BIOLOGICAL ASSESSMENT
FOR THE
WHITE PASS EXPANSION PROPOSAL

SEPTEMBER 2006

Prepared for:

USDI Fish and Wildlife Service
215 Melody Lane
Wenatchee, WA 98801

U.S. Forest Service
Okanagon - Wentachee National Forest
215 Melody Lane
Wenatchee, WA 98801

White Pass Ski Area
PO Box 3030
White Pass, WA 98937

Prepared By:

SE GROUP
3245 146th Place SE, Suite 360
Bellevue, WA 98007

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

LIST OF FIGURES

1.0 INTRODUCTION

This Biological Assessment (BA) was prepared pursuant to the Endangered Species Act of 1973, as amended, to describe and evaluate the potential affects of the White Pass Expansion Proposal on the Northern Spotted Owl (*Strix occidentalis caurina*), Canada Lynx (*Lynx canadensis*), Grizzly Bear (*Ursus arctos horribilis*), Gray Wolf (*Canis lupis*), Bald Eagle (*Haliaeetus leucocephalus*), Marbled Murrelet (*Brachyrampus marmoratus*), and Designated Critical Habitat for the Northern Spotted Owl. This BA contains a list of proposed, threatened, and endangered species or their habitats with the potential to occur in the vicinity of White Pass and describes the study methods used to determine the probability of each species occurrence, their life history, and habitat requirements.

This BA has been prepared as part of the inventory of natural resources associated with construction of the proposed White Pass Expansion; two chairlifts, associated trails, infrastructure and proposed Special Use Permit (SUP) boundary modification. The White Pass ski area is located in the Central Cascades of Washington on US 12 (see Figure 1 – Vicinity Map). The ski area is situated on the Okanagon-Wenatchee National Forest (OWNF) and Gifford Pinchot National Forest (GPNF). White Pass Ski Company operates the ski area under a Special Use Permit (SUP) on the Naches Ranger District (OWNF) and the Cowlitz Valley Ranger District (GPNF) and is administered by the OWNF. The White Pass Company is currently operating under A Master Plan Program for White Pass Washington, (Mel Borgersen & Associates, 1979) which was approved by the USDA Forest Service (USFS).

The FS Manual directs the Forest Service to conserve listed threatened and endangered species, species proposed for listing as threatened or endangered, and the ecosystems upon which they depend. Therefore, the Forest Service is to initiate consultation (or conferencing) on projects that would likely affect species proposed for federal listing, and proposed critical habitats, as if these species or habitats were listed.

The Proposed Action complies with the Forest Plans for the OWNF and GPNF, including amendments in the Record of Decision and the Standards and Guidelines of the Northwest Forest Plan (U.S. Dept. Agric. & U.S. Dept. Interior 1994).

2.0 PROJECT OVERVIEW

The White Pass Study Area lies in the Cascade Mountains of southern Washington within the Clear Fork Cowlitz and Upper Tieton watersheds. The Clear Fork Cowlitz has been designated a Tier 2 Key Watershed. Alternative 4 from the Draft Environmental Impact Statement (DEIS) has been carried forward and modified in the Final Environmental Impact Statement (FEIS) and identified as the Preferred Alternative. It is presented here as the Proposed Action (see Figure 2 – Proposed Action). Habitat types within the vicinity of the White Pass ski area include mixed conifer (Pacific Silver Fir and Mountain Hemlock), Mountain Hemlock Parkland, and shrub/herbaceous communities (see Figure 3 – Action Area and Habitat Types). Field surveys were conducted in all areas where activities may occur under any or each of the Action Alternatives described in the DEIS (USFS, 2004).

The Proposed Action, as depicted in Figure 2, includes expanding the White Pass SUP area to incorporate approximately 767 acres of Hogback Basin, two new chairlifts, 18 new trails covering approximately 85 acres, grading on existing runs, a mid-mountain day lodge, a new ticket booth, and a new parking lot.

White Pass offers a range of recreation opportunities throughout the year. However, the resort is operated primarily as an alpine skiing operation and experiences the highest use during the winter months. Cross Country skiing is also provided on 18 kilometers of trails at White Pass. Lift-served backcountry skiing also occurs in the vicinity of the White Pass SUP area.

White Pass's location between Tacoma (west on US 12), Yakima (east on US 12), Seattle (north on I-5) and Portland (south on I-5) markets, makes it an easy choice for day skiers. White Pass competes with Crystal Mountain, Snoqualmie, and Stevens Pass within the local/day skier market. Skier visits ranged from a low of 19,061 visits during the 2004-2005 season to 142,570 during the 2001-02 season (a record season at White Pass). Over the last five years, White Pass has averaged 109,782 annual visits (PNSAA, 2006a).

Implementation of the Proposed Action would increase the winter skiing opportunities at White Pass, consistent with the management goals in the Wenatchee National Forest Plan (WNF Forest Plan at IV-159) and the Gifford Pinchot National Forest Plant (GP Forest Plan at IV-101).

3.0 ACTION AREA & PROPOSED ACTION

3.1 Action Area

The Action Area encompasses approximately 5,881 acres and is comprised of the White Pass Ski Area Special Use Permit (SUP) Boundary, the proposed Hogback Basin expansion area, potential helicopter flight paths, and a 2/3-mile buffer to account for potential disturbances resulting from noise generation (see Figure 4 – Action Area). The helicopter's flight path would originate in a gravel parking lot on the north side of US 12 and follow US 12 west before heading south along a drainage known as the Grand Couloir and into Hogback Basin.

3.2 Proposed Action

The Proposed Action, under consideration in this Biological Assessment, is based on DEIS Alternative 4, the Preferred Alternative (see Figure 2). The Proposed Action has been modified from the DEIS[1] and now includes the features described in Table 1.

Table 1.
Additional Features Incorporated Into the Proposed Action since the DEIS Preferred Alternative

Resource/Item	Proposed Action modifications
Parking Lot	A 7 acre Parking Lot which incorporates approximately 946 cars and has direct access to US 12. All parking will be off-highway and the shuttle system would not be required.
Lifts and Trails	Lower lift capacity.
	Addition of the ski run (labeled 4-17) within the existing SUP area.
	Include trail re-grading to the upper section of the Holiday trail. This addition aims to allow some skiers to ride up the Lower *Paradise* chairlift and egress via the proposed 'novice' Holiday trail to the base area and parking lot.
	Include the second egress trail above Lower Paradise trail (labeled 4-18), with the aim of allowing skiers to choose to glide to the base area on a trail other than the Lower Paradise trail.
Revegetation of Tree Islands	Incorporating tree islands on the lower face nearby to the *Lower Cascade* chair lift.

As shown in Figure 2, the Proposed Action modifies White Pass's original proposal by:

- Improving skiing during the early season, warm periods during the regular season, or low snow year by providing additional skiing at higher elevations;
- Reducing the potential vehicle/pedestrian conflicts along US 12 by providing a new 7 acre parking lot which would accommodate the CCC of 3,800;

[1] The FEIS refers to the BA Proposed Action as "Modified Alternative 4." The FEIS is scheduled for release in November 2006.

- Reducing the crowding in the existing part of the ski area by allowing skiers to remain on the upper mountain for much of the skiing day without returning to the base area and thereby addressing the need for skier dispersal;

- Expanding the skiable terrain therby meeting the need for additional terrain to serve the growing White Pass ski market;

- Better matching the percent of available terrain distribution with the skier market predications by re-grading a portion of the *Holiday* trail in order for it to be classified as novice.

Under the Proposed Action, White Pass' Comfortable Carrying Capacity (CCC), also known as Skiers-At-One Time (SAOT), would increase from 2,670 to 3,800 skiers, for an increase of approximately 42 percent, or 1,130 skiers.

Lifts

Under the Proposed Action, White Pass would operate a total of seven chairlifts including the proposed *Basin* and *Hogback Express* chairlifts. The bottom terminal of the proposed *Basin* chairlift would be located approximately 1,500 feet upslope (south) from the existing Quail trail at approximately 5,520 feet elevation. While, the upper terminal would be located adjacent to the western boundary of the proposed SUP, at approximately 6,169 feet elevation, and approximately 350 feet from the Wilderness boundary. The bottom terminal of *Hogback Express* would be located approximately 3,600 feet east of the *Basin* lift at an elevation of 5,600 feet. The top terminal would be located at an elevation of 6,450 feet.

All equipment and materials would be delivered to the site via helicopter, transport over the snow, or through the use of low-impact equipment over the ground following pathways less than 50 inches wide, with a focus on minimizing the number of entries needed. No road construction would be required and as described, clearing widths for the lift alignment would not extend beyond the maximum 60-foot clearing limit. The proposed lift corridors would be fully cleared along the entire length of the chairlifts with no grading. Table 2 provides lift specification data for the proposed chairlifts.

Table 2
White Pass Lift Specifications under the Proposed Action

Lift Name	Lift Type	Top Elev. (ft.)	Bot. Elev. (ft.)	Vert. Rise (ft.)	Slope Length (ft.)	Avg. Grade (%)	Adj. Hourly Cap (PPH).
Great White Express	DC4	5,999	4,477	1,521	5,125	32%	1,785
Pigtail	C2	5,978	4,485	1,493	4,987	32%	720
Lower Cascade	C3	5,024	4,514	510	2,232	24%	1,620
Paradise	C2	5,961	5,249	712	2,804	27%	1,080
Platter	S	4,545	4,479	66	517	13%	360
Hogback Express	DC4	6,473	5,605	867	4,162	21%	1,710

Table 2
White Pass Lift Specifications under the Proposed Action

Lift Name	Lift Type	Top Elev. (ft.)	Bot. Elev. (ft.)	Vert. Rise (ft.)	Slope Length (ft.)	Avg. Grade (%)	Adj. Hourly Cap (PPH).
Basin	C3	6,169	5,552	617	3,560	18%	1,080

KEY: "S" is Surface Lift, "C2" is Fixed-Grip Double, "C3" is Fixed-Grip Triple, "DC4" is Detachable Quad. Source: SE Group

Trails

The Proposed Action includes the construction of 18 new trails associated with the White Pass ski area (see Table 3). Under the Proposed Action, the trail network would increase by approximately 85 acres, from the existing 37 named trails on approximately 212 acres, to 55 trails on approximately 298 acres.

Under the Proposed Action, the new terrain associated with the *Hogback Express* Chairlift (between the elevations of 5,605ft-6,473ft) and the *Basin* Chairlift (between the elevations of 5,552ft-6,169ft) would be constructed in the Mountain Hemlock Parkland habitat type using the Tree Island Removal prescriptions. Within the existing Ski Area, Trail 4-17 would be constructed using Full Clearing With No Grading (approximately 6.47 acres). More detailed information on clearing prescriptions can be found in Section 4.0 – Construction Techniques. Additionally, portions of the existing trails along the existing *Cascade* lift would be revegetated (approximately 5.3 acres). Approximately 1.2 acres of grading would be required on the existing Holiday trail and 3.6 acres of grading would provide for Trail 4-18 within the existing SUP area (see Figure 2). In total, the Proposed Action includes approximately 11 acres of Full Clearing With Grading, 2.9 acres of Full Clearing With No Grading, and 16.75 acres of Tree Island Removal (see Table 3).

Table 3
White Pass Trail Construction and Ground Disturbance under the Proposed Action

Trail Name	Full Clearing with Grading (acres)	Full Clearing with Grading for Utilities	Full Clearing with No Grading (acres)	Tree Island Removal (acres)	Tree Island Retention (acres)
Alt 4-1	0.02	0.52		0.28	
Alt 4-2	0.26			0.90	
Alt 4-3	0.05			0.76	0.05
Alt 4-4	0.65	0.21	2.78	1.93	0.19
Alt 4-5				0.23	0.06
Alt 4-6				0.28	0.24
Alt 4-7	0.02			0.04	0.01
Alt 4-8		1.04	0.02	0.39	0.03

Table 3
White Pass Trail Construction and Ground Disturbance under the Proposed Action

Trail Name	Full Clearing with Grading (acres)	Full Clearing with Grading for Utilities	Full Clearing with No Grading (acres)	Tree Island Removal (acres)	Tree Island Retention (acres)
Alt 4-9	0.29	0.65	0.08	0.76	
Alt 4-10		0.07		0.48	0.21
Alt 4-11	0.01	0.13		0.11	
Alt 4-12	0.56	0.51		2.05	0.85
Alt 4-13				0.65	0.15
Alt 4-14	0.02			0.75	0.21
Alt 4-15				0.06	
Alt 4-16	2.41			0.59	
Alt 4-17				6.47	
Alt 4-18	3.57				
Totals	7.85	3.12	2.88	16.75	2.00

Facilities

Buildings

Under the Proposed Action, a two story mid-mountain lodge would be constructed within the expanded SUP area and within proposed ski trail clearing. The footprint of the proposed lodge would total 2,000 square feet. The lodge would provide a limited food service, 150 seats, and restroom facilities with composting toilets during the winter ski season.

A ticket booth would be constructed on existing disturbed ground adjacent to the Yakima Ski Club building and the proposed parking lot in the northeast corner of the existing SUP area. The wooden structure would have a building footprint of 400 square feet and would include a composting toilet.

Parking Lot

A 7-acre parking lot would be constructed in the northeast corner of the SUP area between US 12, existing ski trails, and the White Pass drainfields. The lot would provide direct access to US 12, adjacent to the existing drainfield. This lot would accommodate approximately 946 cars and all parking is proposed to be off-highway compared to the existing condition which allows up to 550 cars to park on US 12.

Utilities and Infrastructure

Stream Crossing

The Proposed Action would require 12 new stream crossings, including 11 low elevation, aerial utility crossings and one temporary culvert below the bottom terminal of the *Basin* chairlift. The

culvert would be placed in the stream during construction and removed following stabilization of the construction site. Additional information on aerial crossings can be found in Section 4.0 – Construction Techniques.

Power

Power lines for the proposed lodge, ticket booth and chairlifts would be trenched within existing and proposed ski trails, with low elevation aerial crossings over streams. The existing Benton REA power lines and transformer would be upgraded with larger diameter conductors on the existing poles to accommodate the increased demand.

Communications

The two new chairlifts would be outfitted with low voltage intercom systems and a telephone line. The new mid-mountain lodge would be outfitted with several telephone lines. New communication lines would be trenched within existing and proposed ski trails, with low elevation aerial crossings over streams.

Water

The Proposed Action would include the installation of a water supply line from the existing water treatment facility to the mid-mountain lodge. In addition, analysis of this alternative in this FEIS includes evaluation of a well, located upslope of the mid-mountain lodge and within the 50-foot building envelope associated with the construction of the lodge. Evaluation of both water supply systems for the lodge site allows for selection of an alternative system in the event the pipe conveyance proves non-feasible at the time of construction.

Wastewater

Gray water from the proposed mid-mountain lodge would be disposed of using a recirculation gravel filter (RGF) system comprised of two septic tanks and a drainfield, which would provide secondary treatment for the wastewater. The drainfield for the lodge would be approximately one quarter acre in size (sufficient to treat the projected 225 gallons per day requirement) and located down slope of the lodge site, within the 50 foot building envelope for the lodge[2].

Special Use Permit Boundary

Under the Proposed Action, the SUP boundary would be modified to include 767 additional acres of land immediately west and south of the current SUP boundary for a total of approximately 1,572 acres. The boundary adjustment would incorporate the proposed expansion into Hogback Basin.

Pacific Crest National Scenic Trail Reroute

The Pacific Crest Trail National Scenic Trail (PCNST) would be re-routed to the Goat Rocks Wilderness boundary within the expansion area to avoid passing under the Basin chairlift. The trail re-route would result in the construction of approximately 2,000 feet of trail. The trail would be constructed to pack and saddle standards (24 inch tread and 6 foot clearing width). The new

[2] The use of composting toilets substantially reduces the demand for waste and wastewater treatment at the mid-mountain lodge.

trail construction would require approximately 0.12 acre of ground disturbance and 0.36 acre of disturbance to vegetation. The re-routed trail would be sited along the ridge to maintain the continuity of the PCNST experience and to minimize views of the ski area structures and facilities. The ends of the original, portion of the trail would be disguised and the remaining trail would be allowed to naturally re-vegetate.

Forest Plan Amendment

Under the Proposed Action, a non-significant amendment (as defined under the National Forest Management Act 1976) would be undertaken to the 1990 GPNF Land and Resource Management Plan.

The non-significant amendment would modify the standards and guidelines to allow for downhill ski runs/trails and other ski area infrastructure to cross riparian influence areas within the existing SUP area and the proposed expansion area. (Riparian influence areas include those areas within 25 feet on either side of a stream or waterway, and are included within Riparian Reserves).

Ski trails, including some that would require tree removal, would cross or be located in riparian and/or riparian influence areas. The proposed amendment would be fully consistent with the standards and guidelines for Riparian Reserves.

4.0 CONSTRUCTION TECHNIQUES

The majority of direct effects to resources would be related to treatments (clearing) for the development of the lift and associated ski trails. Assumptions on the amount of clearing that would occur for specific activities proposed in the Proposed Action are shown in Table 4 (for analysis purposes, clearing widths should be considered "maximum width" and includes forest edge scalloping and feathering treatments; actual clearing would not exceed the stated limit and may be less).

Table 4
Clearing Assumptions

Ski Area Component	Clearing Requirement[1]
Ski Lift	
Alignment Clearing	60-foot corridor
Terminal Ground Disturbance	0.50 acre
Tower Ground Disturbance	100 square feet
Buildings	
Building Footprint	50 foot buffer from the building on all sides
Utility Lines[2]	
Power	15-foot corridor
Communications	15-foot corridor
Water	15-foot corridor

1 "Worst case" estimate of clearing, grading, machinery operation, storage of spoils, etc

2 Underground utilities would be grouped and/or placed in ski trails to the maximum extent practicable.

4.1 Trail Construction

Ski trail and lift line construction will involve the removal of trees within the designated trail boundaries. Treatment techniques include:

- **Full Clearing with Grading:** All trees would be removed within the construction limits, stumps would be removed, and the surface would be graded and re-vegetated, where appropriate (see Illustration A). Grading would occur at all locations where structures are proposed (e.g. lift towers, buildings) and along key trails where a smooth surface is necessary. Grading may include the use of heavy equipment (e.g. excavators, bulldozers, etc.) for earthmoving. The felling of timber would be accomplished by hand, with mechanized processors, such as, feller/bunchers over the snow, where possible, or helicopters. All woody material would be retained onsite (along trail edges, in Riparian Reserves, or in streams) to retain Large Woody Debris (LWD) recruitment potential to the extent possible. Large Woody Material (LWM) for wildlife habitat, and erosion control.

- **Full Clearing with No Grading:** All trees would be maintained within the construction limits, along ski trail edges, in Riparian Reserves, or in streams for LWD recruitment and erosion control. Trees would be cut flush to the ground and stumps would not be removed. The surface would not be graded and the natural ground cover would be maintained (see Illustration B). Tree felling would be accomplished by hand, or with mechanized processors such as feller/bunchers on snow, where possible, or helicopters. All woody material would be retained onsite, along trail edges, in Riparian Reserves, or in streams for LWD recruitment, LWM for wildlife habitat, and erosion control.

- **Tree Island Removal:** Islands of trees would be felled within the ski trail/ lift corridor to connect existing canopy openings. Trees would be flush cut to ground and stumps would not be removed. The surface would not be graded and the natural ground cover would be maintained. Where lop and scatter is not possible, downed wood would be retained onsite, along trail edges, in Riparian Reserves, or in streams for LWD recruitment, LWM for wildlife habitat, and erosion control.

- **Tree Island Retention:** Existing tree islands or shrub/herbaceous vegetation would be retained within the ski trail/lift corridor in their current condition

Illustration A
Typical Full Clearing Treatment With Grading

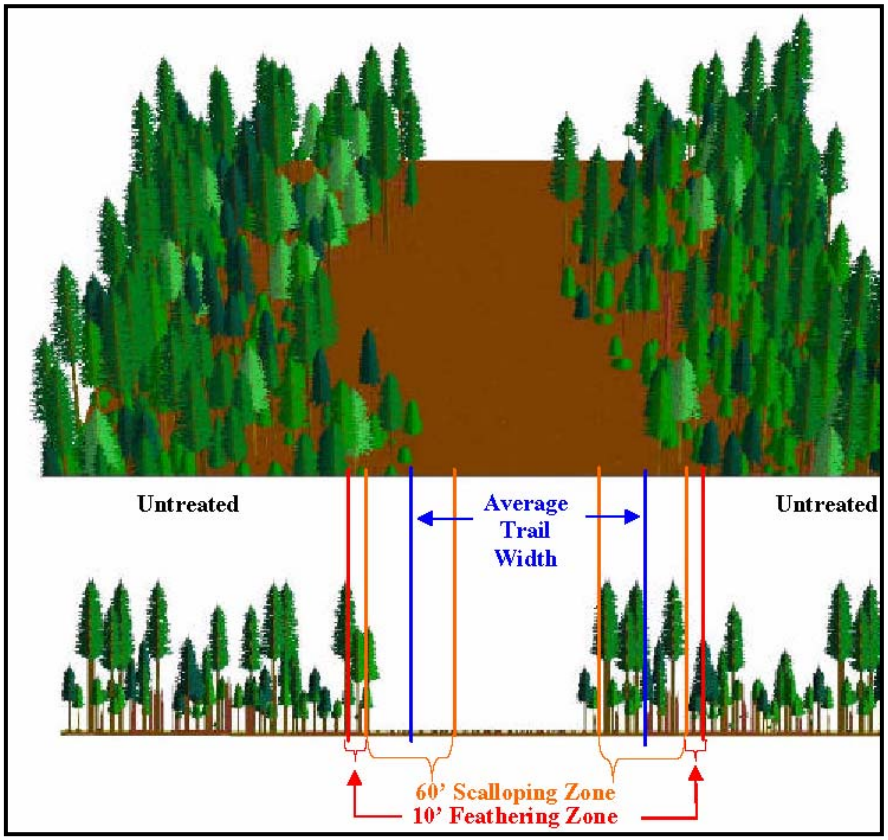
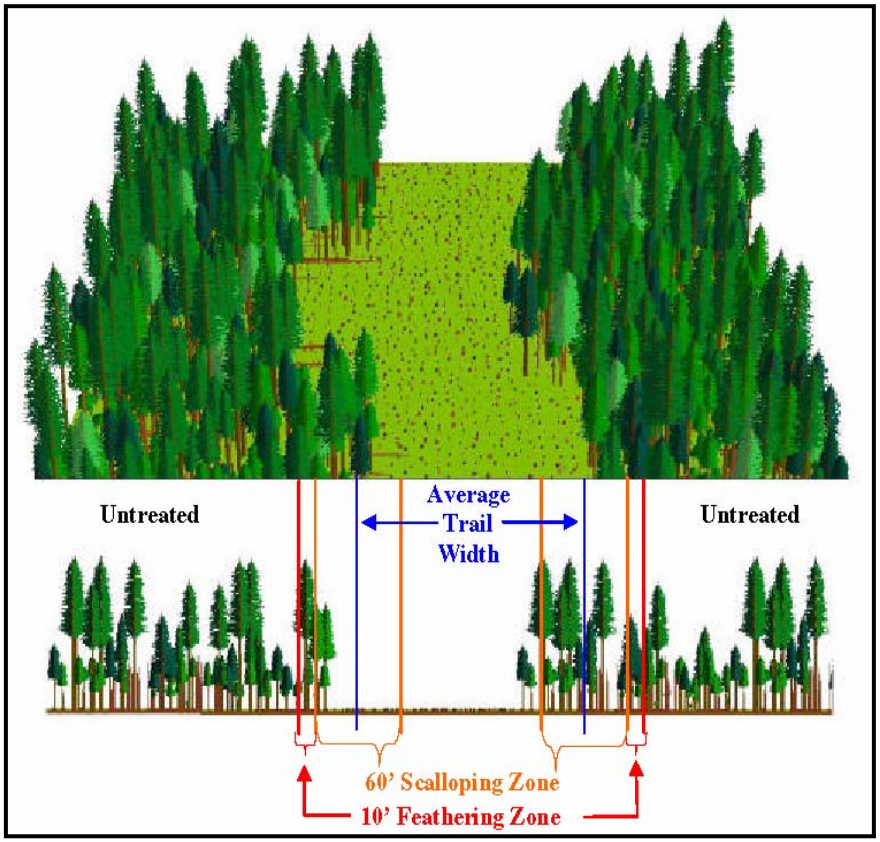


Illustration B
Typical Full Clearing Treatment – No Grading



In addition to the clearing prescriptions outlined above, ski trail clearing would include edge treatments that are intended to reduce the visual effects of trail clearing and to enhance the skiing opportunities along the trail edge. These prescriptions include:

- **Forest Edge Scalloping:** Flagging a separate, limit of clearing boundary outside of the flagged new trail edge so the boundary is non-linear to reduce visual impacts associated with straight trail edges. The limit of clearing boundary would resemble an irregular sine wave that is outside of, but adjacent to the flagged trail edge. The flagged limit of clearing boundary would not exceed a maximum distance of 30 feet from the original flagged trail edge.

- **Forest Edge Feathering:** Selectively removing trees along the flagged limit of clearing boundary where appropriate, so that a hard line in the new trail-to-forest transition is not evident. The area to be thinned for forest edge feathering would be approximately 10 feet wide. Trees would be selectively removed starting at the flagged limit of clearing boundary, so that the tree density gets progressively lower as you move towards the new trail within the 10 foot feathering area.

4.2 Lift Construction

Standard construction techniques would be used for erecting lift terminal structures. Terminal footings will be excavated by excavators that are brought to the site over snow or airlifted in. Spoils from terminal excavation would be hauled off-site by hand or helicopter if not needed for contouring. Construction for each terminal would involve 0.5 acre area of full clearing with grading, which includes the actual terminal site and the clearing assumption described in Table 4. Clearing of trees and vegetation would be completed using trackhoe and dozer equipment. The existing Summit Access road will provide vehicular access to an upper staging area for materials. Materials would then be delivered to terminal sites over snow, or would be flown in by helicopter. Materials would be assembled onsite. Additional information on construction of the proposed *Basin* and *Hogback Express* chairlifts can be found in Table 5.

Lift tower footings would be excavated by hand or by excavators, including walking articulated backhoe equipment depending on site conditions and accessibility. Lift towers would be constructed off-site and airlifted in for final placement. Lift tower footings would be approximately 8 foot by 8 foot in size and 8 feet deep. The clearing assumption for each tower site is approximately 100 square feet, which includes the tower location and space to spread spoils to establish final contours. A staging will be established for tower assembly in the gravel parking lot adjacent to the administrative buildings north of US 12. No temporary roads will be constructed during construction.

Table 5
Lift and Trail Construction

Lift/Trail Name	Upper and Lower Lift Terminal	Lift Towers	Lift Corridor and Trail Construction
Basin Pod	Under the Proposed Action, no roads would be constructed to access lift terminal locations. Transport methods would be consistent with ID 19202004-1 Management of Inventoried Roadless Areas. Construction would include helicopter transport, transport over snow, low-impact equipment, and narrow four wheeled vehicles cross country over pathways less than 50 inches wide. A small crane or boom truck would be necessary for terminal construction. Equipment would access the site cross country in one trip. The equipment would remain onsite until construction was completed and would then leave the site in one trip. Lift terminals would be constructed onsite. Lift terminals would be excavated by machine. Low impact equipment would be used and enter and leave the site one time only, over snow when possible. Grading for lift terminals would be limited by construction envelopes. Exposed areas would be seeded with native grasses and covered with straw after completion of construction. Straw cover to minimize erosion prior to completion of construction would be applied, if soil becomes saturated and/or runoff occurs from the disturbed areas. Silt fence and erosion control blankets would be used as necessary.	All lift towers would be constructed offsite and airlifted into place. Tower footings would be excavated by hand, over snow when possible. A small excavator, transported to the sites by helicopter or cross-country, may be necessary if weather conditions do not permit hand excavation. Low impact equipment would be used as necessary.	All trees would be removed by manual methods. Felled trees would be lopped and scattered along ski trail edges or in Riparian Reserves. No grading would occur within the proposed trail clearing limits, unless specified as a graded area. All understory vegetation less than 3 feet tall would be retained.

Table 5
Lift and Trail Construction

Lift/Trail Name	Upper and Lower Lift Terminal	Lift Towers	Lift Corridor and Trail Construction
Hogback Express Pod	No roads would be constructed to access lift terminal locations. Transport methods would be consistent with ID 1920-2004-1 Management of Inventoried Roadless Areas and include helicopter transport, transport over snow, low-impact equipment over pathways less than 50 inches wide. Lift terminals would be constructed onsite. Lift terminals would be excavated by machine. Low impact equipment would be used and enter and leave the site one time only, over snow when possible, otherwise cross country. Grading for lift terminals would be limited by construction envelopes. Exposed areas would be seeded with native grasses and covered with straw after completion of construction. Straw cover to minimize erosion prior to completion of construction would be applied, if soil becomes saturated and/or runoff occurs from the disturbed areas. Silt fence and erosion control blankets would be used as necessary, as specified by the USFS hydrologist.	All lift towers would be constructed offsite and airlifted into place. Tower footings would be excavated by hand, over snow when possible. A small excavator, transported to the sites by helicopter or cross-country, may be necessary if weather conditions do not permit hand excavation. Low impact equipment would be used as necessary.	All trees would be removed by manual methods. Felled trees would be lopped and scattered. Excess slash would be chipped or scattered onsite in accordance with USFS guidelines. Grading would not occur during periods where runoff conditions would exist (i.e. if ½ inch of rain occurs or is deemed likely to occur during a 24 hour period). This would prevent excessive erosion caused by grading to occur during unusually heavy summer rains and/or fall rains. The surface would be seeded with native vegetation and covered with certified weed free straw after grading is completed. Silt fence and/or erosion control blankets would be used as necessary if specified by USFS hydrologist. All understory vegetation less than 3 feet tall would be retained.

4.3 Facility Construction

Standard construction techniques will be used for construction of the parking lot and ticket booth. The parking lot will be graded using dozer equipment. Excavations for stormwater facilities and the ticket booth foundation will be done with trackhoes. All spoils will be hauled offsite if not used for establishing final grades. The parking lot will be paved following grading activities and construction of stormwater facilities. Construction equipment will access the

parking lot via US 12 and existing ski area work roads. Materials for the ticket booth will be delivered to the site via existing ski area work roads and will be assembled onsite.

Construction of the mid mountain lodge would be performed using standard construction techniques. Equipment will be brought to the site over snow or flown in via helicopter. Excavation for the foundation will be completed by trackhoe. Spoils will be hauled offsite over snow or by helicopter if not used for establishing final grades. Materials for the lodge will be delivered to the site over snow or via helicopter and assembled onsite.

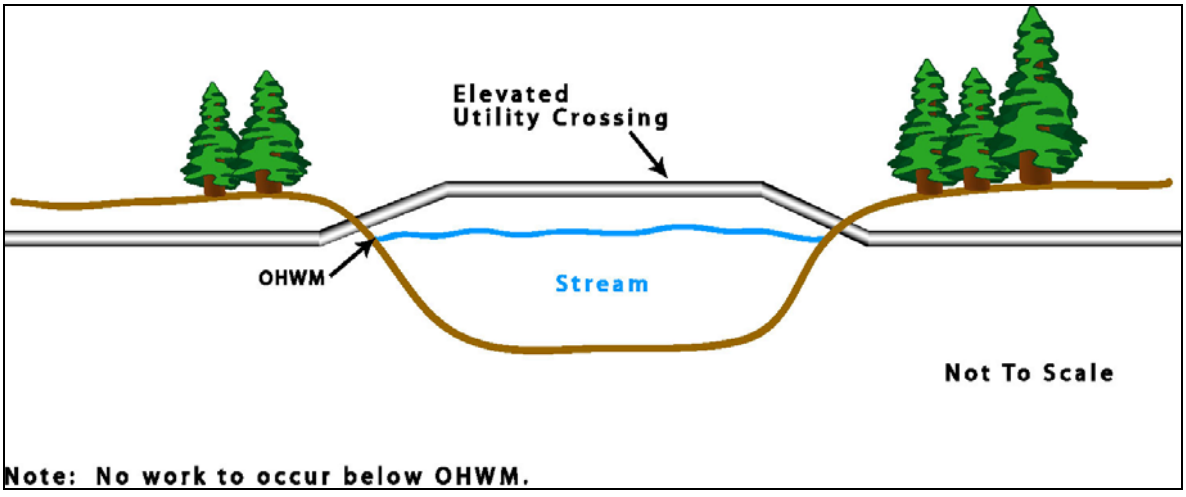
Utility lines (power, water, communication) would be installed in a common trench within existing or proposed trails to minimize overall disturbance. The trench would be excavated by a trackhoe and spoils would be stockpiled for backfilling the trench. The water supply line[3] would be trenched to the mid-mountain lodge from the base area. Power and communication lines would join the water line at the bottom terminal of the existing *Paradise* chairlift.

Rerouting of the Pacific Crest National Scenic Trail would be constructed using hand tools. Cut trees would be left onsite.

4.4 Utility Crossings

Utilities would be trenched in existing and/or proposed ski trails and roads. A trackhoe would be used to excavate the trench and backfill the trench following utility installation. Trenching would not be allowed in streams or wetlands. Low elevation aerial crossings would be used to protect streams and wetlands (see Illustration C – Low Elevation Aerial Crossing). The trench would daylight prior to the Ordinary High Water Mark (OHWM) and no ground disturbance would occur below OHWM.

Illustration C
Low Elevation Aerial Crossing Diagram



[3] If a water line is determined to be not feasible during construction, then a well would be drilled within the disturbance area for the mid-mountain lodge. The construction of the water line, approximately 4.2 acres of disturbance (grading) constitutes a greater impact than a well and is therefore presented here for consultation.

5.0 SPECIES INFORMATION

5.1 Northern Spotted Owl (*Strix occidentalis caurina*)

The northern spotted owl was listed as a threatened species by the USDI Fish and Wildlife Service (USFWS) in 1990 (55 FR 26194) and critical habitat was designated in 1991 (57 FR 1796). Declines in spotted owl populations are a result of extensive habitat loss associated with timber harvesting (Csuti et al., 2001; Gutierrez et. al., 1995).

Habitat Requirements and Ecology

There are two components of spotted owl habitat: habitat containing all the requirements for spotted owl nesting, roosting, and foraging activities (NRF habitat) and dispersal habitat. Dispersal habitat includes both habitat required for juveniles to disperse following fledging, and connective habitat between spotted owl subpopulations (57 FR 1798).

The majority of known spotted owl nesting, foraging and roosting sites are in mature and large-tree old-growth forest. Nests typically occur in dense, multi-layered stands with large diameter branches and high canopy closure but are occasionally found in sites lacking some of these characteristics. Roosting habitat typically consists of stands containing large-diameter trees with high canopy closure and multiple canopy layers. Important components of foraging habitat include complex structure (multiple canopy layers, LWM, etc.) and high canopy closure (57 FR 1798). Nesting, Roosting, and Foraging NRF habitat in the Central Washington Cascade Range is generally below 5,000 feet elevation (Hamer and Cummins, 1991; Personal Communication, Forbes, 2004). It is hypothesized that the owls do not nest above this elevation due to the persistence of snow during the nesting season that may make prey less available. Spotted owl dispersal habitat is more variable, and at a minimum must provide trees of adequate size and canopy closure to provide protection from predators and offer some foraging opportunity (57 FR 1798). The preferred prey species of spotted owls in the northwestern United States are flying squirrels, deer mice, and juvenile snowshoe hares.

In the Washington Cascades, the spotted owl nesting season is generally considered to begin on or around March 1 and end on or around August 31, with a critical nesting season during which the species is believed to be more sensitive to disturbance around the nest site occurring between March 1 and July 15. Spotted owl pairs do not nest every year, an average of 62% (range 16 - 89%) nest each year (Forsman et al., 1984 *in* Forsman, 2003).

In September 2004 a report was published by Sustainable Ecosystems Institute of Portland Oregon titled: *Scientific Evaluation of the Status of the Northern Spotted Owl* (Courtney et al., 2004). The report is a review and synthesis of information on the status of the northern spotted owl. The report was prepared to aid the US Fish and Wildlife Service in their 5-year status review process, as set out in the Endangered Species Act. The report did not make recommendations on listing status, or on management, but focused on identifying the best available science, and the most appropriate interpretations of that science. The focus is on new information developed since the time of listing in 1990. The report relied on demography studies summarized in a report titled: *Status and Trends in Demography of Northern Spotted Owls,*

1985–2003 (Anthony et al., 2004). The following excerpt is from the executive summary of the SEI report:

- Central to understanding the status of the subspecies is an evaluation of its taxonomic status. The panel is unanimous in finding that the Northern Spotted Owl is a distinct subspecies, well differentiated from other subspecies of Spotted Owls.

- The panel did not identify any genetic issues that were currently significant threats to Northern Spotted Owls, with the possible exception that the small Canadian population may be at such low levels that inbreeding, hybridization, and other effects could occur.

- The use of habitat and of prey varies through the range of the subspecies. These two factors interact with each other and also with other factors such as weather, harvest history, habitat heterogeneity etc, to affect local habitat associations. While the general conclusion still holds that Northern Spotted Owls typically need some late-successional habitat, other habitat components are also important (at least in some parts of the range).

- The available data on habitat distribution and trends are somewhat limited. Development of new habitat is predicted under some models. However our ability to evaluate habitat trends is hampered by the lack of an adequate baseline. Given these caveats, the best available data suggest that timber harvest has decreased greatly since the time of listing, and that a major cause of habitat loss on federal lands is fire. In the future, Sudden Oak Death may become a threat to habitat in parts of the subspecies' range.

- Barred Owls are an invasive species that may have competitive effects on Northern Spotted Owls (as was recognized at the time of listing). Opinion on the panel was divided on the effects of Barred Owls. While all panelists thought this was a major threat, some panelists felt that the scientific case for the effects of Barred Owls remained inconclusive; other panelists were more certain on this issue.

- The demography of the Northern Spotted Owl has been recently summarized in a meta-analysis (Anthony et al., 2004), which is the most appropriate source for information on trends. Although the overall population and some individual populations show signs of decline, we cannot determine whether these rates are lower than predicted under the Northwest Forest Plan (since there is no baseline prediction under that plan). However the decline of all four Washington state study populations was not predicted, and may indicate that conditions in that state are less suitable for Northern Spotted Owls. Several reasons for this pattern are plausible (including harvest history, Barred Owls, weather).

- There is currently little information on predation on Spotted Owls, and no empirical support for the hypothesis, advanced at the time of listing, that fragmentation of forest after harvest increases predation risk.

- West Nile Virus is a potential threat, but of uncertain magnitude and effect.

- In general, conservation strategies for the Northern Spotted Owl are based on sound scientific principles and findings, which have not substantially altered since the time of listing (1990), the Final Draft Recovery Plan (1992) and adoption of the Northwest Forest Plan (1994). Nevertheless we identify several aspects of conservation and forest management that may increase both short and medium term risks to the species. These are typically due to failures of implementation.

- A full evaluation of the uncertainties of the data, the conclusions that can be drawn from them, and of the perceived threats to the subspecies, are shown in the summary of individual panelist responses to a questionnaire.

Major threats to Northern Spotted Owls at this time include: the effects of past and current harvest; loss of habitat to fire; Barred Owls. Other threats are also present. Of threats identified at the time of listing, only one (predation linked to fragmentation) does not now appear well supported.

Occurrence within the Action Area

The Gifford Pinchot and the Okanogan-Wenatchee National Forests GIS database do indicate the presence of spotted owl nesting, roosting, or foraging habitat (NRF) in the Action Area (see Figure 5). NRF within the Action Area is typically associated with Douglas-fir, Pacific Silver Fir, and Western Hemlock communities below 5,000 feet elevation and have canopy closures greater than 70 percent. Dispersal habitat, however, covers a variety of forests types which likely include those over 5,000-foot elevation and higher where adequate canopy cover (generally considered to be 40% or greater) is present. The Action Area contains approximately 2,952 acres of dispersal habitat, 1,949 acres of Nesting, Roosting, Foraging (NRF) habitat, and 980 acres of non-forested habitat (talus, open water, cleared ski trails) based on USFS northern spotted owl habitat mapping data (see Figure 5 – Spotted Owl Habitat).

Northern spotted owl NRF habitat does exist within the Action Area, approximately 1,949 acres. Portions of the existing ski area that are contiguous with this NRF habitat were also considered suitable for northern spotted owls because they contain sufficient canopy structure and cover. However, because of the high level of fragmentation and human activity within the existing ski area only the undeveloped fringes of the ski area were considered suitable NRF habitat. Prior to the Northwest Forest Plan the Wenatchee and Gifford Pinchot National Forests designated a habitat network on both sides of White Pass to provide for species viability. The Forests coordinated the designation of these habitat units on both sides of White Pass to allow movement of the birds through potential owl habitat. Since the amendments of both the Wenatchee and Gifford Pinchot National Forest Plans by the Northwest Forest Plan in 1994, this spotted owl management network has been re-allocated by the Northwest Forest Plan into Late-Successional Reserves or Managed Late Successional Areas. More than 5,560 acres or 60 percent of the Clear Fork Cowlitz Watershed Action Area is in Late-Successional or Managed Late Successional allocation to the north and west of the Action Area. The Late Successional Reserves located in the vicinity of the White Pass Analysis Area are RW-153 on the east side (approximately 0.5 miles form the Action Area) and RW-144 on the west side (approximately 1.4 miles from the Action Area). The areas to the east and south of the Action Area are in Wilderness. In addition,

the non-wilderness portions of the Tieton watershed to the east of the Project Area are also largely composed of Late Successional Reserves.

The Critical Habitat Units located in the vicinity of the White Pass Action Area are WA-18 on the east side and WA-37 on the west side. Approximately 441 acres of CHU WA-18 is located within the Action Area (see Figure 5). CHU WA-37 is approximately 0.7 mile from the Action Area. Critical Habitat for northern spotted owl was designated by the U.S. Fish and Wildlife Service in 1992 and is a completely separate entity from the Late Successional Reserves, which were designated under the Northwest Forest Plan (1994). There is some overlap between the two habitat designations and they are designed to serve a similar function, but they are separate in their legal definition.

There are two previously recorded spotted owl pair locations approximately 1.7 and 1.9 miles respectively from the proposed expansion area (Pearson, 2002). Due to the proximity of suitable NRF habitat to the Action Area, surveys for northern spotted owls were conducted outside the Action Area in 1987, 1997, 2000, 2001, 2002, and 2004 with no detections. In 2002, a survey route was added to accommodate the second planned ski lift (Hogback Express) in the Action Area. No detections were made during these surveys. The vegetation in the Action Area is mountain hemlock parkland type forest above 5,000 feet elevation with a north-northwest aspect. It was surmised that the lack of owl detections in the expansion area was largely due to its high elevation, north-facing aspect, and moist forest conditions (Pearson, 2002). In addition, the open nature of mountain hemlock parkland does not provide suitable canopy layers and cover for proper NRF habitat; however, suitable cover exists for owl dispersal. Therefore, northern spotted owls are not expected to utilize the proposed expansion area for nesting, roosting, or foraging but may use the area for dispersal in the fall and early spring. In addition, due to the high human activity level within the Action Area northern spotted owls are not expected to occur on a regular basis.

5.2 Canada Lynx (*Felis lynx canadensis*)

The Canada lynx (*Lynx canadensis*) is listed as threatened under the ESA by the USFWS and by the Washington Department of Fish and Wildlife (WDFW).

Habitat Requirements and Ecology

The total population of lynx in Washington State has been recently estimated at between 96 and 191 individuals (WDFW, 1993a), but the status of lynx throughout their historic range in the Cascades is unknown (USFS, 1998a). At least historically, lynx probably occurred in and adjacent to the GPNF and the OWNF, although the evidence indicates that populations on the west side of the Cascades, in both Canada and Washington, were never very abundant (USFS, MBSNF, 1992a).

Lynx occupy the boreal regions of North America and Eurasia, including Alaska, Canada, and the northern edge of the contiguous United States. Although the lynx remains widespread in many of its northern haunts, it has receded from much of its former range in the U.S. In Washington, the lynx is found in the North Cascade Range, particularly in high elevation lodgepole pine habitat.

Lynx home ranges and habitat characteristics were studied in the Okanogan National Forest from 1980-83 by the Washington Department of Wildlife (WDW) and from 1985-87 by the Wildlife Research Institute (Koehler, 1990; Koehler and Brittell, 1990). Koehler (1990) determined that radio-collared lynx utilized lodgepole pine and Engelmann spruce-subalpine fir forest cover types above the 4,500 foot elevation level in greater than expected proportions. Estimated density of resident adult lynx during the two studies was one animal per 10,750-11,800 acres (Koehler, 1990).

Lynx depend on the snowshoe hare as their primary food source (Koehler, 1990). Because of this close association of lynx with snowshoe hares, habitat that is good for hares is assumed to benefit lynx (Rodrick and Milner, 1991). Snowshoe hares prefer early successional stages of forested habitats with dense stands of shrubs and saplings that provide hiding and thermal cover and winter food (Grange, 1932; Pietz and Tester, 1983; Litvaitis et al., 1985; Monthey, 1986). Hares browse primarily on stems of hardwoods or conifers during winter (Pease et al., 1979), and shift to a diet of forbs, grasses, and leaves in the summer (de Vos, 1964; Wolf, 1978). Although studies in north central Washington found the stems and bark of lodgepole pine to be the principal winter foods of snowshoe hares (Koehler, 1990), snowshoe hare populations in northern Idaho are concentrated in areas wherever hardwood shrubs protrude through snowpacks.

Lynx require a mosaic of forest conditions, including early successional habitat for hunting and mature forests for dens. Den sites are typified by forests older than 200 years with northerly aspects containing lodgepole pine, spruce, and subalpine fir and with a high density of downfall logs (Koehler, 1989). These mature stands for dens were as small as 1-5 acres in size with stringers of connected travel corridors that provide security cover for adults and kittens. Intermediate stages may be used as travel corridors that provide connectivity between foraging, denning, and cover habitats (Koehler and Aubrey, 1994; Aubrey et al., 1999).

Lynx use travel cover to move within their home ranges, for connectivity between denning and foraging areas, and for dispersal across the landscape. Travel cover generally consists of closed canopy coniferous/deciduous vegetation that is greater than 6 feet high and adjacent to foraging habitat. Forested areas with light stocking densities (170 to 260 trees per acre) and openings greater than 300 feet wide may be avoided by lynx (USFS, 1998c). Preferring continuous forest for travel, lynx often use ridges, saddles, and riparian areas (Ruediger, et. al., 2000). Home range sizes in Washington range from 14 to 27 square miles, with daily travel distances of up to 3.2 miles per day and long distance dispersal or exploratory movements up to 600 miles (McKelvey et al., 1999c).

Occurrence within the Action Area

Nearly all of the Action Area is located above 4,400 feet elevation; however, the area does not provide a variety of early successional stage stands suitable as snowshoe hare habitat. Densities of snowshoe hare are low due to the lack of suitable habitat (Forbes, personal communication, 2004). Given the average density of lynx (one per 11,000 acres) and the size and habitat types of the Action Area, less than one resident lynx (not including kittens) could be expected to utilize the Action Area as a portion of their territory. However, there is little to no forage habitat within the Action Area to meet the needs of breeding or raising young. In addition, due to the almost

continuous ski area activity within the existing ski area, due to nighttime trail grooming, and intermittent avalanche control, and daytime operations, the existing White Pass ski area was not considered to contain suitable denning or foraging habitat for this project (USDI, 2000). According to guidelines established in the Lynx Habitat Mapping Direction memo, the Action Area does not contain suitable denning or foraging habitat for the Canada lynx due to the lack of subalpine fir parkland and early Successional stage stands (USDI, 2000). Additionally, according to the Lynx Conservation Assessment Strategy (LCAS), the Action Area is located in peripheral lynx habitat and is considered unoccupied (USFS, USFWS 2005). There have been no sightings or evidence of lynx use of the Action Area.

Since lynx prefer to travel through forest cover, and use riparian areas, saddles and ridges as travel habitat, the majority of the Action Area would be suitable for lynx travel habitat. Areas that would not be suitable include the developed portion of the base area, and the large open areas maintained as ski terrain surrounding the Lower Cascade chairlift and the lower portion of the Great White Express chairlift. Along the ridge tops in the proposed expansion area there are large natural openings in the mountain hemlock parkland vegetation type that may not be preferred lynx travel habitat; however, there are generally small tree islands within this vegetation type that could provide sufficient cover. Lynx could also travel through relatively continuous cover outside of the Action Area to both the north and south. Use of the Action Area by Canada lynx is expected to be limited to rare pass-through dispersal events.

5.3 Grizzly Bear (*Ursus arctos horribilis*)

The grizzly bear (*Ursus arctos horribilis*) is listed as threatened by the USFWS and as endangered by the WDFW.

Habitat Requirements and Ecology

The grizzly bear is a large, wide-ranging animal that requires vast amounts of remote, undisturbed habitat. It has a wide range of habitat tolerances and can exploit a wide variety of food resources. Grizzly bears use a wide variety of habitats from mature coniferous forest of varying story-layer and canopy closure to open meadows and riparian areas. They occupy home ranges that can be more than 1,000 square miles. Grizzly bears, males in particular, prefer low to mid-elevation riparian areas in the spring and late fall, but move up to higher elevation alpine and subalpine habitats during the summer season. Females with cubs generally stay at mid-to-upper elevations throughout the year, presumably to avoid contact with the males. Rocky Mountain Region den sites are often at elevations above 6,500 feet, but in the Cascade Range denning may occur above 5,800 feet (Almack, 1986). Physiographic conditions similar to high elevation denning sites could occur down to the 2,000-foot elevation in the Cascades. Food varies seasonally, and includes anything from forbs, grasses, and berries to rodents, large ungulates, and carrion. Grizzlies prefer secluded areas, generally indicated by open road densities of less than one mile per square mile.

For analysis purposes, the North Cascades Grizzly Bear Management Subcommittee (NCGBMS) has established the following seasons and associated habitat uses:

Spring (den emergence to May 31) habitats include herbaceous, open canopy forest, shrub, and sparse vegetation in the western hemlock and Pacific silver fir zones;

Summer (June 1 – July 15) habitats include the same types as spring, with the addition of the mountain hemlock zone;

Fall (July 16 – denning) focuses on shrub habitat and open forest types with no elevation restrictions.

Within the Action Area, the vegetation types most likely to be suitable for use by grizzly bears are late-seral open canopy; parkland; and managed herbaceous (ski trails).

Occurrence within the Action Area

Grizzly bear recovery plans focus on maintaining grizzly bear populations in defined areas classified as ecosystems. In western Washington, the North Cascades Ecosystem (NCES) has been established in the Cascade Mountains from the Canadian border south to Interstate 90. The recovery plan recognizes that grizzly bears will occur outside of the recovery zone, however only habitat within the recovery zones will be managed for grizzly bears (USFWS, 1993). The southern boundary of the NCES is approximately 36 miles north of the White Pass Action Area. The Interagency Grizzly Bear Committee (IGBC) and associated interagency working groups concluded in 1991 that the North Cascades Ecosystem was capable of supporting a viable grizzly bear population and that a small number of grizzly bears currently inhabit the NCES (Almack et al., 1993). There are no estimates on the number of grizzly bears occurring in the Cascades south of the NCES.

There have been no Class I sightings (confirmed by a biologist) of grizzly bear or their sign within the Action Area or on the Naches or Packwood Cowlitz Valley Ranger Districts; although there have been confirmed sightings on the OWNF (USDA, 1998a). A large ungulate prey base exists in the Action Area during the summer season and it is bordered by extensive unroaded lands (Goat Rocks Wilderness and William O. Douglass Wilderness). Grizzly bear use of the Action Area would be expected to be limited due to the high human activity level and the proximity of US 12. Therefore, while potential summer and fall foraging habitat and winter denning habitat occur within the Action Area, habitat suitability for grizzly bears is greatly reduced by the existing level of human use in the Action Area. Given the low number of grizzly bears thought to occur in the Cascades and this reduced habitat suitability, regular use of the Action Area by grizzly bears is not expected to occur. Use of the area as part of a larger home range may occur, particularly during the summer when human activity is at a minimum. Since the Action Area is outside of the North Cascades Ecosystem (grizzly bear recovery area), and is an area managed for recreation and high human use, the area would not be managed as grizzly bear habitat (USFWS, 1993).

5.4 Gray Wolf (*Canis lupus*)

The gray wolf (*Canis lupus*) is listed as threatened by the USFWS and endangered by WDFW in Washington.

Habitat Requirements and Ecology

Wolves potentially occurring in the Washington Cascades are part of the western distinct population segment. Critical habitat has not been designated for this distinct population segment and no recovery plan for it has been published.

Important elements of gray wolf habitat include large isolated areas with low exposure to humans, a sufficient year round food source and ample denning, rendezvous and dispersal habitat. Wolf territories are associated with areas of low human use, including developed areas (Wydeven et al., 2002; Mladenoff et al., 1995) and areas of low recreational activity (Peterson, 1977). Wolf territories are also associated with areas having low open road densities (Mladenoff et al., 1995; Mladenoff et al., 1999; Mech, 1989). Wolves are particularly sensitive to human activity around den sites (Chapman, 1979) with wolf dens generally being located at least 1 mile from recreational trails and 1 to 2 miles from established backcountry sites (Carbyn, 1974; Peterson, 1977; Chapman, 1979).

Wolf pack territories vary greatly in size, with wolf abundance within a landscape being dependent upon the amount of area available that is relatively free from human disturbance and associated mortality (Fritts and Carbyn, 1995) and upon prey density within the landscape (Fuller, 1989). Areas with a high density of ungulates are able to support a greater number of wolves in a smaller area (Fuller, 1989; Fuller, 1992; Lariviere et al., 2000; Wydeven et al., 1995; Haber, 1977). In areas of low ungulate density, wolf density also decreases and territories become larger (Mech, 1977; Messier, 1987) and wolves may switch to alternate prey such as beaver or snowshoe hare (Voigt, 1976). Reported sizes of wolf pack territories vary from 150 to 180 km^2 (37,000 to 45,000 acres) in the Lake Superior region (Fuller, 1992; Wydeven et al., 1995) to 1,550 -2,590 km^2 (384,000 to 640,000 acres) in Alaska (Haber, 1977).

Gray wolves typically dig their own dens, often weeks in advance of birth of pups. Wolf dens are commonly located on southerly aspects of steep slopes (or rock caves/ abandoned beaver lodges), often within 400 yards of surface water and at an elevation overlooking the surrounding landscape. In addition, these sites tend to be at least 1 mile from recreational trails and 1 to 2 miles from backcountry trails. (USFWS, 1987)

Rendezvous sites are specific resting and gathering sites used by wolf packs during the summer and fall after natal dens have been abandoned. The sites are composed of meadows adjoining timber stands located near water. Wolves are particularly sensitive to disturbance at the first few rendezvous sites used after abandonment of the natal dens. Rendezvous sites are often located in bogs or abandoned and revegetated beaver ponds. The sizes of rendezvous sites varies from 0.5 acres to sites along drainages 0.6 miles long, but are typically about 1 acre.

The most critical factors defining gray wolf habitats are the availability of large ungulate prey and isolation from human disturbance. Roaded access within gray wolf home ranges is a major factor in reducing security from human disturbance. The preferred road density is no roads but the target for gray wolf management is one mile or less per square mile of habitat (Theil, 1985; Jensen et al., 1986).

Occurrence within the Action Area

Although field studies have not been conducted locally, investigations in other regions suggest that wolf social groups occupy individual territories of up to several hundred square miles. Fritts and Mech (1981), for example, estimated territory sizes of eight wolf packs in northwestern Minnesota ranging from 75 to 214 square miles. Preferred habitat is dense conifer forest interspersed with large meadows. Wolves follow migrating big-game herds to lower elevation

winter range areas. Big-game ungulates are present within the Action Area during the summer but migrate to lower elevations during the winter in order to access more readily available sources of food.

The Forest Service has not conducted inventories for gray wolves in the vicinity of the Action Area. A review of the Naches Ranger District and Washington Department of Fish and Wildlife databases, however, reveals that there have been wolf sightings in the township, none of which have been confirmed by a biologist (a Class I sighting). The road density of the Clear Fork Cowlitz River Watershed of which Hogback Basin is a portion is 1.5 miles per square mile. Road density within the Upper Tieton Watershed is .675 miles per square mile. Road densities for the Clear Fork watershed exceed recommended targets for gray wolf management.

A large ungulate prey base exists within the Action Area during the summer season and extensive unroaded lands (Goat Rocks Wilderness and William O. Douglass Wilderness) connect to the Action Area. Thus, the presence of wolves is assumed during the summer and early fall. However, due to the high road density, recreational activity, as well as absence of prey during the winter season, wolves are not expected to occur regularly within the Action Area.

5.5 Bald Eagle (*Haliaeetus leucocephalus)*

The bald eagle is listed as threatened by the USFWS and WDFW. The species has been proposed for removal from the Federal list of endangered and threatened wildlife (64 FR 36454-36464).

Habitat Requirements and Ecology

The species breeds across much of Canada, the Pacific Northwest, throughout the Great Lake states, and along the Eastern and Gulf coasts. Bald eagles are recovering as a breeding species in other areas of interior North America. Washington hosts one of the largest populations of wintering bald eagles in the lower 48 states as well as one of the largest populations of nesting pairs. The majority of nesting bald eagles in Washington occur west of the Cascade Mountains (Smith et al. 1997).

Bald eagles typically nest in stands of old-growth trees near large water bodies. Nests are often constructed in the largest tree in a stand with an open view of the surrounding environment. Nest trees are usually near water and have large horizontal limbs. Snags and dead-topped live trees may be important in providing perch and roost sites within territories. Because of their large size, eagles require ready access to an abundant supply of medium sized to large fish during breeding (Johnsgard 1990). Freedom from human disturbance is probably another important component of suitable nesting habitat (Rodrick and Milner 1991).

Bald eagles winter along rivers, lakes, and reservoirs that support adequate fish or waterfowl prey and have mature trees or large snags available for perch sites. Bald eagles often roost communally during the winter, typically in a stand of mature trees with an open branching structure and well developed canopies. Winter roost areas are usually isolated from human disturbance (Johnsgard 1990).

Early declines in bald eagle populations were attributed to human persecution and destruction of riparian, wetland, and conifer forest habitats. However, the widespread use of organochlorine pesticides that caused eggshell thinning and subsequent reproductive failure was the most important factor in the decline of the species (Detrich 1985).

Various legal and management measures, including restrictions placed on the use of organochlorine pesticides in 1972, development and implementation of the Pacific Bald Eagle Recovery Plan (USFWS 1986), and local bald eagle management plans, have contributed to the continuing recovery of bald eagle populations. Target numbers of nesting pairs in the region have been met and this species was proposed for delisting in 1999(64 FR 36453-36464), however it has not been de-listed.

Occurrence within the Action Area

There is one documented occurrence of nesting bald eagle on Rimrock Lake, approximately six miles east of the Action Area. Bald eagles potentially forage around Leech Lake, which is located within the Action Area. Therefore, the occurrence of Bald Eagle within the Action Area is expected to be limited to pass through events.

5.6 Marbled Murrelet (*Brachyrampus marmoratus*)

The marbled murrelet is listed as threatened by both the USFWS and the WDFW.

Habitat Requirements and Ecology

The North American subspecies of marbled murrelet occurs from the Aleutian Islands south along the coasts of Alaska, Washington, Oregon, and California. Its distribution is closely correlated with the presence of late successional coastal forests (Carter and Erickson 1988, Nelson 1989, Paton and Ralph 1988, Sealy and Carter 1984). Marbled murrelets are mostly found within 1 mile of shore (Strachan et al. 1995, Strong et al. 1996) when in salt water. In Washington, the marbled murrelet is found in all near-shore marine environments, with the greatest concentrations found in the northern Puget Sound area (WDFW 1993b).

Murrelets live primarily in a marine environment but fly inland during the nesting season to nest in older forests. Murrelets typically nest in low-elevation old-growth and mature coniferous forests (Hamer 1995; Hamer and Cummins 1991). Once at sea, murrelets can be found as dispersed pairs or in flocks or aggregates (Strachan et al. 1995, Strong et al. 1996). Strong et al. (1996) found that most murrelets occurred within 1 mile of the shoreline, regardless of their age. However, hatch-year fledglings were closer to shore than the general population.

Marbled murrelets construct their nests high in older conifers with wide horizontal limbs. In Washington State, murrelets have been detected up to 50 miles inland from the coast, most typically adjacent to major drainages (Hamer and Cummins 1991). However, over 90 percent of all observations have been within 37 miles of the coast in the northern Washington Cascades (61 FR 26256-26320). According to the Recovery Plan for the Threatened Marbled Murrelet (*Brachyramphus marmoratus*) in Washington, Oregon, and California, the Puget Sound Zone has been defined as extending 50 miles (80 km) from the eastern shore of Puget Sound (USFWS 1997).

Although marbled murrelets have been known to nest in stands as small as 7.5 acres, the average nest stand size in Washington is 515 acres (Hamer and Nelson 1995) and large contiguous stands of suitable habitat are considered important to marbled murrelet recovery (61 FR 26256-26320). Marbled murrelet nests in Washington are usually found at elevations below 3,500 feet, within 40 miles of the nearest body of salt water (Hamer 1995), and in stands with old-growth characteristics (Raphael et al. 1995).

Potential habitat for the marbled murrelet is defined in the survey protocol as mature, old-growth, or younger coniferous forests that have deformations or other structures suitable for nesting (Ralph et al. 1991). Although this definition is general, it encompasses some of the new information on murrelet nesting, including documented activity in younger forests (40 to 80 years) in the Oregon Coast Range (Grenier and Nelson 1995). Nonetheless, nearly all marbled murrelet nest trees have been located in old-growth and mature stands or stands with old-growth characteristics (Hamer and Nelson 1995). The percentage of old-growth tree crown cover appears to be an important factor associated with occupied sites (Miller and Ralph 1995, Hamer and Nelson 1995).

Because so few marbled murrelet nests have been found, an understanding of the microhabitat requirements of the bird is limited. The few nests that have been measured suggest that the number of potential nest sites on trees may be the best predictor of stand occupancy by this species (Hamer and Nelson 1995). Murrelets require a broad flat surface (referred to as a platform) on a large lateral limb or other lateral structure. Large lateral limbs are usually found on trees with larger diameters and/or on older-aged trees. Potential nest platforms include mistletoe brooms, deformed limbs, and areas where a tree has been damaged (Hamer and Nelson 1995). The essential element of a murrelet nest site, therefore, is the presence of a horizontal limb that is sufficiently large, wide, and flat enough to support a nest.

Occurrence within the Action Area

There have been no known occurrences of marbled murrelet within the White Pass Action Area. Marbled murrelet is not expected to occur within the Action Area as it is located greater than 50 miles from marine waters of Puget Sound.

6.0 CONSERVATION MEASURES

The conservation measures identified in the following table (see Table 6) would be included in the site plans and construction plans, as appropriate. All conservation measures would be approved by the USFS prior to authorization for construction.

Table 6
Conservation Measures for the White Pass Ski Area Expansion

CM1	Riparian Reserves would be protected to the fullest extent practical by flagging the clearing limits and any trees to be removed in the field, which would be approved by the USFS prior to ground disturbance. Trees cleared would be felled towards stream channels and left on site to provide in-channel LWD and streambank stability. Ski trails crossing streams and Riparian Reserves would be narrowed to minimize future loss of LWD. Riparian understory vegetation adjacent to stream channels would be avoided where possible to maintain bank stability and channel shading.
CM2	If the presence of any special status species is determined in the area affected by the Action Alternatives, the Forest Service Biologist would be immediately notified and management activities altered as appropriate.
CM3	Evaluation of the need for surveys for special status species would be conducted in all areas where suitable habitat is determined by a Forest Service approved biologist. If the presence of these species is determined to be in an area affected by the Proposed Action, the Forest Service Biologist would be immediately notified and management activities altered as appropriate.
CM4	If helicopters are planned for use, seasonal restrictions (March 1 – July 31) would be implemented during the Northern Spotted Owl nesting season if protocol surveys are not current. Seasonal restrictions would not apply if surveys are current and no owls are found.
CM5	Animal proof containers would be used for waste disposal to prevent habituation of wildlife to human food sources.

7.0 EFFECTS OF THE ACTION

7.1 Northern Spotted Owl

Due to the absence of detections during surveys between 1987 and 2004 it is considered unlikely that owls regularly disperse through the area. Therefore, potential effects to northern spotted owl individuals resulting from construction and periodic maintenance would be temporary and would most likely result in avoidance of the area by this species. Juveniles typically disperse after fledging, in September and October, which would occur before winter ski area operations begin. However, some juveniles have been known to disperse again in late winter/early spring, which would coincide with late season nighttime trail grooming (Thomas et al., 1990). Grooming of ski trails, which typically occurs at night, may also disturb individuals, and lead to avoidance of the area, if they were to try to disperse within the Study Area. However, these impacts would be intermittent and short-term in nature. In addition, Construction operations would increase the noise and activity levels within the Action Area and could result in avoidance of the area by dispersing individuals. These operations would be temporary and therefore potential use of the area by dispersing and foraging owls would most likely resume once construction activities were complete. Construction of the ski runs and installations of the lifts, lodge and associated infrastructure would occur during the day in dispersal habitat and would not affect an active nest tree of spotted owls. There would be no effect from disturbance to spotted owls from the construction of the ski runs.

Some construction activities would require the use of a Type I helicopter in order to transport materials to construction sites and to place lift towers. Helicopter operation could occur within suitable NRF and dispersal habitat, and within 2/3 mile of CHU WA-18. Therefore a seasonal restriction during the critical breeding season of March 1-July 31 will be implemented as specified in Conservation Measure 4 (see Table 6), thus limiting disturbance to northern spotted owls within the Action Area or adjacent habitat. Outside of the critical breeding season adult owls would be more mobile and better able to move away from the disturbance; nevertheless some disturbance of individuals is possible. Large helicopters can have larger disturbance areas and can still impact spotted owls outside of the critical breeding.

Suitable habitat (NRF and dispersal) for northern spotted owl within the Action Area would be impacted through clearing activities for ski trails, lifts, and facilities as described in Section 4.0 – Construction Techniques (see Table 7). Clearing activities would result in permanent removal of approximately 13.7 acres of NRF habitat, as vegetation would be maintained as developed or a managed shrub/herbaceous condition for the life of the ski area (see Figure 6 – Impacts to Spotted Owl Habitat). The greatest impact to NRF would result from construction of the 7 acre parking lot and ticket booth at the base of the ski area. This would result in the complete removal of forested vegetation within NRF habitat. However, due to the presence of the existing ski area to the south and west, US 12 to the north, and the existing drainfields to the east, the condition of the NRF habitat is considered to be degraded. Impacts to dispersal habitat would result from trail and lift clearing.

Table 7
Impacts to Northern Spotted Owl Habitat from the Proposed Action

Habitat Type	Impacts (acres)
NRF	13.7
Dispersal	29.7
Total	43.4

Clearing for ski trails and lift corridors would directly impact approximately 29.7 acres of dispersal habitat within the Action Area (see Figure 6). Dispersal habitat remaining within the Action Area is not expected to be considerably fragmented following clearing as the new trails have been designed to minimize the amount of clearing necessary by utilizing the existing openings common throughout the mountain hemlock parkland forest cover. This clearing would reduce the overall amount of mature forest available, but not interior forest. However, long-term impacts would occur to dispersal habitat where islands of trees are removed for ski trails. The reduction of dispersal habitat and the creation of openings in the forest may increase the risk of predation for spotted owls if they were to disperse through the area.

Northern Spotted Owls nesting sites and activity centers have been observed adjacent to the Action Area since 1992. The Proposed Action could potentially affect dispersal patterns for this species through the removal of vegetation. However, because of the proximity of known nests (approximately 1.7 and 1.9 miles away), the existing ski area operations, and the presence of US 12 in the Action Area, the vegetation removal would not likely alter dispersal patterns. As known nesting sites are more than one mile away from the proposed activities, it has been determined that the effects on spotted owl nesting by the Proposed Action are highly unlikely.

Canopy closure and tree size would be negligibly affected by the Proposed Action in the mountain hemlock parkland community, a high elevation forest with a naturally low canopy closure and comparatively small tree size. Within this community, only individual scattered trees along ski runs and chairlift corridors would be removed rather than complete stands through the Tree Island Removal clearing prescription. Proposed activities occurring in lower elevation communities, where canopy closure is greater and tree size is larger, occur adjacent to existing ski trails. Construction of ski trails would fragment existing forest communities, but would not alter canopy closure and tree size in adjacent undisturbed areas.

The information presented in the SEI report includes a review of the effects of forest fragmentation in the southern part of the range on the likelihood of occupancy by northern spotted owls (Courtney et al., 2004). The report concludes that:

> "Studies consistently showed that mature/old forest patch area was an important predictor of forest occupancy by Spotted Owls. While a fragmentation index was negatively associated with site occupancy in some studies, a trade-off between large patches of

mature/old forest and juxtaposition of land cover types appeared to benefit Spotted Owls in other studies."

The report went on to recommend additional studies of long-term survival and reproductive data in order to determine more conclusively how significant the role of forest fragmentation is in the recovery of the species.

The Proposed Action would result in minimal fragmentation as it is designed to make use of the open nature of the mountain hemlock parkland that comprises the proposed expansion area. Fragmentation of forested communities would be greatest within the existing ski area where previous trail construction has already fragmented habitat.

Northern Spotted Owl Critical Habitat

The Critical Habitat Units located in the vicinity of the White Pass Study Area are WA-18 on the east side and WA-37 on the west side. Approximately 441 acres of CHU WA-18 occurs within the Action Area. The LSR's located in the vicinity of the White Pass Study Area are RW-153 on the east side and RW-144 on the west side. Additionally, two large wilderness areas and Managed Late-Successional Areas (MLSA's) where suitable dispersal and NRF habitat are widely available are located adjacent to the Action Area.

No proposed activities would occur within the CHU. It is unlikely that the Proposed Action would directly affect northern spotted owl dispersal habitat or the viability of the LSR. The Proposed Action would not adversely affect the function of CHU and LSR's or MLSA's outside the Study Area utilized by Northern Spotted Owls.

7.2 Canada Lynx

The Proposed Action is not expected to result in significant impacts to Canada lynx since it is not expected to occur in the Action Area, except during rare pass-through occasions. The Action Area is not located within a LAU and it is considered peripheral habitat according to the Canada Lynx Recovery Outline (USWFS, 2005). The project is consistent with the Lynx Conservation Assessment and Strategy (LCAS, Ruediger et. al. 2000) and the Lynx Conservation Agreement (USFS and USFWS 2005). An amendment to the Lynx Conservation Agreement (USFS and USFWS 2006) further identified the southern potion of the OWNF and GPNF as "unoccupied" by Canada Lynx. Potential impacts to lynx traveling through the area include disturbance due to construction and maintenance activities during both summer and winter. These activities could temporarily cause lynx to alter their route through the area. As such, Canada lynx are unlikely to use the area as a permanent home range, and any lynx using the area are likely to be in transit to more suitable habitat.

7.3 Grizzly Bear

The Proposed Action is not expected to result in significant impacts to grizzly bears. No grizzly bears have been documented or are know to occur with the Action Area. The Action Area is located approximately 35 miles south of the North Cascades Ecosystem, the nearest recovery zone for grizzly bear. Potential short-term construction impacts to grizzly bear and their habitat could include disturbance during construction of chairlifts and associated trails and short-term

changes in vegetation within areas developed for ski trails. Increases in wintertime activity would not impact grizzly bears as they would be in hibernation, most likely outside of the Action Area since suitable habitat for hibernation is lacking. Impacts to grizzly bear during the summer would be minimal to non-existent since no summertime recreation activities are proposed. Occasional lift and trail maintenance could potentially disturb bears that might pass through the area but this is expected to be rare. The addition of new ski trails, the mid-mountain lodge, parking lot, and ticket booth would not be expected to alter grizzly bear travel habitat as this species is a habitat generalist and will utilize a variety of habitats during its travels.

7.4 Gray Wolf

The Proposed Action is not expected to impact individuals as gray wolf occurrence has not been documented within the Action Area. The presence of gray wolves is expected to be rare and limited to occasional use of the Action Area as part of a larger home range territory, in part because the area is lacking in suitable denning habitat for this species.

As previously described, gray wolves use a variety of habitat types and appear to select habitat based upon prey availability and security from human disturbance. Ungulates are the primary prey of gray wolves, and elk, black-tailed, and mule deer are seasonally abundant throughout the Action Area. Ungulates are present during the late spring, summer, and early fall months, but absent in the winter when the snowpack makes the forage unavailable and travel difficult. Therefore, wolves may occasionally hunt within the Action Area during the summer. Potential impacts to the prey base from the Proposed Action could have adverse affects on potential wolf populations. Wolf abundance is related to prey density and their densities have been observed to increase as ungulate populations increased (Fuller, 1989; Lariviere et al., 2000). At low ungulate prey densities, wolves become nutritionally stressed, are more nomadic, less territorial, and more solitary (Mech, 1977; Messier, 1987).

Potential impacts to ungulates within the Action Area would include loss or conversion of cover habitat, an increase in foraging habitat, and disturbance due to construction and increased human activity. These impacts could lead to a short-term avoidance of the Action Area during the summer when construction activities occur. A reduction in the number of potential prey animals occurring in the Action Area could make it more difficult for wolves to find prey, thereby affecting their ability to forage. However, cover habitat does not appear to be limiting in the action area Action Area and the changes should be negligible.

Construction activities during the summer months associated with the Proposed Action would include increased noise and human activity within the Action Area that could result in short-term avoidance of the area by wolves. However, due to the proximity of US 12 and the existing ski area operations, it is assumed that wolves currently avoid the area. Therefore, no impacts to wolf are expected during construction activities. Impacts to wolves due to winter ski area operations are not expected as this species is not expected to occur during the winter due to lack of suitable prey and increased human activity.

7.5 Bald Eagle

The Proposed Action is not expected to affect Bald Eagle as no known nests or wintering occurs within the Action Area. Potential foraging may occur at Leech Lake, however due to the proximity of US 12 and the existing ski area no impacts to foraging eagles are expected.

7.6 Marbled Murrelet

The Action Area is located outside the limit of suitable marbled murrelet habitat and no documented occurrences have been recorded within the Action Area. The Proposed Action is not expected to have any effect on marbled murrelet.

7.7 Interdependent and/or Interrelated Effects

Development of the Proposed Action will necessitate maintenance activities (i.e. grooming, and mowing) that will prevent ecological succession of ski trails and other modified land cover areas from developing into fully functioning forested area. In the Action Area there would be no interdependent or interrelated effects relevant to listed species.

7.8 Cumulative Effects

The Action Area for the White Pass Expansion Proposal is comprised mostly of federal lands. There are no known Federal or non-Federal projects occurring within the Action Area, that were available to analysis of cumulative impacts. This project is not expected to have cumulative impacts on listed, proposed, or candidate species.

8.0 DETERMINATION OF EFFECT

Table 8 presents the effect determination for each listed species. Additional information can be found in the following paragraphs.

Table 8
Determination of Effect to Listed Species

Species	Effect Determination
Northern Spotted Owl	May Affect, Likely to Adversely Affect
Northern Spotted Owl Critical Habitat	No Effect
Canada Lynx	No Effect
Grizzly Bear	No Effect
Gray Wolf	May Affect, Not Likely to Adversely Affect
Bald Eagle	No Effect
Marbled Murrelet	No Effect

8.1 Northern Spotted Owl

No individual owls are expected to be affected by the Proposed Action as no individuals or nests have been documented within the Action Area during previous surveys. The nearest known nests are greater than one mile from the Action Area. NRF habitat within the Action Area is not expected to be utilitized due to the proximity of noise disturbance from US 12 and the existing ski area operations. However, the Proposed Action would remove approximately 13.7 acres of NRF habitat and 29.7 acres of dispersal habitat within the Action Area.

Therefore the Proposed Action **May Affect, and is Likely to Adversely Affect** northern spotted owl through the loss of approximately 13.7 acres of NRF habitat for construction of the parking lot, ticket booth and ski trails. Implementation of the Conservation Measures listed in Table 6 would reduce impacts to owls in the vicinity of construction activities. The seasonal restriction on helicopter use during the critical breeding season would reduce impacts to nesting owls potentially occurring within adjacent NRF habitat.

Northern Spotted Owl Critical Habitat

The Proposed Action would have **No Effect** on northern spotted owl critical habitat as no project activities would occur within CHU WA-18.

8.2 Canada Lynx

The Proposed Action would have **No Effect** on Canada lynx. No lynx have been documented within the Action Area. The Action Area is not located within a LAU. Occurrence of lynx within the Action Area is expected to be limited to rare pass-through events. As previously described, the Action Area is not considered lynx habitat due to lack of suitable denning or foraging habitat which is due to the lack of plant associations identified as suitable lynx habitat

as defined by the USFS (Forbes, pers. comm., 2004). According to the Canada Lynx Recovery Outline (USFWS 2005),the Action Area is located within peripheral habitat which has been classified as "unoccupied" by the amended Lynx Conservation Agreement (USFS and USFWS 2006).

8.3 Grizzly Bear

The Proposed Action would have **No Effect** on grizzly bear as no bears have been documented within the Action Area. The North Cascades Recovery Zone is located approximately 35 miles to the north of the Action Area. Grizzly bear are considered habitat generalists and the removal of habitat (clearing) within the Action Area is not expected to affect bears.

8.4 Gray Wolf

The Proposed Action is not expected to impact individuals or populations of gray wolf as no sightings of wolves have been documented within the Action Area. Since wolves are habitat generalists, the removal of habitat through project activities (clearing) is not expected to impact wolf habitat within the Action Area. Potential impacts to wolf prey, ungulate populations, include an avoidance of the Action Area during summer construction activities. This could impact wolf foraging opportunities during the summer. Ungulates are known to avoid the Action Area during the winter as it does not contain suitable wintering grounds due to the high elevation and snowpack. Therefore, the Proposed Action **May Affect, but is Not Likely to Adversely Affect** gray wolf. The proximity of US 12 and year-round human disturbance at the existing ski area would likely lead to an avoidance of the area by gray wolf.

8.5 Bald Eagle

The Proposed Action would have **No Effect** on bald eagle as project activities are located approximately six miles from known nest sites. No bald eagle wintering has been documented within the Action Area. Potential occurrences of bald eagle are limited to foraging on Leech Lake. Due to the proximity of US 12 and the existing ski area operations, any eagles foraging in this area would be habituated to human activity and noise levels from vehicle traffic. Therefore no impacts to foraging bald eagles are expected.

8.6 Marbled Murrelet

The Proposed Action would have **No Effect** on marbled murrelet as the action occurs outside the range of suitable habitat. There has been no documented occurrence of marbled murrelet within the Action Area.

9.0 SUMMARY AND CONCLUSION

The White Pass Expansion Proposal May Affect and is Likely to Adversely Affect northern spotted owl resulting from a loss of NRF habitat. The project May Affect, but is Not Likely to Adversely Affect gray wolf. The proposed project would have No Effect on Canada lynx, grizzly bear, bald eagle, or marbled murrelet.

10.0 REFERENCES

Almack, J. 1986. North Cascade grizzly bear project; Annual Report. Washington Dept. Of Game, Olympia. 71 p.

Almack, J.A., W.L. Gaines, R.H. Naney, P.H. Morrison, J.R. Eby, G.F. Wooten, M.C. Snyder, S.H. Fitkin and E. R. Garcia. 1993. North Cascades Grizzly Bear Ecosystem Evaluation; Final Report. Interagency Grizzly Bear Committee, Denver, Colorado. 156 pp.

Anthony, R.G. et al. Forsman, Franklin, Anderson, Burnham, White, Schwarz, Nichols, Hines, Olson, Ackers, Andrews, Biswell, Carlson, Diller, Dugger, Fehring, Fleming, Gerhardt, Gremel, Gutiérrez, Happe, Herter, Higley, Horn, Irwin, Loschl, Reid, Sovern. Draft 2004. Status and Trends in Demography of Northern Spotted Owls. A Draft Report to: Interagency Regional Monitoring Program, Portland, OR. April 30, 2004. 180 pp.

Aubry, K.B., G.M. Koehler and J.R. Squires. 1999. Ecology of Canada lynx in southern boreal forests, pp 373-396, Chapter 13, in L.F. Ruggiero, K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey and J.R. Squires (eds.). Ecology and Conservation of Lynx in the United States. University Press of Colorado and the USDA Rocky Mountain Research Station. Website: http://www.fs.fed.us/rm/pubs/rmrs_gtr30.html

Carbyn, L. N. 1974. Wolf Predation and Behavioral Interactions With Elk and Other Ungulates in an Area of High Prey Diversity. Ph.D thesis, Univ. Toronto, 1974 (233pp).

Carter, H. R., and R. A. Erickson. 1988. Population status and conservation problems of the marbled murrelet in California, 1892-1987. (Final Report, Contract F67569.) California Department of Fish and Game. Sacramento, CA.

Chapman, R.C. 1979. Human disturbance at wolf dens--a management problem. Pages 323-328 in Proceedings of the 1st Conference Scientific Research in the National Parks. Edited by R.M. Linn. U.S. National Park Service., Proceedings Series Number 5., Volume 1.

Courtney, S P., Blakesley, J A., Bigley, R E., Cody, M L., Dumbacher, J P., Fleischer, R C., Franklin, A B., Franklin, J F., Gutiérrez, R J., Marzluff, J M., Sztukowski, L. 2004. Scientific Evaluation of the Status of the Northern Spotted Owl. Sustainable Ecosystems Institute. Portland, Oregon.

Csuti et. al. 2001. Atlas of Oregon Wildlife: distribution, habitat, and natural history. 2nd edition. Oregon State University Press. 2nd Edition. Corvallis, OR.

Detrich, P. J. 1985. The status and distribution of bald eagle in California. M.S. thesis. California State University, Chico. Chico, CA.

de Vos, A. 1964. Food utilization of snowshoe hares on Manitoulin Island, Ontario. J. For. 62:238-244.

Federal Register. 1990. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Northern Spotted Owl. Final Rule. U.S. Fish and Wildlife Service. June 26. 55:26114-26194

Federal Register. 1992. Determination of Critical Habitat for the Northern Spotted Owl. 57: 1796.

Federal Register. 1992. 57: 1798.

Federal Register. 1996. Final Designation of Critical Habitat for the Marbled Murrelet. Final Rule. 61 (102): 26256-26320.

Federal Register. 1999. U.S. Fish and Wildlife Service; Endangered and Threatened Wildlife and Plants, Proposed Rule to Remove the Bald Eagle in the Lower 48 States from the List of Endangered and Threatened Wildlife. Proposed Rule. 64: 36454-36464.

Federal Register. 1999. U.S. Fish and Wildlife Service, Department of the Interior; Endangered and Threatened Wildlife and Plants, Proposed Rule to Remove the Bald Eagle in the Lower 48 States from the List of Endangered and Threatened Wildlife. 64: 36453-36464,

Forbes, Peter R. 2004. Personal Communication. Phone calls and emails to USFS wildlife biologist.

Forsman, E.D. M. Amos, C. Borgman, H. Jensen, D. Kelso, K. Laubenmeir, L. Page, A.Rex, and M. Wagner. 2003. Demographic characteristics of northern spotted owls (*Strix occidentalis*) on the Olympic Peninsula Study Area, Washington, 1987-2002. Wildlife Habitat Relationships in Washington and Oregon FY2002, Oregon State University, Corvallis, OR.

Fritts, S.H. and L.N Carbyn. 1995. Population viability: nature reserves and the outlook for gray wolf conservation in North America. Restoration Ecology 3: 26-38.

Fritts, S. H., and L. D. Mech. 1981. Dynamics, movements, and feeding ecology of a newly-protected wolf population in northwestern Minnesota. Wildlife Monographs 80:1-79.

Fuller, T.K. 1989. Impact of Wolves on White-Tailed Deer in North-central Minnesota. Wildlife Monographs, 105, 1989.

Fuller, T.K. 1992. Population dynamics of wolves in northcentral Minnesota. Wildl. Monogr. 105: 41 pp.

Grange, W.B. 1932. Observations on the snowshoe hare, *Lepus americanus phaeonotus*, Allen. J. Mammal. 13:1-19.

Grenier, J. J, and K. S. Nelson. 1995. Marbled murrelet habitat associations in Oregon. In C. J. Ralph, G. L. Hunt, Jr., M. G. Raphael, and J. F. Piatt (eds.), Ecology and conservation of the marbled murrelet. (General Technical Report PSW-GTR-152.) U.S. Forest Service, Pacific Southwest Research Station. Albany, CA.

Gutierrez, R.J., A.B. Franklin and W.S. Lahaye. 1995. Spotted Owl. No. 179 in The Birds of North America (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologist's Union, Washington, D.C.

Haber, G. C. 1977. Socio-ecological dynamics of wolves and prey in a sub-arctic ecosystem. Ph.D. thesis, University of British Columbia. Vancouver.

Hamer, T. E. 1995. Inland habitat associations of marbled murrelets in western Washington. In C. J. Ralph, G. L. Hunt, Jr., M. G. Raphael, and J. F. Piatt (eds.),

Hamer, T. and E. Cummins. 1991. Relationship between forest characteristics and use of inland sites by marbled murrelets in northwestern Washington. Washington Department of Wildlife, Wildlife Management Division, Nongame Program. Olympia, WA.

Hamer, T. E., and S. K. Nelson. 1995. Characteristics of marbled murrelet nest trees and nesting stands. In C. J. Ralph, G. L. Hunt, Jr., M. G. Raphael, and J. F. Piatt (eds.), Ecology and conservation of the marbled murrelet. (General Technical Report PSW-GTR-152.) U.S. Forest Service, Pacific Southwest Research Station. Albany, CA.

Harmer, T. and E. Cummins. 1991. Relationship Between Forest Characteristics and Use of Inland Sites by Marbled Murrelets in Northwestern Washington. Washington Department of Wildlife. Wildlife Management Division, Nongame Program.

Jensen, W.F. et al. 1986. Wolf, *Canis lupus*, Distribution on the Ontario-Michigan Border Near Sault Ste. Marie. Canadian Field-Naturalist, 100/3: 363-366.

Johnsgard, P.A. 1990. Hawks, eagles, and falcons of North America. Smithsonian Institution Press. Washington, D.C.

Koehler, G.M. 1989. Population and habitat characteristics of lynx and snowshoe hares in north central Washington. Canadian Journal of Zoology 68:845-851.

Koehler, G. M. 1990. Population and habitat characteristics of lynx and snowshoe hares in north central Washington. Can J. Zool. 68:845-851.

Koehler and K. B. Aubry. 1994. Lynx. Pages 74-98 in Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, L. Jack Lyon, and W. J. Zielinski, eds. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. Gen. Tech. Rep. RM-254. Fort Collins, CO: U. S. Dept. Agric., Rocky Mountain For. and Range Exp. Sta. 183 pp.

Koehler, G. M. and J.D. Brittell. 1990. Managing spruce-fir habitat for lynx and snowshoe hares. J. For. 88:10-14.

Lariviere, S., H. Jolicoeur, and M. Crete. 2000. Status and conservation of the gray wolf Canis lupus in wildlife reserves of Quebec. Biological Conservation: 94:143-151.

Litvaitis, J. A., J. A. Sherburne, and J. A. Bissonette. 1985. Influence of understory characteristics on snowshoe hare habitat use and density. J. Wildl. Manag. 49:866-873.

McKelvey, K.S., J.J. Claar, G.W. McDaniel, G. Hanvey. 1999. National Lynx Detection Protocol. USDA Forest Service, Rocky Mountain Research Station, Missoula, MT. (unpubl. report) 11 pp.

Mech, L.D. 1977. Productivity, mortality and population trend of wolves in northeastern Minnesota. Journal of Mammalogy 58, 559-574.

Mech, L. D. 1989. Wolf population survival in an area of high road density. Am. Midl. Nat. 121:387-389.

Mel Borgersen & Associates. 1979. A Master Plan Program for White Pass, Washington

Messier, F. Physical Condition and Blood Physiology of Wolves in Relation to Moose Density. Canadian Journal of Zoology, 65, 1987, 91-95.

McAllister, K. (USDA Forest Service), R. Morgenweck, C. Jahoula. In litt. Lynx Habitat Mapping Direction Memo. August 22, 2000.

Miller, S. L., and C. J. Ralph. 1995. Relationship of marbled murrelets with habitat characteristics at inland sites in California. In C. J. Ralph, G. L. Hunt, Jr., M. G. Raphael, and J. F. Piatt (eds.), Ecology and conservation of the marbled murrelet. (General Technical Report PSW-GTR-152.) U.S. Forest Service, Pacific Southwest Research Station. Albany, CA.

Mladenoff, D.J., T.A. Sickley, R.G. Haight, and A.P. Wydeven, 1995. A landscape analysis and prediction of favorable gray wolf habitat in the northern Great Lakes region. Conservation Biology 9:279-294.

Mladenoff, D.J. et al. 1999. Predicting Gray Wolf Landscape Recolonization: Logistic Regression Models vs. New Field Data. Ecological Applications, 91/1, 37-44.

Monthey, R. W. 1986. Response of snowshoe hares, *Lepus americanus*, to timber harvesting in northern Maine. Can. Field-Nat. 100-568-570.

National Forest Management Act of 1976. 16 USC 1600.

Nelson, S. K. 1989. Development of inventory techniques for surveying marbled murrelets (*Brachyramphus marmoratus*) in the central Oregon coast range. (Publ. No. 88-6-01.) Oregon Department of Fish and Wildlife, Nongame Program, Portland, OR.

Pacific Northwest Ski Areas Association. 2006a. Annual Visitation

Paton, P. W. C., and C. J. Ralph. 1988. Geographic distribution of the marbled murrelet in California at inland sites during the 1988 breeding season. (Contract No. FG7569.) California Department of Fish and Game. Sacramento, CA.

Pearson, Robert R. 2002. Survey Results for Northern Spotted Owl within the White Pass Study Area. Letter to Peter R. Forbes.

Pease, J.L., R.H. Vowles, and L.B. Keith. 1979. Interaction of snowshoe hares and woody vegetation. J. Wildl. Manag. 43:43-60.

Peterson, R. O. 1977. Wolf ecology and prey relationships on Isle Royale. U.S. National Park Service Scientific Monograph Series 11. Washington, D. C. 210 pages.

Pietz, P.J. and J.R. Tester. 1983. Habitat selection by snowshore hares in north central Minnesota. J. Wildl. Manag. 47:686-696.

Ralph, C. J., P. W. C. Patton, and C. A. Taylor. 1991. Habitat association patterns of breeding birds and small mammals in Douglas-fir/hardwood stands in northwestern California and southwestern Oregon. Pages 379-393 in L. F. Ruggerio, K. B. Aubry, A. B. Carey, and M. H. Huff (tech. coords.), Wildlife and vegetation of unmanaged Douglas-fir forests. (General Technical Report PNW-GTR-285.) U.S. Forest Service, Pacific Northwest Research Station. Portland, OR.

Raphael, M. G., J. A. Young, and B.M. Galleher. 1995. A landscape-level analysis of marbled murrelet habitat in western Washington. Pages 177-189 in C.J. Ralph, G.L. Hunt, Jr., M.G. Raphael, and J.F. Piatt (eds.), Ecology and conservation of the marbled murrelet. (General Technical Report PSW-GTR-152.) Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture. Albany, CA.Rodrick, E. and R. Milner. eds. 1991. Management recommendations for Washington's priority habitats and species. Wash. Dept. of Wildlife, Olympia.

Rodrick, E. and R. Milner. 1991. Management recommendations for Washington priority habitats and species. Washington Department of Wildlife. Olympia, WA.

Ruediger, B., J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger and A. Williamson. 2000. Canada lynx conservation assessment and strategy. Forest Service Publication #R1-00-53. Missoula, Montana.

Sealy, S. G., and H. R. Carter. 1984. At sea distribution and nesting habitat of the marbled murrelet in British Columbia: problems in the conservation of a solitarily nesting seabird. Pages 737-756 in J. P. Croxall, P. G. Evans, and R. W. Schreiber (eds.), Status and conservation of the world's seabirds. (ICBP Technical Seabirds Publication 2.)

Smith, M. R., P. W. Mattocks, Jr., and K. M. Cassidy. 1997. Breeding birds of Washington state. Volume 4 in K. M. Cassidy, C. E. Grue, M. R. Smith, and K. M. Dvornich (eds.)

Washington State Gap Analysis - Final Report. Seattle Audubon Society Publications in Zoology No. 1, Seattle, WA.

Strachan, G., M. McAllister, and C. J. Ralph.1995. Marbled Murrelet at-sea and foraging behavior. Pp. 247–254 *in* Ecology and conservation of the Marbled Murrelet. Gen. Tech. Rep. PSW- 152 (C. J. Ralph, G. L. Hunt, Jr., M. G. Raphael, and J. F. Piatt, Eds.). Pacific Southwest Research Station, USDA Forest Service, Albany, California.

Strong, C. S., J. Jacobsen, D. M. Fix, M. R. Fisher, R. Levalley, C. Striplen, W. R. McIver, and I. Gaffney. 1996. Distribution, abundance, and reproductive performance of marbled murrelets along the northern California coast during the summers of 1994 and 1995. Final report. Crescent Coastal Research and Mad River Biologists. McKinleyville, CA. Prepared for the Marbled Murrelet Study Trust.

Thiel, R.P. 1985. Relationship between road densities and wolf habitat suitability in Wisconsin. Am. Midl. Nat. 113: 404-407.

Thomas, J.W., E.D. Forsman, J.B. Lint, E.C. Meslow, B.R. Noon, and J. Verner. 1990. A conservation strategy for the northern spotted owl. A report by the Interagency Scientific Committee to address the conservation of the northern spotted owl. USDA, Forest Service, and U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Land Management, and National Park Service. Portland, OR.

U.S. Department of Agriculture. 1990a. Land and Resource Management Plan, Gifford Pinchot National Forest, Pacific Northwest Region.

U.S. Department of Agriculture. 1990b. Land and Resource Management Plan, Wenatchee National Forest, Pacific Northwest Region

U.S. Department of Agriculture. 1998a. Upper Tieton Watershed Anaylsis. Naches Ranger District. Wenatchee National Forest.

U.S. Department of Agriculture and U.S. Department of the Interior. 1994. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl. Standards and Guidelines. U.S. Forest Service and U.S. Bureau of Land Management.

U.S. Fish and Wildlife Service. 1986. Pacific states bald eagle recovery plan. Portland, OR.

U.S. Fish and Wildlife Service. 1987. Northern Rocky Mountain Wolf Recovery Plan. Denver, CO.

U.S. Fish and Wildlife Service (USFWS). 1992. Final draft recovery plan for the northern spotted owl.

U.S. Fish and Wildlife Service. 1993. Grizzly Bear Recovery Plan. Missoula, Montana.

U.S. Fish and Wildlife Service. 1997. Recovery Plan for the Threatened Marbled Murrelet (*Brachyramphus marmoratus*) in Washington, Oregon, and California. U.S. Fish and wildlife Service, Region 1, Portland, OR.

U.S. Forest Service. 1998. Environmental Assessment, Crystal Mountain Resort - Green Valley Chairlift Replacement and Snorting Elk Chairlift Installation. Mt. Baker-Snoqualmie National Forest.

U.S. Forest Service. 1998c. I-90 Land Exchange, USDA Forest Service/Plum Creek Timber Company, L.P. Draft Environmental Impact Statement. Wenatchee, Mt. Baker-Snoqualmie, and Gifford Pinchot National Forests.

U.S. Forest Service. 2004. White Pass Draft Environmental Impact Statement. SE Group.

U.S. Forest Service, Mt. Baker-Snoqualmie National Forest. 1992a. The Status of the Lynx on the Mt. Baker-Snoqualmie National Forest. R6-ECOL-TP-028-91. U.S. Department of Agriculture.

USFS, USFWS. 2005. Canada Lynx Conservation Agreement. USFS Agreement #00-MU-11015600-13.

USFS, USFWS. 2006. Amendment to the Canada Lynx Conservation Agreement. USFS Agreement #00-MU-11015600-13.

Voight, D.R., C.B. Kolenosky, and D.H. Pimlott. 1976. Changes in summer foods of wolves in central Ontario. J. Wildl. Mgmt., 40:663-668.

Washington Department of Fish and Wildlife. 1993a. Status of the North American lynx (*Lynx canadensis*) in Washington. Unpublished Report. Olympia, WA.

Washington Department of Fish and Wildlife. 1993b. Status of the marbled murrelet (*Brachyramphus marmoratus*) in Washington. Unpublished Report. Olympia, WA.

Wolfe, J.O. 1978. Food habits of snowshoe hares in interior Alaska. J. Wildl. Manag. 42:148-153.

Wydeven, A.P., R.N. Schultz, and R.P. Thiel, 1995. Gray wolf (canis lupus) population monitoring in Wisconsin, 1979-1991. In L.N. Carbyn, S.H. Fritts, and D.R. Seip, eds. Ecology and conservation of wolves in a changing world. Canadian Circumpolar Institute, University of Alberta, Edmonton, Canada.

Wydeven, A.P., J.E. Wiedenhoeft, and J. E. Ashbrenner. 2002. American marten surveys in northern Wisconsin. Wisconsin Wildlife Surveys.