, Blue grouse, Olympic marmot, Black-tailed deer, Roosevelt elk, Black bears, and Snowshoe hares (ONP). The Olympic marmot (*Marmota olympus*) often seen at Hurricane Ridge during the summer months is an endemic species to the Olympic Mountains and inhabits elevations of 4000 feet and up. The Olympic marmot is not on the Federal Endangered Species list, but is a current candidate for the Washington state Endangered Species list. Another species of concern in the project area is the regionally endemic Mazama pocket gopher (*Thomomys mazama melanops*). These animals live in the subalpine and alpine meadows of the Olympic Mountains. Mazama pocket gophers are listed in Washington as “threatened” and are current candidates for Federal listing (ECOS). These creatures play an important ecological function by overturning and mixing soils in the area they inhabit as well as provide a prey source for many predators. The Mazama pocket gopher is most at risk in subpopulations at lower elevation in the lower Puget Sound due to development, rather than in the Olympics and the region around the Hurricane Ridge Ski and Snowboard Area (Stintson). Table 4 lists the endemic wildlife found within the ONP subalpine habitats.

10.1.1 Proposed Action

*Impacts:* Regardless of the method chosen for filling in the gullies, there is a potential to have considerable local effect on the wildlife. Whether the fill is delivered in loads via helicopter or by creating a path for heavy machinery from the Hurricane Ridge parking area, there will most likely be a localized negative impact to wildlife in the area. Species most at risk from this operation are the Olympic marmot and the Mazama pocket gopher
due to the destruction of habitat by the use of heavy machinery. One positive impact from the proposed action plan after completion would be the reduction in noise. With the creation of a diesel generator shed replacing the gasoline motors on each of the lifts, operation would be quieter, likely benefiting wildlife in the area.

*Mitigation:* Delivering fill and materials via helicopter rather than heavy machinery would reduce impact on wildlife. Once fill is delivered, construction by hand would reduce impacts from the use of heavy machinery.

10.1.2 Alternative Action

*Impacts:* Materials for bridge construction would still need to be imported to the project area, likely influencing wildlife in the area. Impacts to wildlife from the alternative action plan would be minimal.

*Mitigation:* To reduce damage to vegetation and subsequently the wildlife in the area, one option would be to transport the bridge building materials via helicopter. A second option would be to transport the bridge materials via Sno-Cat at the end of the ski season. Using a Sno-Cat, the Hurricane Ridge Winter Sports Club could deposit the material at the build site and wait until summer to begin construction. The bridges could then be built by hand, eliminating the need to bring in and incur the negative impacts of heavy machinery.

10.1.3 No Action Alternative

*Impacts:* Removal of the ski lift towers and equipment after the eventual breakdown of the lifts would have initial localized impacts caused by the use of extraction equipment and heavy machinery during the summer months. After removal of all equipment is completed there would be no impact on the wildlife in the area.

11 Vegetation

The Hurricane Ridge Ski and Snowboard Area is in a sub-alpine region with altitude ranging from 4860 to 5460 feet. Subalpine is the transition zone between the treeless alpine at higher elevation and the dense forest below. It is an area of sparse trees with open meadows dotted with shrubs, grasses, and wildflowers. Common trees in this area include: Alaska yellow cedar, Douglas fir, Mountain hemlock, Silver fir and Subalpine
Sitka fir. Sitka alder are found in areas disturbed by avalanche activity. Common shrubs include: Blueberry, Common juniper, Sitka mountain ash and White rhododendron. Common wildflowers of the area include: Avalanche lily, Beargrass, Broadleaf lupines, paintbrushes, Red mountain heather, Shooting stars, and violets (ONP).

Rare and sensitive plant species found in the same elevation range as the Hurricane Ridge Ski and Snowboard Area and in similar terrain are:

<table>
<thead>
<tr>
<th>Latin Name</th>
<th>Common Name(s)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Hedysarum occidentale</em></td>
<td>western sweetvetch,</td>
<td>State Sensitive</td>
</tr>
<tr>
<td></td>
<td>western hedysarum</td>
<td></td>
</tr>
<tr>
<td><em>Carex obtusata</em></td>
<td>blunt sedge, obtuse sedge</td>
<td>State Sensitive</td>
</tr>
<tr>
<td><em>Carex stylosa</em></td>
<td>long-styled sedge</td>
<td>State Sensitive</td>
</tr>
<tr>
<td><em>Draba lonchocarpa var. vestita</em></td>
<td>lance-fruited drapa</td>
<td>State review group 1</td>
</tr>
<tr>
<td><em>Erigeron alceae</em></td>
<td>Alice's fleabane</td>
<td>State Sensitive</td>
</tr>
<tr>
<td><em>Microseris borealis</em></td>
<td>northern microseris</td>
<td>State Sensitive</td>
</tr>
<tr>
<td><em>Oxytropis borealis var. viscida</em></td>
<td>sticky crazyweed</td>
<td>State Sensitive</td>
</tr>
<tr>
<td><em>Saxifraga tischii</em></td>
<td>Tisch's saxifrage</td>
<td>Endemic, State Sensitive</td>
</tr>
<tr>
<td><em>Astragalus australis var. olympicus</em></td>
<td>Cotton's milkvetch, Olympic Mountain milkvetch</td>
<td>Endemic, State Threatened, USFWS Species of Concern</td>
</tr>
</tbody>
</table>

11.1.1 Proposed Action

*Impacts:* Filling in the creek gullies to provide for an earlier and more consistent operation period would require the work of heavy machinery. The insertion and extraction of large machinery into the Hurricane Ridge Ski and Snowboard Area would result in the damage and loss of vegetation where the machinery traveled. The actual process of filling in the creek gullies would result in a loss of vegetation in the area covered with fill. The proposed action would have a significant localized impact on vegetation. The growing season in the project area is very short, typically June through September, as it is dependent on the ground being snow-free. Consequently, damage to vegetation in this area has much greater impact compared to lowland vegetation because recovery takes longer.
**Mitigation:** Minimizing the use of heavy machinery and building by hand would reduce impacts to vegetation. Efforts to reestablish damaged vegetation would aid in recovery time.

**11.1.2 Alternative Action**

*Impacts:* Placing bridges over the gullies would reduce vegetation damage caused by the removal of soil to be used as gully fill. Materials for bridge construction would still need to be imported to the project area. Impacts to vegetation if executed using either Sno-Cat or helicopter to transport materials would be minimal. However, if heavy machinery is used to bring in bridge building equipment from the parking lot there is likely to be considerable vegetation damage.

*Mitigation:* With the goal of reducing damage to vegetation, one option is to transport the materials via helicopter instead of transporting via heavy machinery. Another, alternative is to transport the material via Sno-Cat at the end of the ski season. Using the Sno-Cat, the Hurricane Ridge Winter Sports Club could deposit the material at the proposed bridge sites and wait until summer to begin construction. The bridges could then be built by hand, eliminating the need to bring in heavy machinery.

**11.1.3 No Action Alternative**

*Impacts:* Removal of the ski lift towers and equipment after the eventual breakdown of the lifts would have impacts on vegetation from the use of extraction equipment (heavy machinery) during the summer months. After removal of all equipment is completed, there would be no additional impact on the vegetation in the area.

*Mitigation:* Minimizing the travel and use of heavy machinery to remove the lifts would reduce localized impact to vegetation. Using planned routes for the machinery to travel in order to avoid sensitive species would reduce negative impacts to sensitive species.
The Built Environment

12 Transportation
Highway 101 provides access to all areas in the Olympic National Park. Highway 101 runs north-south from southern California through Oregon and Washington State. In Washington State, Highway 101 follows the Pacific coast towards the northwestern area of the Olympic Peninsula until it turns east towards Port Angeles. Hurricane Ridge Ski and Snowboard Area is located 17 miles south of Port Angeles and is accessed via Hurricane Ridge Road. The number of cars permitted to access the Hurricane Ridge Ski Area is limited by the capacity of the parking lot, which can hold approximately 250 cars. Once the parking lot reaches capacity, visitors wanting to access the Hurricane Ridge Ski Area are held at a gate located on Hurricane Ridge Road 12 miles before the ski area until parking spaces are vacated.

Due to winter weather conditions during the operational season of Hurricane Ridge Ski Area, Hurricane Ridge Road must be plowed and sanded frequently. Visitors are required to carry tire chains during the winter. The use of snowplows and tire chains may result in a higher rate of wear on the road. The use of sand to improve vehicle traction increases road dust emissions. Runoff of sand in snowmelt may affect nearby streams and rivers.

Hurricane Ridge Road is vulnerable to several hazards that may result in closure and damage. This road is often closed during winter storm conditions, especially heavy snowfall. Furthermore, this area is prone to landslides and avalanches, which pose a safety threat and may result in road closure.

12.1.1 Proposed Action
Impacts: There will be minimal impact on transportation, as capacity of the Hurricane Ridge parking lot will remain unchanged. The infill of two gullies on the POMA Bowl will allow the POMA Lift to open earlier in the season, which may cause more early season traffic. While the capacity of the parking lot will regulate the amount of cars visiting Hurricane Ridge, this may not limit the number of bus shuttles from Port Angeles and neighboring areas.

Most impacts to transportation will occur during construction. Construction equipment and the new lift systems will need to be transported via the Hurricane Ridge Road, which may cause traffic delays and an increase in dust emissions.
Mitigation: To restrict the number of vehicles accessing Hurricane Ridge Ski Area, cars will continue to be counted and held at the gate located 12 miles from the ski area until parking lot space becomes available. Wetting Hurricane Ridge Road can mitigate dust resulting from the transportation of construction equipment. Traffic congestion from construction and removal activities can be mitigated by limiting construction to shoulder seasons when the number of visitors is the lowest (Table 1).

12.1.2 Alternative Action

Impacts: Impacts are similar to those of the proposed action.

Mitigation: Mitigation efforts are the same as in the proposed action.

12.1.3 No Action Alternative

Impacts: The POMA Lift will eventually need to be removed from the area via transportation down the Hurricane Ridge Road, which may cause increased congestion and dust during removal activities.

Mitigation: Mitigation efforts are the same as in the proposed action.

13 Health and Safety

Health and safety issues are mostly due to the nature of snow sports. Skiing and snowboarding may result in injury if the participant is skiing beyond their own ability, or if an accident occurs. Hurricane Ridge Ski Area is exposed to winter weather conditions, which can disorient participants and cause deep snow hazards. Avalanches are possible during times of heavy snow and can be fatal.

Additional health and safety issues surround transportation. Winter weather can affect road conditions, causing cars to lose traction. Hurricane Ridge Road is vulnerable to landslide and avalanches, which pose a threat to occupants.

13.1.1 Proposed Action

Impacts: Removal and installation of lift system infrastructure and filling in the gullies in the POMA Bowl will pose a safety threat to construction workers. Also, a longer ski season will increase traffic and number of visitors, increasing the probability of car accidents.

Mitigation: Health and safety hazards during construction activities can be mitigated with proper protocol and education among construction workers. Increased traffic accidents can be mitigated with proper upkeep (sand and snowplows) of Hurricane Ridge Road and enforcement of tire-chains on cars. An increase in operating days also increases the chance of ski and snowboard accidents, but can be mitigated with proper education of ski area visitors.
13.1.2 Alternative Action

*Impacts:* Impacts for this Alternative are similar as in the Proposed Action. Additional safety hazards may surround the construction of bridges across the gullies in the POMA Bowl.

*Mitigation:* Mitigation activities are the same as in the Proposed Action.

13.1.3 No Action Alternative

*Impacts:* Removal of lift system infrastructure will pose a safety threat to construction workers. Once lifts are removed, the Hurricane Ridge Ski Area will not pose any health or safety hazards.

*Mitigation:* Safety threats during lift removal can be mitigated with proper protocol and education among construction workers.

14 Public Services

Hurricane Ridge is accessed by a two-lane road maintained by the Washington State Department of Transportation that also provides access to the Hurricane Ridge Visitor Center and multiple trailheads and recreation areas year round.

14.1.1 Proposed Action

*Impacts:* The proposed action is to bring equipment up to date: there are no expansion plans. Increased construction traffic may affect public usage of the road, parking lot, and ski area temporarily. This may impact fire, medical, or rescue access to this portion of ONP.

*Mitigation:* Construction transportation should occur during March, April, October, or November, which are the months with the lowest average vehicle counts (Table 1). Having drivers in radio contact could allow trucks to use designated shoulders to wait, allowing first responders to access the recreation areas in a timelier manner.

14.1.2 Alternative Action

The alternative action will have the same impacts and mitigation requirements as the proposed action.

14.1.3 No Action Alternative

Eventual removal of equipment will have the same impacts and mitigation requirements as the proposed action.
15 Utilities
Utilities at Hurricane Ridge in the heart of ONP are limited to essential functions and all were originally installed concurrently with the Hurricane Ridge Visitor Center.

15.1 Electricity
Electrical power is provided to the trailer housing the ticket window and operations office by 1000-ft cable from the visitor center (Figure 4). The current configuration has one gasoline engine per lift, to be replaced with a central diesel generator running power lines to each of the three lifts.

15.1.1 Proposed Action
Impacts: ONP’s General Management Plan (GMP) calls for buried lines whenever possible to minimize aesthetic impacts (NPS Policy 9.1.5.3, 6.2.2.1). Buried cable will need to be laid between the generator house and the lift houses. The surface lift replacement in the POMA bowl may be powered from the upper end of the lift house to minimize impacts on soil.

Mitigation: Construction footprint will be minimized and construction expedited to not limit public use of the area or endanger the public during the construction period. Expedition will be accomplished by ensuring all permits and scientific studies are finalized before construction begins.

15.1.2 Alternative Action
The alternative action will have the same impacts and mitigation requirements as the proposed action.

15.1.3 No Action Alternative
Impacts: The no action alternative will not require additional infrastructure. Eventual removal of ski-area-related equipment would require that current buried electrical lines running to the ticket trailer be removed.

Mitigation: Old electrical lines may not be well insulated, and extra precautions should be taken to protect human health and the environment, such as turning power off before construction and workers using personal protective equipment (PPE).

15.2 Water
There is no running water supply to HRSSA.

15.3 Sewage
There are no changes to existing sewage lines under either the proposed or alternative plan. Implementation of the No Action Alternative will eventually require removal of existing sewage line infrastructure. Original sewage pipe will be used as long as viable to not disrupt the natural environment (NPS Policy 9.1.5.4).
15.4 Petroleum
Currently gasoline is brought to the ski area in 55-gallon drums in the back of private vehicles from Port Angeles. It is then transported to the individual generators via Sno-Cat. There is no belowground infrastructure in place.

15.4.1 Proposed Action
*Impacts*: Replacing three gasoline-powered generators with one central diesel generator will require a new building to house the generator. There will be less transportation and transfers of liquid fuel, which will decrease likelihood of spills. Diesel is a more dense fuel source that will need additional precautions when refilling generators.

*Mitigation*: Safe handling practices and spill response procedures will minimize the potential impacts on the environment.

15.4.2 Alternative Action
Impacts and mitigation for the alternative action will be the same as for the proposed action.

15.4.3 No Action Alternative
*Impacts*: Eventual removal of gasoline-powered generators will require appropriate handling to prevent contamination.

*Mitigation*: Careful removal procedures isolating machine parts, especially industrial lubricants, oils, and fuel, will adequately protect the environment.

16 Land use
Hurricane Ridge Ski and Snowboard Area is one of three ski areas on NPS land in the United States. Executive Order 13266 promotes the health and fitness of the general public. The National Park Service encourages and allows downhill skiing, hiking, cross-country skiing, and other outdoor sports. The proposed and alternative actions are both in accordance with NPS regulations (NPS Policy 8.2.2). This policy calls for use and regulation of the ONP as a hub of recreation and outdoor activities. The No Action Alternative will fall out of compliance with this policy if ski area infrastructure breaks down and is removed, causing public use to become more limited.

The National Park Service (NPS) defines a special park use as an activity that takes place on Park land that provides a benefit to an individual, group, or organization rather than the public at large that is not prohibited by law or regulation and requires written authorization from the NPS. Under the same statute, the NPS will not permit events or uses that are conducted for financial, for-profit gains that charge a separate public admission fee. HRSSA charges fees, but they are for facility use, not admission to the ski area (NPS Policy 8.6.1).
HRSSA is a historic site that has operated yearly since 1950. To maintain the long-standing tradition of winter sports in Olympic National Park the lift equipment requires replacement. By replacing existing equipment with updated, modern versions of the same style, the character of the area will remain the same. The proposed project does not propose to enlarge or expand the size of HRSSA. The scope is solely updating equipment to ensure future use and increase patron safety and satisfaction (NPS Policy 9.21.2.2). By increasing the number of days that the POMA Bowl is serviced by lift access will allow greater public use of the area.

17 Noise

Noise levels are very or extremely important to the majority of Park visitors (Moore and Polley, 2007). If the HRSSA is too loud, it will impact both visitor days and wildlife presence. Road noise is significantly less than summer, even with the daily plowing. There are fewer visitors each day, even if ONP does not plow the road seven days a week when able. Winter weekdays are subject to no more than 50 visitors; weekends see about 200 visitors (Olympic National Park Visitor Center, 2012). For contrast, summer visitations peak around 1,000 a day in July or August (Olympic National Park Visitor Center, 2012). Snow dampens sound and slows drivers, decreasing engine noise on the roadway, but also requires heavy equipment use for removal. The parking lot does represent a cap on number of users, but it is rarely full. If a shuttle in place, there is potential for more traffic up and down the road each day in good conditions, as well as more capacity for people on Hurricane Ridge at any given moment, if it loops from Port Angeles to Hurricane Ridge continuously.

17.1.1 Proposed Action

*Impacts:* It is likely the new equipment and one central diesel generator will be quieter than three independent gasoline powered motors (HRWSC, 2011). Capacity of the lifts will not be increased and the parking lot will still limit the number of visitors on Hurricane Ridge for all purposes (snowshoeing, snow play, hiking, cross-country skiing, backcountry touring, and ski area use). The shuttle does circumvent the parking lot’s capacity, but it remains to be seen how much it will be utilized with the proposed upgrades in place. Changes in impacts are unknown, as the number of skiers may increase, but the lifts will be quieter. It is difficult to understand the net effect of this trade-off will work out.

*Mitigation:* A greater decrease in noise from the generator is attainable through soundproofing its case with industrial foams. These heat-resistant substances absorb sound given off by the motor and are used in boats and generator engine cases.
17.1.2 Alternative Action

*Impacts:* The alternative is no different in sound level than the proposed action. Lifts will still run on a single diesel generator and the Hurricane Ridge Ski and Snowboard Area would be used at similar levels.

*Mitigation:* The same soundproofing approach would be utilized as in the proposed action.

17.1.3 No Action Alternative:

Removing the ski lifts after they fall into disrepair will reduce lift noise on Hurricane Ridge and the road during the winter by eliminating the motors’ sound as well as the noise associated with the skiers using the lifts. Backcountry travel and touring will continue and ONP will still be open during the winter for these pursuits. Traffic will persist, but likely be reduced in comparison to if the lifts remained. It is likely shuttle service would be reduced, if not discontinued, eliminating its continuous cycle up and down the mountain and the workaround it represents for the limited parking. Parking would likely no longer be an issue, however, as one of the major uses of Hurricane Ridge would disappear with the lifts, thus decreasing demand.

18 Culture and History

The current ski area layout and lift equipment have been in use for more than 50 years. It is the westernmost ski area in the contiguous 48 states and only ski area in the Olympic Mountains after the abandonment of Deer Park in favor of Hurricane Ridge (HRSSA). The lifts are likely only capable of providing up to five more years of service according to the Hurricane Ridge Winter Sports Club, because the original equipment manufacturer can no longer supply parts for liability reasons related to the lifts’ age.

The northern Olympic Peninsula is the ancestral home of the Klallam tribe. Today’s segment is the Lower Elwha Klallam, residing on a 991-acre reservation eight miles west of Port Angeles (Lower Elwha Klallam Tribe). The tribe consists of 974 members (Lower Elwha Klallam Tribe). Europeans first settled in Port Angeles in 1857, forcing Lower Elwha Klallam out of their ancestral home of Tse-whit-zen – just outside of Port Angeles (Valadez and Watson-Charles). This ancient site had been inhabited by the Klallam since 3,000 BC up to the 1930s (Valadez and Watson-Charles). However, much of the Klallam culture and heritage is coast oriented; “Klallam families traveled up and over the Olympic Mountains to gather medicinal plants, berries, bear grass, cattails, as well as hunt for bear, deer, and elk” (Lower Elwha Klallam Tribe). The Olympic Mountains are regarded as sacred (Lower Elwha Klallam Tribe, A). A 2,900-year-old basket found at
Obstruction Point suggests their historic presence in what is now Olympic National Park and Forest (Olympic National Park, 2011). The Klallam value the Earth and respect it because of their historic ties to the land for their subsistence (Lower Elwha Klallam Tribe).

18.1.1 Proposed Action:
*Impacts:* The proposed surface lift replacements would not change the cultural and historical significance of Hurricane Ridge and its ski area. It would remain the westernmost ski area in the lower 48, the only ski area in the Olympics and one of three within National Park land, but it would be equipped with a modern lift system (HRSSA). This update would secure its future as a landmark location for ONP and the northern portion of the Olympic Peninsula. Residents of Port Angeles, Sequim, and other Peninsula communities will be able to enjoy their unique ski area for years to come.

Runoff impacts may affect the Elwha River. Its salmon population is important to the culture and livelihood of the Lower Elwha Klallam, especially as the dam removal improves the spawning conditions of the salmon.

*Mitigation:* Should the runoff be determined to potentially adversely impact the Elwha River, it would be necessary to undertake mitigation factors, either by fortifying the fill so that it does not washout or redirecting the runoff.

18.1.2 Alternative Action
*Impacts:* The alternative proposal would have no different cultural or historic significance from the Proposed Action aside from a reduced impact on the Elwha River and its salmon. The alternative prevents these impacts by maintaining natural flow of runoff and eliminating risk of soil erosion.

18.1.3 No Action Alternative
*Impacts:* By letting the current lifts fall into disrepair and then removing them, the Olympic Peninsula would lose a unique cultural and historical icon. The Hurricane Ridge Ski and Snowboard Area would likely end. Only backcountry travel, which is already a very popular activity on Hurricane Ridge, would remain. Skiing may transform to a more skilled activity at Hurricane Ridge. New and less skilled traditional downhill skiers would have to travel a minimum of four hours to reach a groomed and lift-serviced ski area at Snoqualmie Pass or Stevens Pass.
19 Socio-economics
The ski area provides business for Olympic National Park during otherwise slow winter months, sustains itself and its employees, and draws business into Port Angeles from other communities from around the Kitsap and Olympic Peninsulas. Some businesses, such as North by Northwest Surf Company and Swain’s General Store in Port Angeles, and Kitsap Sports in Silverdale, along with local restaurants and groceries, supply the ski and snowboard economy. According to a study by Moen and Fredman (2007), “[d]ownhill skiers is also the category that has the highest level of expenditures at their destination (Fredman, in press), which makes downhill skiing an activity of large importance for many local economies.” The ski area itself employs two staff members on salary and a number of lift operators, mostly high school students from Port Angeles (Grant and Holmquist interview, 2012). All patrolling and other needed work is volunteer-based by community and Winter Sports Club members (HRSSA).

19.1.1 Proposed Action
Impacts: The proposal to update the lifts would improve the Ski and Snowboard Area’s ability to open the ski area earlier in the season, providing more operation days for more skiing. Opening a month earlier, and possibly remaining open later into the season, dependent on conditions, will bolster business all around, and the initial gain from the debut season for the updated lifts will also likely be noticeable. NxNW expects an increase of 50-60% in winter sales with a well-run ski area that would result from the proposed upgrades (Crippen, 2012).

19.1.2 Alternative Action
Impacts: The alternative proposal does not vary from the proposal in its positive economic benefits except to reduce the Ski and Snowboard Area’s potential adverse impacts on the Elwha River and the Klallam tribe’s fishing therein (see water impacts section).

19.1.3 No Action Alternative
Impacts: In personal communication, NxNW’s Crippen estimated that the removal of lift equipment would decrease his sales about 25-40% and therefore cause him to quit carrying winter sport equipment. He stated he may then close during winter months and three part-time jobs would be lost. If the ski area closes, being left for backcountry touring, those Port Angeles and Peninsula residents who would continue to use it would be left to get much of their winter sports equipment from no closer than Kitsap Sports in Silverdale – a distance of nearly 70 miles from Port Angeles – or online. It is likely a smaller group of skiers and snowboarders would continue backcountry use at Hurricane Ridge, but many beginners or intermediate skiers and snowboarders would be forced to quit or ski less frequently, making trips a significant distance. This would remove the economic benefits from the Olympic Peninsula and Port Angeles area.
20 Recreation
Skiing in the Olympics is a unique experience and realistically the best option for residents of the Olympic Peninsula, as “[t]he next closest downhill skiing areas are a minimum of 4 hours travel time from Port Angeles. Day trips to these areas are impractical” (HRWSC, 2011). The goal for level of use that the Hurricane Ridge Winter Sports Club wishes to see for Ski and Snowboard Area is a maximum of about 5,500 user days per winter - equal to the 2003-2004 level (HRWSC, 2011). The position of the POMA lift has led to a need for sufficient snow to fill gullies, which causes delay in opening. While there may be enough snow on the Ridge to support backcountry travel and touring in mid-December, the lifts did not open until late January in 2012. The typical scheduled operating days amount to about 35, but the 2007/08 and 2008/2009 seasons were both cut to only 23 (HRWSC, 2011). That is a loss of around 30% of operating days those two seasons.

Climate change presents a challenge to secure the future of the Hurricane Ridge Ski Area because of the contingency of operation upon ski conditions. Some of the predicted outcomes of climate change include increased total snowfall but fewer snowing days, meaning the early season will suffer, pushing opening day back (Moen and Fredman, 2007). Low-altitude ski areas are to face a steeper challenge (Moen and Fredman, 2007). “Snow conditions are a key variable for skiers to decide where to ski” (Moen and Fredman, 2007), and if Hurricane Ridge cannot open soon enough, often enough, or at all, business will suffer, endangering the future of lift skiing in the Olympics more each season. The ski area is already at its maximum potential altitude.

20.1.1 Proposed Action

Impacts: The proposal to replace 50-year-old lifts will not increase capacity, but rather improve reliability and HRSSA’s future. A safer, modern lift system will improve guest safety and enjoyment, vital to the continued existence of the ski area. Frank Crippen of North by Northwest Surf Company (NxNW) estimates that the replaced rope tows will allow opening day to be a month earlier (around December 1st), and that the POMA lift could open in late December or early January.

20.1.2 Alternative Action

Impacts: The alternative of building bridges rather than filling gullies will not limit the recreation opportunities of the Ski and Snowboard Area. The structure could possibly be visible, depending on location, during summer months of hiking. This is of less concern, as the main lift already remains in place outside of winter months. The major trails do not approach this section of ONP, instead climbing out toward Hurricane Hill for a view of the interior Olympics, Port Angeles, the Strait of Juan de Fuca, and Vancouver Island.
20.1.3 No Action Alternative

*Impacts:* Should the lifts fall into disrepair at Hurricane Ridge, lift-aided skiing and snowboarding will end, leaving the area only open for backcountry use, which is already popular. The POMA lift, which is a permanent installation, would no longer be present, returning the landscape to its natural appearance. Skiers from the Port Angeles area seeking out a lift-serviced ski area would need to travel about four hours to the Summit at Snoqualmie or Stevens Pass, rather than the drive up the 17-mile road that takes less than an hour.

21 Aesthetics

Every winter the two rope tows are reinstalled in the ski area. They remain there for the duration of the ski season and then are disassembled and removed from the late spring to early fall seasons for aesthetics. This way, when they are not in use, they are out of eye of the general public. The diesel generator building and the POMA lift, however, do not move and are permanent structures year round. Because the POMA lift is on the backside of the ski hill, it is not visible from the parking lot. Hidden on the backside, many people do not see it and it generally does not obstruct views of the mountains (Grant).

21.1.1 Proposed Action

*Impacts:* The surface lift that replaces the POMA lift will stay in place year round along with the generator house. The only change that will occur is the addition of the permanently filled portion of the gully.

*Mitigation:* Initially, the gully will most likely not be very visually pleasing, but once vegetation grows over the fill, the gully should appear like the rest of the sub-alpine areas nearby. Like current operations, the new rope tow and Magic Carpet will be disassembled for the off-season to enhance aesthetics.

21.1.2 Alternative Action

*Impacts:* The bridges that will be constructed will be a permanent structure.

*Mitigation:* Like the proposed action the lifts will be moved seasonally. To ensure that the bridges are not a visual impact on the landscape, it could be designed to be suited to its surroundings so that it not only looks good under snow, but also with alpine fields as a backdrop in the summer.
21.1.3 No Action Alternative

Impacts: Visual aesthetics will stay the same as current conditions until the equipment is removed.

Mitigation: Since all of the lift equipment will be removed, the land should look as it did before the ski area was designated. Any damage caused by removal should be repaired.

22 Summary of Findings

After analyzing the environmental impacts of the proposed Hurricane Ridge Redevelopment Plan, we recommend the Alternative Action. This action will adequately accomplish the desired outcomes without placing an undue burden on the environment. By choosing the Alternative Action plan, we think that all parties (ONP, HRSSA, DFW, etc.) will find the proposal acceptable as part of a sustainable and environmentally sound plan for the future of winter sports at Hurricane Ridge. By maintaining current natural drainage patterns, adverse effects on the environment will be minimized, and by building bridges instead of filling in gullies erosion events will also be minimized.

HRSSA is one of three winter recreation areas in the National Parks, and we believe it provides a unique and valuable service to the community that is irreplaceable. The No Action Alternative will end nearly a century-long tradition of organized winter sports in ONP, and this adverse effect on recreation and cultural history far outweighs minimal environmental impacts. The Proposed Action and Alternative Action provide the same service in two different ways, and the Alternative Action is more environmentally sound which is why we believe it is the right choice for the future of winter sports in Olympic National Park.

The positive, negative, and no impacts on each of the individual elements are summarized in the Decision Matrix.
23 Works Cited


24 Appendix

24.1 Tables

Table 1. Olympic National Park Visitation Statistics For Hurricane Ridge Road By Month

<table>
<thead>
<tr>
<th>Species</th>
<th>Distance via Little R. watershed (miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinook</td>
<td>7.3</td>
</tr>
<tr>
<td>Coho</td>
<td>7.3</td>
</tr>
<tr>
<td>Chum</td>
<td>7.3</td>
</tr>
<tr>
<td>Pink</td>
<td>7.3</td>
</tr>
<tr>
<td>Sockeye</td>
<td>10</td>
</tr>
<tr>
<td>Bull trout</td>
<td>7.3</td>
</tr>
<tr>
<td>Steelhead</td>
<td>7.3</td>
</tr>
</tbody>
</table>

Table 2. Distance from the Hurricane Ridge Ski Area to potential fish habitat, traced out along the Little river watershed. Potential fish habitat being where fish are expected to return following the removal of the Elwha and Glines Canyon dams (SalmonScape).
Table 3. Distance from the Hurricane Ridge Ski Area to potential fish habitat with the exception of Bull trout. Bull trout have been documented to be 2.6 miles away from the ski area, while the other species distances are speculative and dependent on the recolonization of habitat once dam removal is complete (SalmonScape).

<table>
<thead>
<tr>
<th>Species</th>
<th>Distance via Lillian River watershed (miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinook</td>
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</tr>
<tr>
<td>Coho</td>
<td>4</td>
</tr>
<tr>
<td>Chum</td>
<td>4</td>
</tr>
<tr>
<td>Pink</td>
<td>4</td>
</tr>
<tr>
<td>Sockeye</td>
<td>8.8</td>
</tr>
<tr>
<td>Bull trout</td>
<td>2.6</td>
</tr>
<tr>
<td>Steelhead</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 4. Endemic species within the Olympic National Park; found in subalpine areas and likely found at the project site (Houston).

<table>
<thead>
<tr>
<th>Latin Name</th>
<th>Common Name(s)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Marmota olympus</em></td>
<td>Olympic marmot</td>
<td>State Candidate</td>
</tr>
<tr>
<td>Thomomys mazama melanops</td>
<td>Mazama pocket gopher</td>
<td>State Threatened, Federal Candidate</td>
</tr>
<tr>
<td><em>Mustela erminea olympica</em></td>
<td>Olympic ermine</td>
<td>not listed</td>
</tr>
<tr>
<td><em>Tamias amoenus caurinus</em></td>
<td>Olympic yellow-pine chipmunk</td>
<td>not listed</td>
</tr>
<tr>
<td><em>Scapanus townsendii olympicus</em></td>
<td>Olympic snow mole</td>
<td>not listed</td>
</tr>
</tbody>
</table>
24.2 Figures

Figure 1. Map of Hurricane Ridge Ski Area Preferred Alternative
Figure 2. Hurricane Ridge Ski Area Boundary showing location of POMA lift
Figure 3. Hurricane Ridge Ski Area showing POMA lift area enlargement in relation to other lifts
Figure 4. Topographic Map of proposed improvements